2022

FAMILY AND CONSUMER SCIENCES EXTENSION AGENTS PERCEPTION OF A SUSTAINABLE EATING CURRICULUM FOR KENTUCKIANS

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Digital Object Identifier: https://doi.org/10.13023/etd.2022.145

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FAMILY AND CONSUMER SCIENCES EXTENSION AGENTS PERCEPTION OF A SUSTAINABLE EATING CURRICULUM FOR KENTUCKIANS

THESIS

A thesis submitted in partial fulfillment of the
requirements for the degree of Master of Science in Nutrition and Food Systems in the
College of Agriculture, Food and Environment at the University of Kentucky

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2022

ABSTRACT OF THESIS

FAMILY AND CONSUMER SCIENCES EXTENSION AGENTS PERCEPTION OF A SUSTAINABLE EATING CURRICULUM FOR KENTUCKIANS

The population is rapidly increasing all over the world. As foods are produced for us to consume, the food system generates negative environmental impacts at each step. The extent of damage generated by food production depends on the amount of land, water, and energy depleted. These environmental impacts can result in reduced quantities of food produced, damages to the land and water used to grow/produce food, pollution of food, and food waste. All of which impact the amount of product produced. Thereby, shifting food-related behaviors of consumers toward sustainable eating may be a way to promote the health of people and the environment. A sustainable diet is defined as a diet with low environmental impacts, is accessible, culturally appropriate, and nutritionally adequate. These diets may curb negative environmental impacts that are seen in our current food system. Increasing understanding of sustainable eating may improve acceptance among individuals. Once knowledge and acceptance are acquired, food choices are dependent on the consumer's willingness to make behavior changes. Development of a Family and Consumer Sciences (FCS) Extension curriculum is a mechanism to bring information about sustainable eating to Kentuckians. Currently, an Extension curriculum is not available to educate adults about this topic.

KEYWORDS: Environment, sustainable eating, Family and Consumer Sciences Extension curriculum

Lindley Barker

04/22/2022

Date

FAMILY AND CONSUMER SCIENCES EXTENSION AGENTS PERCEPTION OF A SUSTAINABLE EATING CURRICULUM FOR KENTUCKIANS

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ACKNOWLEDGMENTS

First, I would like to thank Dr. Dawn Brewer, my thesis chair. Dr. Brewer has been a constant support through both my undergraduate and graduate studies. Without her guidance, encouragement, and knowledge this thesis would not have been possible.

I would like to thank my committee members, Dr. Heather Norman-Burgdolf and Dr. Tammy Stephenson for their collaboration and assistance on this project. I would also like to thank my professors, fellow students, and advisors in the Department of Dietetics and Human Nutrition.

Lastly, I want to thank my parents for their infinite support and love. Without the support of my family and friends, I would not have been able to accomplish all that I have.

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CHAPTER 1. INTRODUCTION

1.1 Background

The human population is increasing rapidly, not only in America, but all over the world. As of 2021, the world's population was about 7.9 billion (Country Meters, 2021). By 2050, the population is expected to reach 10 billion people (United Nations, 2017). The current food system is working towards producing more food with an ever-growing population. This presents the problem of how to feed everyone nutritious food, while experiencing constraints on resources, such as water and land. All of this presents a risk to the health and well-being of the population and the environment (Hoek et al., 2017).

As foods are produced for us to consume, the food system negatively impacts the environment at each step (production, processing and packaging, distribution and retail selling to consumption of food by shoppers). Negative environmental impacts include greenhouse gas emissions, particulate matter, and food waste (Friel et al., 2014). Production of food is responsible for 30% of greenhouse gas emissions and about 70% of all human water use (Hoek et al., 2017). Ultimately, harming the environment can impact the nutritional quality of food, food yields and food safety. The extent of damage generated by food production depends on the amount of land, water, and energy depleted, which is influenced by the processes used during production, the region, and season in which the product was produced (Friel et al., 2014).

Kentucky is an agricultural state, both in animal and plant production. As of 2020, according to the USDA, there were 983,000 beef cattle, 299,000,000 chickens, 2,090,000 calves, 460,000 hogs, 101,200,000 bushels of soybeans, 21,420,000 bushels of wheat, and 250,240,000 of corn for grain produced. One out of every two acres of land in

Kentucky (25,860,200 acres) is used for agricultural production (Farmland Information Center). Many families in Kentucky depend on some facet of agriculture as their source of income and livelihood. Although food production practices can have negative environmental impacts, this may not be considered as some Kentuckians are dependent on the production of food for income and sustenance. Therefore, sustainability is a topic that may not be considered, in either farming practices or food choices.

Table 1: Sustainable Dietary Examples

Sustainable Dietary Practices (Academy of Nutrition and Dietetics, 2019)	Explanation
Grow Food	Tomatoes grown on a patio or a window herb garden
Shop Local	Keeps money in the community and a lower number of resources are needed to transport items
Talk to Farmers	Learn about the practices used by farmers in the community; choose items from farmers who are preserving the environment through sustainable farming practices
Eat Seasonally	Consume foods that are in season
Be Mindful of Beverages	Instead of purchasing beverages in plastic bottles, use re-usable bottles and fill with filtered water

A sustainable diet is a diet that has low environmental impacts, is accessible, nutritionally adequate, and culturally appropriate; diets such as these optimize natural and human resources (Friel et al., 2014). Sustainable eating patterns are associated with decreased chronic disease risk and reduced environmental damage (Macdiarmid et al., 2016). A switch to a diet that is both sustainable for the environment and advantageous to health is needed among Kentuckians. In Kentucky, overweight and obesity are prominent issues. In 2018, 36.6% of adults were obese. Kentucky is ranked 5th in the nation for adult obesity and 68.5% of adults are either obese or overweight (Kentucky Health News,

2019). Health concerns are associated with overweight and obesity, such as type 2 diabetes, cardiovascular disease, hypertension, sleep apnea, high cholesterol, dyslipidemia, stroke, mental health disorders, and death (CDC, 2021).

Regardless of the known health benefits, only 12.2% of adults nationwide meet daily recommendations for fruit intake and 9.3% meet recommendations for vegetable intake (CDC, 2018). Consumption of fruits and vegetables is even lower among Kentuckians as only 6.3% of adults meet daily vegetable intake and only 8% meet daily recommendations for fruit intake (CDC, 2018).

Regarding sustainable eating, commons strategies suggested to achieve this include reducing meat consumption, reading quality labels (i.e. organic), eating a healthy and balanced diet, purchasing local foods, consuming low-fat foods, eating seasonal foods, avoiding food waste, considering animal welfare (Zakowska-Biemans et al., 2019), reducing consumption of processed and packaged foods, consuming more plant-based foods, and avoiding overconsumption of foods (Van Loo et al., 2017). The current study focuses on four of these strategies which are associated with food-related behaviors. The four strategies include avoiding overconsumption of food, consuming more plant-derived foods, reducing food waste, and reducing consumption of highly processed and packaged foods (Van Loo et al., 2017).

1.2 Statement of the Problem

There is a lack of understanding among individuals as to how food choices and food-related behaviors impacts the environment and our health. Kentuckians generally do not follow a sustainable diet, potentially because of lack of knowledge and/or interest.

