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Mixed-methods approach to assessing community nutrition programming needs

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Mixed-methods approach to assessing community nutrition programming needs

by

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The student author, whose presentation of the scholarship herein was approved by the program of study committee, is solely responsible for the content of this thesis. The Graduate College will ensure this thesis is globally accessible and will not permit alterations after a degree is conferred.

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DEDICATION

To my endlessly supportive family, for celebrating every victory and comforting me in every disappointment along my academic journey. To my parents Karen and Rick, for all the sacrifices you've made along the way to allow me to get here. To my twin brother Clay, for being my biggest fan and also being the only one that truly understands academia. To my brother Darran, for always counseling me to reach my true potential. To my loving friends, who frequently reminded me to take a break and pursue work-life balance. Finally, to my two beautiful cat babies Lovey and Amory, who forced me to take a break to play, cuddle, and most importantly, feed them.

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ABSTRACT

Social determinants of health (SDOH) are linked to health disparities and impact quality-of-life and wellbeing. In addition, adverse health behaviors (e.g. sedentary time, poor diet quality, etc.) contribute to chronic disease risk. In response, Extension is well-positioned to address health disparities by creating and delivering relevant programming to underserved audiences. Understanding the needs and preferences of the target audience and key stakeholders is crucial for accomplishing this goal.

Study One assessed the health and Extension programming needs and preferences of Iowans (n=452). Respondents were primarily female (70.6%), non-Hispanic (89.6%), White (79.2%), and 47.6% were 35 years or younger. Respondents were split evenly between rural/urban, and food secure/insecure populations. General descriptive statistics assessed respondent sociodemographics and programming preferences. Binomial logistic regression analyses predicted the influence of SDOH variables on Extension program use, and interest in participating in a health-related programs. Respondents preferred short (< 1 hour duration and 3 weeks length), low-cost, online programs. Most (76.8%) have not knowingly used Extension programs or materials previously. Those who were persons of color ($p < 0.001$), Hispanic/Latino ($p= 0.030$), and food insecure ($p < 0.001$) were more likely to use Extension programs and materials. Many (47.6%) were interested in health-related programming. Those not interested were less educated ($p= 0.011$) and had a chronic disease condition ($p= 0.036$). These results provide valuable information that informs future directions for Extension program recruitment, content, and format.

Study Two gathered Supplemental Nutrition Assistance Program (SNAP) food retailers' perspectives on the most feasible and effective strategies to improve food choices of SNAP

participants. Two corporate and six local-level food retailer managers from five counties participated in interviews; each had high SNAP participation. The stores included six grocery, one convenience store, and one supermarket. Thematic analysis was performed and themes were identified via consensus. SNAP marketing, incentive, and disincentive program models, as well as simple programs with easy implementation and educational components were viewed positively. Driving sales and program alignment with corporate and social responsibility goals were important factors related to willingness to participate in SNAP pilot programs. Insights from this present study can inform future SNAP pilot programs and promote food retailer buy-in.

CHAPTER 1. GENERAL INTRODUCTION

Health is multi-dimensional and is defined as the "complete physical, mental and social wellbeing and not merely the absence of disease or infirmity" by the World Health Organization (WHO, "Constitution"). Pursuing health is augmented by practicing a variety of positive health-promoting behaviors (e.g., consuming fruits and vegetables, getting regular exercise). Conversely, health can be compromised by practicing behaviors that adversely affect health (e.g., sedentary time, smoking). Additionally, health can be affected and limited by one's social determinants of health (SDOH), or the conditions in which they were raised and live their day-to-day lives (WHO, "Social determinants of health").

General health, wellbeing, and quality of life are also reduced by the presence of chronic disease. In the United States, nutrition-related chronic diseases such as type 2 diabetes and cardiovascular disease are prevalent, as are modifiable risk behaviors such as physical inactivity and low produce consumption that contribute to the subsequent development of chronic disease (National Center for Chronic Disease Prevention and Health Promotion [NCCDPHP], 2015; NCCDPHP, n.d.