Research has been conducted on the benefits of consuming a sustainable diet (Culliford & Bradbury, 2020; Friel et al., 2014; Hoek et al., 2017; Macdiarmid et al., 2016), but currently a curriculum does not exist to educate adults, particularly Kentuckians. A curriculum based on the benefits to health and the environment that are associated with sustainable eating, as well as practical tips that can be implemented in everyday life to make sustainable food choices is needed. This gap suggests that there is a need to develop a Family and Consumer Sciences (FCS) Cooperative Extension curriculum to educate citizens across Kentucky on the topic of sustainable eating. Gathering the perspectives of Kentucky FCS agents will aid in the development of a locally accepted curriculum that can be utilized in FCS Cooperative Extension programs to reach community members. Cooperative Extension provides land-grant universities a mechanism to extend their programs and resources to local communities. This allows for evidence-based research to be brought directly to people in both rural and urban areas (USDA). By collecting information from FCS Extension agents across Kentucky through semi-structured interviews and anonymous Qualtrics surveys, quantitative and qualitative data was gathered and used to create education lessons focused on sustainable eating strategies appropriate for adults in Kentucky.

1.3 Research Questions

1. How does the agents' attitude towards the concept of sustainable eating change following their involvement with developing a sustainable eating FCS Extension curriculum?

2. What content is perceived as appropriate to include in the sustainable eating Kentucky FCS Extension curriculum?

1.4 Hypotheses

1. Following their involvement in reviewing the sustainable eating FCS Extension curriculum, FCS agents will have an increase in their self-reported sustainable eating involvement and a reduction in their perception of barriers to sustainable eating.

2. Each sustainable eating lesson outline will require adjustments respective and important to the values Kentuckians hold, while maintaining the principles of sustainable eating.

1.5 Purpose of this Study

The purpose of this study was to collect formative data from Kentucky FCS Cooperative Extension agents regarding their perception on sustainable eating and gather their opinions on the appropriateness of content included in five lesson plan outlines developed by researchers with expertise in nutrition and FCS Extension. The opinions gathered from the agents were used to develop a sustainable eating FCS Extension curriculum. Utilizing FCS agents' community expertise and experiences, lessons can be developed that are appropriate and acceptable to adults in Kentucky that will ultimately aide in creating an effective curriculum to increase sustainable eating knowledge and promote behavior change.

1.6 Significance

Sustainability is a controversial topic, therefore it is critical to make evidence-based information on the topic available to everyone. Creating an effective program will provide education to community members and may result in adherence to a more

sustainable diet, improving health of both humans and the environment. A program such as this does not exist elsewhere, thus development of one is crucial.

CHAPTER 2. REVIEW OF THE LITERATURE

Sustainable eating patterns are associated with decreased chronic disease risk and reduced environmental damage, hence these diets promote environmental sustainability (Macdiarmid et al., 2016). Shifts in diet patterns can potentially provide benefits for health and the environment (Aleksandrowicz et al., 2016). A sustainable diet is defined as a diet that is respectful and protective of biodiversity, affordable, accessible, healthy, nutritionally adequate, and culturally acceptable; these diets also optimize natural and human resources (Friel et al., 2014). These diets have low environmental impacts which contribute to food security for people, now and for future generations (Friel et al., 2014). Sustainable diets can have positive impacts on climate change, agriculture, water, and health (Aleksandrowicz et al., 2016).

Currently, there is no shift being made to consume a diet that is sustainable in order to provide nutritious food for a growing population. With our current food system trying to feed an expanding population with constraints on the environment, such as land and water, providing FCS agents with appropriate Cooperative Extension curricula is a necessary first step to encourage changes in dietary habits among agents and their clientele to help improve health while also decreasing negative environmental impacts.

2.1 Food Production and Impact on the Environment

From production to the consumption of food, negative environmental impacts are generated. Examples of environmental impacts generated from food production to consumption include greenhouse gas emissions, land use, water depletion, water eutrophication, generation of particulate matter, and food packaging (EPA, 2020a, 2018, 2020b; Downs & Fanzo, 2015; USGS; Bodamer, 2016).

Land use is how humans make use of land, which can negatively or positively affect wildlife as well as potentially impose health risks to both livestock and humans (EPA, 2018). Water eutrophication is caused by an overabundance of nutrients in water. This overabundance can lead to dirty water, clogged water intake pipes, and decreased recreational value. Particulate matter is the term for the mixture of solid particles and liquid droplets that are found in the air. These droplets are very small and can be inhaled, leading to serious health problems, such as cardiovascular disease (CVD) and asthma (Nasser et al., 2015; Xu et al., 2020). Lastly, food packaging is usually designed for single-use and is intended to be thrown away or recycled, however substantial amounts of plastic are found in water ways affecting humans and aquatic life (Bodamer, 2016). While these environmental impacts are steadily occurring, many people are unaware that their everyday food choices may contribute to the problem. Therefore, to sustain life, we need to be mindful of our food choices to benefit health and protect the environment so food can continue to be produced by farmers and consumed by individuals.

Raising awareness at the individual level about how food choices not only impact human health, but the health of the environment is the first step towards gaining support for more impactful actions such as policy, systems, and environmental changes to promote sustainable eating.

2.2 Awareness of Healthy and Sustainable Diets

Sustainable eating patterns are associated with decreased chronic disease risk and reduced environmental damage, hence these diets promote environmental sustainability (Macdiarmid et al., 2016). Shifts in diet patterns can potentially provide benefits for health and the environment (Aleksandrowicz et al., 2016). A sustainable diet is defined as

a diet that is respectful and protective of biodiversity, affordable, accessible, healthy, nutritionally adequate, and culturally acceptable; these diets also optimize natural and human resources (Friel et al., 2014). These diets have low environmental impacts which contribute to food security for people, now and for future generations (Friel et al., 2014). Sustainable diets can have positive impacts on climate change, agriculture, water, and health (Aleksandrowicz et al., 2016).

Current diets, such as a Western diet, are typically high in processed foods containing added sugar, saturated fats, and sodium; they also contain fewer servings of vegetables and fruits than is recommended. Western diets can contribute to an increase in risk for chronic disease and put more pressures on the environment to produce processed foods and certain animal-based foods. Individuals who see sustainability as important tend to not consume Western diets, whereas those who are ambivalent or are unaware of these environmental issues are more likely to consume a Western type of diet (Allès et al., 2017). Therefore, it is important to raise awareness among consumers about how personal food choices affect environmental sustainability along with their health.

A cross-sectional study conducted by Culliford and Bradbury (2020) developed a questionnaire to measure the public's perception on sustainable diet behaviors based on measures of sustainable diet behaviors that have been applied to previous studies. Participants perceived benefit of nine sustainable diet behaviors (buy local grown produce, limit red and processed meat, prioritize plant-based proteins, avoid excess packaging, choose sustainable fish, choose organic, reduce food waste, consume seasonal vegetables and fruits, reduce consumption of air freighted foods) was measured using a 5-point scale, from 'very small benefit' to 'very large benefit' (Culliford & Bradbury,

2020). Interestingly, for 7 of the 9 sustainable diet recommendations listed above, at least half of the participants perceived a high environmental impact. For the majority of the sustainable diet recommendations mentioned in this study, about 50% of the participants reported being in the action or maintenance stage of change (Culliford & Bradbury, 2020). This study indicated that increases in knowledge and perceived environmental impact of sustainable dietary behavior can lead to a higher-level stage of change (action or maintenance) among participants.

A study by Hoek et al., (2017) found that study participants were willing to make food-related behavior changes to benefit the environment once they were made aware, however, participants were hesitant to reduce their meat consumption as participants had strong beliefs that meat and animal products are needed in a healthy, balanced diet. In their study, Hoek et al. administered an online survey aimed to identify participants perception of health and environmental concerns and their relation to food; and to identify participants perception/attitude on food-related behaviors. These included reducing consumption of discretionary food, reducing food waste, reducing overconsumption, and consuming more plant-based foods and less animal-based foods (Hoek et al., 2017) . Three different rating scales were used to measure participants perception of behavior: easiness to perform the said behavior, beneficial impact on the environment (1 to 10), and beneficial impact to health for the food related behaviors mentioned. Overall, health rather than environmental impact seemed to be the primary driver behind food choices that were both environmentally sustainable and healthy (Hoek et al., 2017).

Another study that also assessed perception of sustainable eating was conducted by Van Loo (2017). Researchers evaluated participants' understanding of sustainability and how sustainability was related to food. Participants were asked about their perception of healthy, sustainable eating and their involvement with this topic. Participants were also asked about their feelings towards consuming a plant-based diet. In this study a plant-based diet was defined as eating meals made up of one-third or less animal foods and two-thirds or more plant-based foods (Van Loo et al., 2017). Participants associated healthy and sustainable diets with plant-based diets. Similar to other studies, Van Loo (2017) found that participants were more concerned about health than sustainability. A more plant-based diet was perceived and followed by those who saw a high importance in eating a sustainable diet (Van Loo et al., 2017).

Lastly, a study conducted by Zakowska-Biemans et al., (2019) conducted in-depth interviews to obtain insight on the participants perception, knowledge, and attitudes of sustainable eating. Participants were asked to explain how they thought sustainable and healthy eating went together. The participants were then introduced to concepts of sustainable and healthy eating (e.g., reduced consumption of processed food, plant-based food consumption, food waste, etc.). It was shown that to get participants involved and participating in healthy and sustainable eating, it was essential to communicate what healthy and sustainable eating is, and ways it could be incorporated into everyday life. Increased knowledge led to a better understanding and more motivation from participants to incorporate changes into their diet and life (Zakowska-Biemans et al., 2019). Once knowledge is acquired, the adaptation of making healthy and sustainable food choices is

dependent on the consumer's ability and willingness to make behavior changes (Van Loo et al., 2017)

2.3 Examples of Healthy and Sustainable Food-Related Behaviors

2.3.1 Avoiding Overconsumption of Food

Any food that is consumed above energy needs represents avoidable greenhouse gas emissions, pressure on biodiversity, and utilization of natural resources (Friel et al., 2014). Consumption of high calorie diets compared to low calorie diets has greater emissions of greenhouse gases (Friel et al., 2014). Constant consumption of food above recommended calorie needs by a growing number of people presents not only health risks but threatens natural resources and the environment through the detrimental environmental outputs associated with food production. Additionally, the burden of overconsumption is adding to the already high statistic of food waste leading to unsustainable ecological cost to the environment. Awareness about the impact overconsumption has on the environment and natural resources is a public health concern, due to general unawareness of the population (Toti et al., 2019).

Often associated with overconsumption of food is overweight and obesity, which are defined as abnormal or excessive body fat. In 2016, there were 650 million people globally that were considered obese (World Health Organization, 2020). In 2017, the prevalence of obesity was 42.4% in the U.S (Rakhra et al., 2020). Consumption of a Western diet is considered to be a major contributor to increasing rates of obesity in the U.S (Rakhra et al., 2020). Obesity increases the likelihood of developing disease such as cardiovascular disease, diabetes, and some cancers (World Health Organization, 2020). Overweight and obesity are now considered to be a global epidemic (World Health

Organization, 2021). Obesity is impacting multitudes of people and is caused by excess consumption of food above energy needs, leading to more constraints on the environment as more food needs to be produced.

2.3.2 Reducing Consumption of Highly Processed and Packaged Foods

According to the United States Environmental Protection Agency (EPA), almost half of solid waste is made up by food packaging materials. Food packaging utilizes a great deal of resources such as water, chemicals, and energy (Food Print). Phthalates, Per- and Polyfluoroalkyl substances (PFASs),and Bisphenol A (BPA) are common hormone disrupter chemicals used in food packaging (Silent Spring Institute). These chemicals raise not only health concerns, but environmental concerns as when they are disposed of in landfills, the chemicals can enter into the soil and groundwater, leading to potential contamination of drinking water (Silent Spring Institute).

In the study conducted by Hoek et al., (2017) it seemed to be generally accepted by the participants that consumption of highly processed and packaged foods should be reduced or eliminated from the diet by the participants, both for health and environmental concerns (Hoek et al., 2017). These items can lead to waste from food packaging leading to more environmental costs. Most consumers may be unaware that packaged and processed foods are not just bad for health, but that they are also bad for the environment. This is an opportunity to raise awareness on the topic and to encourage, when feasible, for people to consume fewer packaged and highly processed foods.

Access is a major issue when it comes to purchasing food, however. Low-income families typically have less access to healthy foods and more access to processed foods (Evans et al., 2015). These communities are referred to as “food deserts” and they

generally have access to convenience stores rather than supermarkets, as supermarkets require longer traveling times (Evans et al., 2015). Therefore, geographical access and income are barriers to obtaining healthy, less processed food items.

The NOVA scale is used to define the degree of processing of food. The NOVA scale is recognized as a valid tool for nutrition and public health research. It is the most up to date food classification scale for levels of processing (Vandevijvere et al., 2019). The scale includes four categories: unprocessed or minimally processed, processed culinary ingredients, processed foods, and ultra-processed foods (Vandevijvere et al., 2019). Ultra-processed foods are foods made entirely or mostly from foods or food constituents with little intact food, which contain flavors and additives (Vandevijvere et al., 2019). Ultra-processed foods represent more than 50% of the calories consumed in the United States (Martínez Steele et al., 2016).

Table 2: Examples of the levels of processing according to the NOVA scale (Harvard T. H. Chan, 2019).

Classification of Processing	Examples
Unprocessed or minimally processed	Fresh fruit, vegetables, nuts, whole grains
Processed Culinary Ingredients	Pasta and flour made from whole grains; oils made from plants, nuts, and seeds
Processed Foods	Canned fruits and vegetables; some cheeses, canned fish, and freshly made bread

Ultra-Processed Foods	Sugar sweetened beverages, chips, frozen dinners, lunch meat, breakfast cereal, and cookies

Western diets are typically high in ultra-processed foods. Ultra-processed foods are often high in added sugars, calories, and sodium. Diets such as these may contribute to the development of diet-related disease such as cardiovascular disease, diabetes, obesity, and hypertension (Martínez Steele et al., 2016). Overconsumption of highly processed foods, or discretionary foods, lead to the depletion of more environmental resources and adverse health outcomes (Friel et al., 2014). Consumption of processed foods has negligible contributions to nutrient intake, meaning that the environmental costs are not even off set by positive health outcomes, essentially these foods are a waste to produce (Friel et al., 2014).

2.3.3 Consuming More Plant-Based Foods

. Plant-based diets focus on consuming plant-based proteins, fruits, whole grains, and vegetables. The U.S. Dietary Guidelines for Americans 2020-2025 suggests that adults 18-59, consuming a 2,000 calories diet, should intake 2 ½ cups of vegetables and 2 cups of fruit per day; focusing on whole fruits and a variety of vegetables (USDA, 2020). It is suggested that half of your plate should be made up of fruits and vegetables, the other half should consist of ¼ proteins (animal or plant) and ¼ (grains; half of which should be whole grains.) Almost 90% of Americans do not meet the recommended intake of vegetables per day and 80% do not meet the recommended intake of fruit per day

(USDA, 2020). Only 6.3% and 8% of adults in Kentucky meet daily recommended vegetable intake and fruit intake, respectively (CDC, 2018).

A plant-based diet focuses primarily on the consumption of plant-based products. Consumption of a plant-based diet aligns with the recommendations from the U.S. Dietary Guidelines for Americans. Consuming more plant-based protein within diets can provide high-quality protein for the population and potentially reduce adverse environmental effects (Hertzler et al., 2020). Well planned plant-based diets may have more sustainable benefits when compared to Western dietary patterns (Blackstone et al., 2018).

2.3.4 Reducing Food Waste

Food waste is "composed of raw or cooked food materials and includes food loss, before, during or after meal preparation in the household, as well as food discarded in the process of manufacturing, distribution, retail and food service activities" (Abeliotis et al., 2015). Food waste leads to depletion of land, water, and increased greenhouse gas emissions (Munesue et al., 2015). Greenhouse gas emissions from food waste are avoidable emissions since the product was unnecessarily produced because it was later wasted (Abeliotis et al., 2015). The reduction of food waste and these environmental impacts needs to be targeted at the food processing, foodservice, and household levels. Starting at the household level allows everyone to become involved and feel like they are capable of making a difference. Reducing household food waste is considered to have the highest prevention potential (Abeliotis et al., 2015). Reduction at the household level could reduce water waste as well (Read et al., 2020). Methods to reduce food waste

include planning what we want to buy, shopping for what we need, cooking left over food to reduce waste, and preserving and storing foods properly.

2.4 Sustainable and Healthy Eating Education Programs

With current literature suggesting that a first step towards sustainable eating behaviors is to increase awareness among consumers, there is surprisingly very few education programs available focused on sustainable eating. Only three programs, with lesson plans, were identified pertaining to this topic. One, by the California Academy of Science, focuses on sustainable food solutions and environmental problems. It utilizes activities to interact with children to explore global food system issues and learn about potential solutions to improve food system issues. The program examines dietary changes that can be implemented to positively impact the environment, the negative effects of food waste, and food deserts. It was targeted towards youth (California Academy of Science).

Another program by Trans-disciplinary Research Oriented Pedagogy for Improving Climate Studies and Understanding (TROP ICSU) targets high school students and focuses on climate and food security, and agriculture and climate change using a computer-based program. Activities explore the relationship between the topics in which opinions of participants are voiced and what can be done to solve these issues are discussed (TROP ICSU).

Lastly, Purdue University released an extension education program that targets school-aged children and is focused on food waste and its impact on the environment and natural resources. It contains lessons that provide education on how land and water resources are being depleted to produce food. It discusses how food waste impacts water,

climate change, and wildlife, and discusses ways to reduce food waste such as proper storage methods, ugly foods, and best-by dates on food packaging. It also discusses transportation of food and how it impacts the environment (Purdue Agriculture).

2.5 Cooperative Extension Services as a Means to Educate Communities

The Cooperative Extension Service was created to provide land-grant universities and colleges a mechanism to relay their programs and resources to communities. It was founded with the Smith-Lever Act of 1914 (USDA). Extension services are available to adults and children in both rural and urban areas in America. They provide education programs on modern technology, food safety, and nutrition education (USDA). Cooperative Extension Service encourages farmers and community members to face all the challenges they meet; such as improving nutrition, protecting the environment, adjusting to changes in technology, and preparing for emergencies. Agricultural, environmental, and food challenges are growing steadily, making Cooperative Extension more important than ever. It has such a large reach, with an office in or near each of the United States approximate 3,000 counties (USDA). The USDA has a wide array of cooperative extension research programs including families, youth, and communities; food, nutrition, and health; technology and engineering; natural resources and environment; and economics and commerce (USDA). With the focus on nutrition and consumers, a sustainable eating program would fall into the Family and Consumer Sciences programmatic area.

Extension, specifically in Kentucky, has never offered a program focused on sustainable eating. Using the vast network and community connections established by Extension is a logical next step in disseminating a sustainable eating curriculum to raise

awareness about this topic in hopes of promoting positive behavior changes to protect both health and the environment. To accomplish this, a necessary first step is to develop an appropriate FCS curriculum for Kentuckians that considers the importance of agriculture to local economies. To our knowledge, a curriculum does not exist which targets an audience of adults 18+ years that describes what healthy and sustainable eating is and practical food-related strategies that people can implement in their everyday lives that can have a positive impact on health and the environment. Therefore, to begin developing an acceptable Extension curriculum for adult Kentuckians focused on sustainable eating, the community expertise of FCS Extension Agents will be utilized along with assessing if their perception of sustainable eating changes following review of our lesson plan outlines.

CHAPTER 3. METHODOLOGY

3.1 Assessment of Family and Consumer Sciences Extension Agent Interest in a Sustainable Eating Curriculum

During a FCS Extension Agent statewide meeting, 59 agents were given a survey that gauged their interest in a healthy and sustainable eating Extension curriculum. The concept of sustainable eating was explained to agents along with the three pillars of food intake behaviors and one food provisioning behavior that were framed to demonstrate the human health benefits and the benefits to the environment. The food-related behaviors that were presented included 1) reducing overconsumption; 2) reducing consumption of highly processed and packaged foods; 3) promotion of consuming more plant-derived foods and consuming locally raised animals; and 4) reducing the amount of food waste.

Agents then completed a three-question paper-based interest survey that showed 98% were interested in teaching a sustainable eating curriculum to their community; 95% felt that there were members of their community that would participate in such Extension lessons, and 71% were interested in being involved in piloting a sustainable eating curriculum.

The research team, that included an FCS Extension Specialist, utilized the literature to develop an outline of content for each lesson topic that was then vetted by FCS Extension Agents. Lesson topics for the proposed curriculum were identified following a literature review.

3.2 Research Design

3.2.1 FCS Agent Recruitment

All research procedures were approved by the University of Kentucky Institutional Review Board (IRB). Selection criteria included FCS Extension Agents in Kentucky. The FCS Extension agents were contacted by the FCS Extension Specialist through a listserv of FCS Extension agents. There were no age limits. Exclusion criteria included not being an FCS Extension agent in Kentucky.

The content of the recruitment email outlined the expectations of the agents if they agree to participate. Following the initial recruitment email, two more recruitment emails were sent one and two weeks later. The goal was to recruit the same number of agents from the three different Extension-designated regions in Kentucky, the West, Central, and Eastern regions. The Western region is characterized by a flat terrain conducive to farming and commodity production; agriculture is the driving economic industry here. The Eastern region relies on coal and energy production to provide economic stability in addition to agriculture and the Central region includes the most populated counties and is the most demographically diverse.

Agents were asked for 9-12 hours of their time to dedicate to reviewing materials, participating in an interview, providing lesson feedback, and completing a pre- and post-survey. Agents then decided whether or not they were interested in joining the study. If interested, they worked with a research team member to schedule their interview.

3.3 Data Collection

3.3.1 Healthy and Sustainable Eating Questionnaire

After IRB approval from the University of Kentucky, the agents were contacted via email. Those who chose to participate in the study were first asked to complete a Qualtrics questionnaire that asked for the participants name, email address, and which county they were from. Agents were then sent an email link to complete a second Qualtrics survey that served as a pre-questionnaire consisting of six questions that Agents were asked to complete before reviewing the lesson outlines, including demographic questions such as age and ethnicity (American Indian/Alaska Native, Asian, Native Hawaiian or Pacific Islander, Black of African American or White). The first question asked agents to describe what came to mind when they heard the terms "healthy and sustainable eating". Then the first set of questions asked about Sustainable Eating Involvement, these were adapted from a previous research study conducted by Van Loo et al. (2017). A five-point scale was used, 1 meant strongly disagree, 2 disagree, 3 neutral, 4 agree, and 5 strongly agree. Questions such as "sustainable eating is important to me," "I care a lot about sustainable eating," "sustainable eating means a lot to me," and "I am very concerned about the consequences of what I eat in terms of sustainability" were asked. The second set of questions consisted of the Sustainable Eating Barrier Questionnaire that was adapted from Brodie, T. (2020). This questionnaire used a five-point scale as well, 1 meant strongly disagree, 2 disagree, 3 neutral, 4 agree, and 5 strongly agree. Questions such as "I do not know how to eat more sustainably," "sustainable eating is expensive," "my eating patterns do not have an impact on the environment," "meat is necessary for a balanced meal," "sustainable foods are

inconvenient," "I have no way to get sustainable food," "eating meat is an important part of my culture," "I do not want to change my current diet," "I do not have time to prepare sustainable foods," and "sustainable foods taste bad" were asked. Following their zoom interviews, the agents were asked to complete a post-questionnaire consisting of the same questions, excluding demographic questions and the question asking them to describe what came to mind when they heard the terms "healthy and sustainable eating".

3.3.2 Questionnaire to Collect Lesson Outline Feedback

After completing the sustainable eating pre-questionnaire, the participants were emailed instructions for reviewing lesson outlines and a link to the sustainable eating lesson plan outlines. After reviewing the lesson outlines and participation in the Zoom interview, participants completed the post-questionnaire.

As agents reviewed each lesson outline, they were instructed to complete an anonymous Qualtrics questionnaire for each outline that included questions to gather feedback about each lesson plan outline. The questions pertaining to the lesson outlines supplemented the information collected during the semi-structured interviews. The research team felt the feedback would be richer if the agent had more time to think about those particular questions without the pressure of an interviewer waiting for a response. Questions included, "what do you think about the series title," "what engaging activities come to mind that would be feasible to include in this lesson," "do you have any thoughts on a marketable and catchy lesson title," "do you have suggestions for better subtitles anywhere within the lesson," "what do you think of the recipes," and "which topics within this lesson would an agent likely need supplemental information for." Data

collected from this questionnaire was qualitative and was collected for all five lesson plans.

3.3.3 Agent Interviews

Semi-structured interviews were used to determine FCS Extension Agents perception on healthy and sustainable diet-related behaviors, opinions, and critiques on the five lesson plans; and they were also asked how the lesson plans could be more culturally appropriate for their community members. The interviews were conducted via Zoom by researchers at the University of Kentucky between May-July 2021 and lasted no more than 90 minutes. Interviews were conducted by three different researchers at the University of Kentucky. A session script was used to guide the interviews. In these interviews, the five lesson plan outlines were discussed. For each lesson plan, the agents were asked questions such as “are there words used in the lesson that would offend your clientele”, “is there any material that needs to be added”, “is there any material that needs to be removed”, and “are there any other thoughts that you have about this lesson that you would like to share.” These interviews were audio-recorded, and a Zoom transcript was saved on a password protected computer.

The audio-recording and transcript from Zoom was de-identified and the Zoom audio was transcribed using technology provided by Zoom. The graduate research assistant working on the project listened and transcribed the recorded Zoom audio, making corrections to the transcription from Zoom. The recording was transcribed within three days of the interview. A research assistant attended each interview and took notes.

3.4 Statistical Analyses

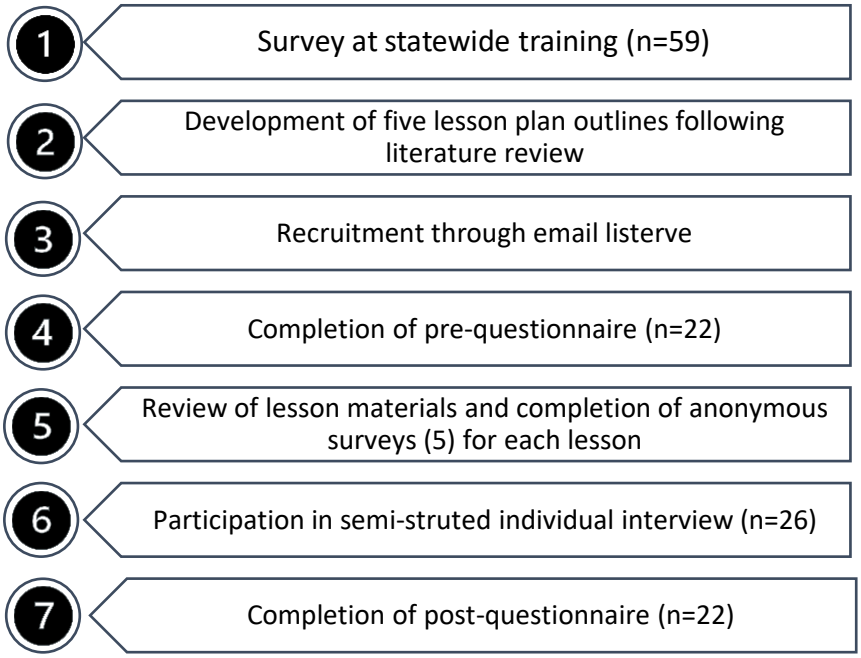
Descriptive statistics were calculated from the pre- and post-questionnaires that were completed by FCS Extension Agents. Mean and standard deviations were calculated for continuous variables and frequencies will be presented for categorical variables. To detect significant difference between variables, the Wilcoxon signed-rank test was used for continuous variables and chi-square tests will be used for categorical variables. A P-value of 0.05 or less was considered statistically significant. All quantitative data was analyzed using SPSS v. 24. Quantitative data was used to determine opinions and involvement in sustainable eating behaviors, observing how opinions changed both before and after participation in the study using pre- and post-surveys.

Qualitative data was collected from Zoom interviews with the Agents and via Qualtrics surveys to obtain opinions on each of the five lesson plans. All interviews were recorded and transcribed verbatim. Initial coding was conducted using stratified coding by interview question. Codes were compared across interview data by question to highlight commonalities and differences. All codes were refined and organized into main themes (interview questions) and sub-themes (feedback). Data analysis was conducted in Microsoft Excel and Microsoft Word. Two graduate research assistants analyzed the transcripts.

CHAPTER 4. RESULTS

A total of 26 FCS Cooperative Extension agents participated in the individual semi-structured Zoom interviews. There were 11 agents from the Western region, 8 from the Central region, and 7 from the Eastern region. There were 22 participants that completed both the Qualtrics pre- and post-questionnaires, which took place before and after the Zoom interview, respectively.

Figure 1: Study Design



4.1 Demographics

Demographic data was gathered from the 22 FCS agent participants that completed both the pre- and post-questionnaires. Among the 22 participants that completed the post-survey, the mean age was 45.7 $\pm$14.6 years old. Of the sample, 95.5% of the participants reported being White (Caucasian) and 4.5% reported being Black or African American.

Table 3 contains the results of the change in perception regarding Sustainable Eating Involvement (SEI) measured on a scale of 1 -5 with 5 being strongly agree. The average score of the Sustainable Eating Involvement (SEI) questionnaire before the FCS Extension Agents reviewed the materials increased non-significantly from 3.53 $\pm$0.74 to 3.91 $\pm$0.56 (P=0.054) following their review of the material and their Zoom interview with a member of the research team. Only the question, "Sustainable eating means a lot to me" showed a significant increase from pre- to post-questionnaire (P=0.029).

Table 3: Change in FCS Extension Agent Perception of Sustainable Eating Involvement Following Review of Sustainable Eating Lesson Material.

Question Sustainable Eating Involvement	$\overline{X}^a$	SD	P-Value
Sustainable eating is very important to me			
Pre-survey	3.68	.780	
Post-survey	4.08	.572	.083
I care a lot about sustainable eating			
Pre-survey	3.59	.734	
Post-survey	3.92	.640	.157
Sustainable eating means a lot to me	3.45	.800	
Pre-survey	3.88	.600	.029
Post-survey			
I am very concerned about the consequences of what I eat in terms of sustainability			
Pre-survey	3.41	.854	
Post-survey	3.76	.663	.100

[a]SEI measured on a 5-point Likert Scale from 1 (strongly disagree) to 5 (Strongly Agree).
*p-value of ≤ 0.05 statistically significant.

Table 4 contains the results of the change in perception regarding Sustainable Eating Barriers (SEB) on a scale of 1 -5 with 5 being strongly agree. The average score before the interview and material review significantly decreased from 2.29 $\pm$ 0.457 to 2.08 $\pm$0.29 (p=0.019). Agent perception of "I do not know how to eat more sustainably"

significantly decreased (P=0.003) following their review of material and Zoom interview. There were no other significant changes in perception of sustainable eating barriers observed from the pre- to the post-questionnaire.

Table 4: Change in FCS Extension Agent Perception of Sustainable Eating Barriers Following Review of Sustainable Eating Lesson Materials

Question Sustainable Eating Barriers	$\overline{X}^a$	SD	P-Value*
"I do not know how to eat more sustainably"			
Pre-survey	2.59	.854	
Post-survey	1.80	.500	0.003
"Sustainable eating is expensive"			
Pre-survey	2.77	.813	
Post-survey	2.44	.651	0.185
"My eating patterns do not have an impact on the environment"			
Pre-survey	1.82	.795	
Post-survey	1.72	.678	0.285
"Meat is necessary for a balanced meal."			
Pre-survey	1.95	.653	
Post-survey	1.92	.759	0.480
"Sustainable foods are inconvenient"			
Pre-survey	2.41	.796	
Post-survey	2.08	.572	0.106
"I have no way to get sustainable food"			
Pre-survey	1.91	.526	
Post-survey	1.68	.476	0.157
"Eating meat is an important part of my culture"			

Pre-survey	3.18	1.296	
Post-survey	3.00	.258	0.351
"I do not want to change my current diet"			
Pre-survey	2.41	.590	
Post-survey	2.44	.712	0.813
"I do not have time to prepare sustainable foods"			
Pre-survey	2.18	.664	
Post-survey	2.04	.200	0.317
"Sustainable foods taste bad"			
Pre-survey	1.73	.703	
Post-survey	1.64	.490	0.527

[a] $Sustainable\ Eating\ Behaviors\ (SEB)$ measured on a 5-point Likert Scale from 1 (Strongly Disagree) to 5 (strongly Agree).
*p-value of ≤ 0.05 statistically significant.

Questions pertaining to appropriateness and acceptability of the five lesson plans were asked during each of the semi-structured Zoom interviews. Four main themes were derived from the Zoom interview transcripts. The four themes identified from the content were 1) offensiveness of lessons, 2) appropriate wording, 3) appropriate length and amount of lesson materials, and 4) framing the message.

4.1.1 Theme 1: Offensiveness of Lessons

All five of the proposed lesson plans were generally not found to be offensive. A common sentiment among a majority of agents was "I didn't see anything that would turn anybody off." Some agents however, commented that discussing health can be a turn off. For example, one agent stated, "Sometimes when we, obviously our job is to promote health, but if we harp on health too much, sometimes it turns people off." This points to a

strategy of encouraging healthy behaviors without discussing health itself that agents have developed through long term work with their community.

The Rethink Your Plate lesson was of concern by the research team because it discusses weight, which can be a sensitive topic. Agents stated that lesson attendees are typically aware of their weight and their motivations for attending extension curriculum are to learn healthy lifestyle practices. One agent shared, “I don't think [weight is a sensitive topic] because the majority of people that we see are coming to learn how to eat healthier because they want to be healthier themselves because there is something going on with them personally, so I think it's a good thing to put that in there.” Another agent added, “I don't think anything's hurtful because we spoke about a healthy weight and a healthy weight is different for everybody, you know.” In other words, community members who choose to participate in extension curriculum that emphasizes healthy lifestyle practices are likely to know their weight status and not be offended by discussions of weight.

While weight itself is not a sensitive topic according to most agents, the ways in which weight is discussed and the words and terms used must be taken into account. Agents mentioned that the term healthy weight should be used, rather than words that could be offensive such as obese. For example, one agent said, “Nobody likes the word obesity or fat. What would you call it? Overweight or healthy weight. Those are kind of some of the terms, or maybe help people reach a healthy weight. I wouldn’t say its offensive, it was just the truth.” Word choice is an important consideration when developing educational material. This is true for discussions of weight as well as other topics.

4.1.2 Theme 2: Appropriate Wording

To ensure that lessons are appropriate for community members, agents suggested minimizing jargon throughout all five of the lesson plans. One specific suggestion was to avoid using the word consumption. “Maybe that this is not an offensive or turn off term it's just something that people don't say,” one agent shared. “When they talk about eating, they don't usually say consumption or overconsumption they'll talk about overeating or eating, so it, just talking like you were talking to a friend or talking to a in person class and using those terms might hit home a little bit better.” In short, education material should reflect the manner of speaking familiar and comfortable to its intended audience.

The Reduce Food Waste lesson contained several suggestions for more appropriate language. It was suggested that wording should be culturally unbiased, “Let’s see under shop smart to save a few bucks I was just thinking culturally I’m trying to be culturally nonbiased and I’m just wondering if dollar should be used there versus bucks.” The agent pointed out that to someone whose first language is not English, “bucks” may be confused with a male deer. Utilizing “dollar” is a straightforward way of preventing miscommunication or misunderstanding. Wording, according to another agent, should also be culturally aware, specifically when discussing canning, “At home canning I think just saying canning or food preservation because it could be frozen it may not be canned. Or preserving.” In other words, using a term like “food preservation” is more inclusive due to the wide range of food preservation techniques employed throughout the state.

Agents suggested that when discussing food waste appropriate and clear wording should be used, as food waste is created by everyone as a natural byproduct of cooking and cannot always be avoided. “They like to refer… to home food waste as wasted food

not food waste because people waste food…, we all create food waste when we peel a cucumber we, something with a peel, that's food waste, but wasted food are things like we throw away food off of the table, or we throw away the apple that wasn't good that maybe could have been applesauce." While such clarifications to language may seem pedantic, they are crucial to audience comprehension of the education material and their role in preventing food from becoming waste.

As mentioned previously, The Rethink Your Plate lesson discussed weight. Agents stated that a positive tone should be kept when discussing weight. "I think the more that you can focus on this is what is healthy. ... everybody's going to eat junk every now and then, you know that doesn't necessarily mean you've got a problem, but that I think the more you can keep things on the positive side, and here are some things that not only are healthier for you, but you will feel better you'll have more energy. Let that be your focus the more positive term, you can and here's the things you can do and there you know some simple, easy changes yeah that kind of thing." This quotation is shared in full to echo what was emphasized above – that focusing on healthy behaviors and lifestyle practices are more effective than discussing body weight alone. In general, agents felt that positive messages – what could participants do or add to their routines – were more likely to be appropriate and adopted.

4.1.3 Theme 3: Appropriate Length and Amount of Lesson Materials

Length of the lesson was also mentioned by the agents. It was suggested that the length of lessons need to be appropriate in that they need to keep the general audience's attention, without overwhelming them. When breaking the information down for publications, one agent mention "when you're thinking about breaking things down for

actual handouts and things that we can put in newsletters or do in a class and that kind of thing we try to do one page front and back and no more than two-page front and back." Specifically, the Reduce Consumption of Processed and Packaged Foods lesson was perceived as too lengthy and potentially overwhelming for some of the participants. For example, one agent commented, "So, this one would have to be kind of laid out in a way that isn't like too overwhelming, but other than that I think it's really good." It was also mentioned that the lesson could be broken up in order for it to be better understood by the participants, as another agent shared, "Maybe taking some of this information, I know it goes like this section, but kind of hitting on some of the in the Rethink Your Plate [lesson]. And then, reinforcing it in the next one, so people are familiar with it already, so they don't get too overwhelmed during this last one." Due to the breadth of information presented in one lesson, agents suggested introducing some of the material sooner or breaking the lesson up into multiple parts, even if that meant extending the total number of lessons.

A theme statement was included in each lesson to orient participants to the overarching theme of the curriculum. When asked their opinion of the theme statement, agents stated that the theme statement was too lengthy. To best facilitate participant engagement and understanding, one agent suggested "it could be broken down into bullet points, [that] would even help visually." Another agent agreed, stating that the theme statement contained a lot of good information that just needed "to be in…bite size [pieces], where [participants] can take it in and absorb it." Rather than cutting material out that was perceived as too lengthy, agents here suggested visually breaking the information up to facilitate better learning.

4.1.4 Theme 4: Framing the Message

As mentioned above, framing a lesson only through the lens of health can be a turn off for participants. Budgeting and economics are two additional topics that overlap with sustainable diets that make the material more acceptable and frame it around the needs of the community. As one agent stated, “Tie in like budgeting and like saving money and that always goes over really well you know just realizing and thinking about how much you know you're throwing away food, but also you're throwing away money, and so I think that is another good way to get people interested in the topic.” This articulates with what agents shared about discussions of weight – that focusing on positive behaviors can lead to the implementation of healthy and sustainable lifestyle practices.

When reviewing the Food Waste outline, agents again suggested including financial benefits, as one agent shared, “how can we incorporate how this is saving money and making that very, very clear. I said this might be a good place for this infographic where they have a breakdown of I don't know if it would be serving or ounce per ounce some kind of infographic on how much cheaper [cooking at home is vs. eating at a restaurant].” Graphic representations of information about the financial benefits of a healthy and sustainable diet are presented here as another ‘bite size’ approach to sharing information.

Agents suggested that they wanted the material to be framed specifically for their community members or to at least present options where resources are scarce. Some parts of the state – particularly in rural areas – do not have recycling programs. In discussions of proper recycling, community members may feel left out and as if there is nothing they can do. As one agent points out, “In several spots we're talking about recycling which is

important. But like we didn't have recycling in my county for a long time, and then we got recycling and now we don't have that. And that's also a political thing, um, but maybe talking about… finding a way to recycle when you don't have recycling in your community." One agent mentioned "reducing" for those who do not have the resources in their county to recycle, "I used this book when I was doing the beeswax class and it talks about how recycling and reusing are second and third but reducing should be our number one, and so, because if you reduce then you don't have the reason to recycle."

Along with graphic representations, agents expressed that examples play a large role in facilitating understanding of lesson material. Specifically, within the Reduce Consumption of Processed and Packaged Foods lesson, the scale or hierarchy of food processing and packaging was a new concept and one that could benefit from robust examples. "It's just a lot of stuff that is going to be pretty brand new to people," one agent said, "so when you start talking about the types of processing… that's going to be making a lot of people that haven't heard that before. Then you probably have to do what types of food use more or less packaging - that's probably something that people haven't thought about before. And again, here you're going to want to have examples that people can see and look at so they know what you're talking about." In particular, information that might be new to participants would benefit from either graphic representations or specific examples.

The feedback provided by agents across Kentucky demonstrated that our proposed Extension curriculum focused on sustainable eating would not be offensive to

those attending FCS extension programs. It was stated by the agents that the lessons were not offensive, but some adjustments were needed to ensure acceptance by Kentuckians.

Adjustments included: choosing suitable wording with an emphasis on reducing jargon in order to increase participant understanding. Positive wording and tone should be used when discussing weight. Appropriate length was suggested for the lessons and theme statement to present information in a comprehensive manner to community members. Shorter messages are generally more accepted and better understood by the public. Graphic representations of new information, along with robust examples, further facilitate participant comprehension. The agents' feedback showed a need for the message to be framed specifically for their community, such as when discussing health and recycling. Suggested materials to include that are not currently discussed in the curriculum include budgeting and economics. Agents suggested that these topics may pique the interest of community members, as finances are a concern for many Kentuckians.

CHAPTER 5. DISCUSSION

The purpose of this study was to gather feedback from Kentucky FCS Cooperative Extension agents on the appropriateness of the content included in a proposed Extension curriculum pertaining to sustainable eating. Content was spread across five lesson plan outlines that were developed by researchers at the University of Kentucky with expertise in nutrition and FCS Extension. In addition, our study sought to assess if agent perception about sustainable eating changed following their review of the proposed lesson outlines. Our results demonstrated that after reviewing the lesson outlines there was a significant decrease in the agents' overall perception of the barriers

associated with healthy and sustainable eating as assessed by the ten questions included in the Sustainable Eating Barrier Questionnaire. In particular, the question "I do not know how to eat more sustainably", significantly decreased following lesson outline review. Within the sustainable Eating Involvement questionnaire, their attitudes in response to "I care a lot about sustainable eating" significantly increased. Taken together, these results indicate that providing information on the topic of sustainable eating can result in positive changes in perception and reduce perceived barriers associated with sustainable eating. Increasing knowledge and improving attitudes towards sustainable eating is an important first step towards increasing involvement in sustainable eating. Once knowledge is obtained however, making sustainable food choices are based on the consumers' willingness and ability to make behavior changes (Van Loo et al., 2017). Findings by Culliford and Bradbury (2020), support this notion as they observed that participants who reported having knowledge about the impact of sustainable dietary behaviors was associated with having a higher involvement in sustainable eating (Culliford & Bradbury, 2020). Furthermore, a study by Zakowska-Biemans et al., (2019) also showed that to increase involvement in sustainable eating, an increase in knowledge was essential (Zakowska-Biemans et al., 2019). In that study, six concepts of healthy and sustainable eating (e.g., reduced consumption of processed food, plant-based food consumption, food waste, etc.) were introduced to participants during the interview.

Therefore, our study results are encouraging and highlight the importance of using the Cooperative Extension Service model and network to educate community members about healthy and sustainable eating in hopes of increasing their knowledge and engagement in these dietary behaviors. FCS Extension agents can be influential in their

communities and, with FCS agent positions in all 120 Kentucky counties, the reach of Cooperative Extension brings great potential to educate many community members.

Having FCS Extension agents recognizing the value and importance of sustainable eating will help in effectively communicating the concept to community members. Increasing community members' knowledge and acceptance of sustainable eating increases the likelihood of them engaging in healthy and sustainable dietary choices and practices. Agents are trusted members of their community that bring information from land grant Universities to their communities (Butterworth, 2016). Involving agents in the development phase of a curriculum can increase agent buy-in, which is critical because they are integral, important members of the community who have the potential to influence collective decisions and norms related to nutrition in a community. Community members may establish long-term relationships with their FCS agents because the agents often live in the communities they serve, build relationships with the community, convince community members of the need for change, and help employ and maintain changes. These are all key characteristics of "agents of change" (Center for Community Health and Development, 2017).

In a previous pilot study, the Body Balance Extension curriculum that focused on raising awareness about the negative impact of environmental pollution on health and how a healthy diet can help protect the body; demonstrated that increasing dietary knowledge was critical to promote positive behavior changes (Brewer et al., 2019). Also, the Body Balance pilot study showed that participants reported that their FCS Extension agent was an important component in their decision to make healthier lifestyle choices (Brewer et al., 2019). Thereby, in the current study we leveraged the community

expertise of the FCS agents to assist our research team with framing the information about sustainable eating for our curriculum in a manner that is appropriate for Kentuckians. We asked agents to identify what changes were needed to make the materials more appropriate and acceptable to Kentuckians in their communities. The main themes derived from our semi-structured agent interviews pointed to ways the lessons could be made more acceptable. Within the identified themes of "framing the message" and "appropriate wording," agents specifically suggested ways to make the lessons more appropriate by including unbiased wording, as Extension should be accessible to all backgrounds and ethnicities. Overall, despite sustainable eating being a controversial topic, the agents felt that the information included in the proposed lesson outlines was generally appropriate and not offensive.

A study by Hoek et al., (2017) identified that health, rather than impact on the environment, seemed to be the primary driver behind food choices that were both environmentally stable and healthy. These results conflict with the results found in our study. Agents felt discussing health could be a turn off. As mentioned by one agent, "Sometimes when we, obviously our job is to promote health, but if we harp on health too much, sometimes it turns people off." It was suggested that the message be framed around economics, budgeting, and encouragement of healthy behaviors, rather than health itself.

A paper by Smith, M. et. al., (2017) identified a seven-step approach for effective curriculum development for use in Cooperative Extension Programming (Smith et al., 2017). The steps are: (1) identification of a societal need and associated learning objective, (2) organization of content, (3) determination of acceptable evidence of

learning, (4) identification and development of learning experiences, (5) preliminary evaluation, (6) pilot testing, and (7) outcome evaluation (Smith et al., 2017). In our planning and development of this curriculum we have completed steps one through five with agents. Our research team has future plans to have a group of agents pilot the curriculum in their communities in order to execute steps six and seven.

The first step, identification of a societal need and associated learning objective, shapes educational objectives around a social, environmental, or economic need and identifies an approach to address the need (Smith et al., 2017). There is currently no program, that we are aware of, offered in Kentucky on the topic of sustainable eating. Furthermore, to assess Agent interest, a survey was given to FCS extension agents during their statewide agent training in 2019 to gauge their interest in a healthy and sustainable eating curriculum. The results from this showed that there was interest.

Step two, organization of content, suggests the importance and challenges of logical organization to accurately deliver the meaning of the materials (Smith et al., 2017). To this end, we developed lesson outlines for review by agents. Agents were then able to provide feedback on the content and organization of each outline. Agents made suggestion on length of outline and materials included within the outlines. There was no suggestion to change the order or organization of the outlines. The last lesson (Reduce Consumption of Highly Processed and Packaged Foods) was the only lesson that was identified as too lengthy.

Step three, determination of acceptable evidence of learning, involves determining whether learning was achieved through observation, participation, and review of results (Smith et al., 2017). This study observed whether agents' perception of

sustainable eating changed after reviewing lesson outlines. Pre- and post-Qualtrics surveys were used to determine this.

Step four, identification and development of learning experiences, addresses the importance of gathering resources and developing materials for effective implementation of learning (Smith et al., 2017). This study was unique in the sense that FCS agents were involved in the development of materials. Outlines for each lesson were developed and given to agents to review and provide feedback on how materials could be made more appropriate for Kentuckians, before piloting with community members. After review by agents, changes will be made to the lesson plans that will later be piloted in communities by agents in Kentucky.

Step five, preliminary evaluation, involves content organization, order of learning experiences, and determination of educational goal (Smith et al., 2017). Interviews with agents were conducted to review material and determine what changes needed to be made before piloting the lesson plans with community members. Lesson plans were also reviewed by the research team to ensure all necessary materials were included on the topic of sustainable eating.

5.1 Conclusion and Future Research

In conclusion, our study garnered feedback from FCS Extension agents located across Kentucky about the appropriateness of proposed content to include in a sustainable eating focused Extension curriculum. The agent interviews revealed four major themes for the team to considered while developing the healthy and sustainable eating Extension curriculum in its entirety. The themes included offensiveness of lessons, appropriate wording, appropriate length, and framing the message. The theme ‘offensiveness of

lessons' identified if the information included could be found offensive or off putting to community members. 'Appropriate wording' was identified to ensure the wording used throughout the lessons would be understood and acceptable to the community members. 'Appropriate length and amount of lesson materials' was identified to ensure that the length of the lessons would be adequate, and not overwhelming, for implementation into Cooperative Extension. Lastly, 'framing the message' was identified. This theme observed whether the information presented in the outlines would be acceptable and relevant to communities to ensure learning of the concepts associated with healthy and sustainable eating.

Our qualitative and quantitative results showed that by just reviewing lesson outlines there was an increase in awareness on the topic of sustainable eating by FCS Extension agents. Moreover, the agents' perception of barriers associated with sustainable eating significantly decreased after they reviewed lesson outlines. This is an important finding as having the instructor or trainer invested in the lesson content they are presenting will allow them to effectively teach the content to the learner, ensuring all misconceptions and questions are addressed to increase learning among the participants (University of Nothern Iowa).

As mentioned previously, future studies will include community members as the target audience rather than the FCS Extension agents to work through steps six and seven for developing an effective Cooperative Extension Program as outlined by Smith M. et. al., (2017). The agents' feedback from the current study will be incorporated into pilot lesson materials with the intention of maintaining the science of healthy and sustainable eating, but in an appropriate manner for Kentuckians.

5.2 Limitations:

This study did not include community members therefore the acceptability of our proposed curriculum from the community member perspective is unknown. However, our future study will pilot curriculum materials with community members and at that time we will obtain their feedback. Another limitation is that our study included a convenience sample of agents that volunteered to participate. Utilizing this convenience sample could influence the degree of acceptability of curriculum contents by a wider audience, but the curriculum will be revised again following the future pilot study with community members and other agents. Another limitation identified is that despite the number of recruited agents being similar across the Western, Central and Eastern regions of Kentucky, we did not account for recruiting the same number of rural and urban counties within the region. In our study we recruited 5 rural and 6 urban from the Western region; 7 rural and 0 urban from the Eastern region and 3 rural and 5 urban from the Central region. Community members from rural versus urban communities may have differing perspectives of what content is appropriate for our curriculum, but our study did obtain feedback from all three Extension regions in Kentucky.

APPENDICES

APPENDIX 1. PRE- AND POST-SURVEY QUESTIONNAIRES

Van Loo et al.'s Sustainable Eating Involvement Scale
From Van Loo et al. (2017b)
Please indicate to what extend you agree or disagree with the following statements.

	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
Sustainable eating is very important to me	☐	☐	☐	☐	☐
I care a lot about sustainable eating	☐	☐	☐	☐	☐
Sustainable eating means a lot to me	☐	☐	☐	☐	☐
I am very concerned about the consequences of what I eat in terms of sustainability	☐	☐	☐	☐	☐

Sustainable Eating Barriers Questionnaire (From Brodie Thesis) (Brodie, 2020)
Please indicate if to what extent you agree or disagree with the following statements.

	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
"I do not know how to eat more sustainably"	☐	☐	☐	☐	☐
"Sustainable eating is expensive"	☐	☐	☐	☐	☐
"My eating patterns do not have an impact on the environment"	☐	☐	☐	☐	☐

“Meat is necessary for a balanced meal.”	☐	☐	☐	☐	☐
“Sustainable foods are inconvenient”	☐	☐	☐	☐	☐
“I have no way to get sustainable food”	☐	☐	☐	☐	☐
“Eating meat is an important part of my culture”	☐	☐	☐	☐	☐
“I do not want to change my current diet”	☐	☐	☐	☐	☐
“I do not have time to prepare sustainable foods”	☐	☐	☐	☐	☐
“Sustainable foods taste bad”	☐	☐	☐	☐	☐

APPENDIX 2. DEMOGRAPHIC QUESTIONNAIRE

1. **Age in years: _____**

2. **What is your ethnicity?**

- ☐ American Indian/ Alaskan Native
- ☐ Asian
- ☐ Native Hawaiian or Pacific Islander
- ☐ Black or African American
- ☐ White

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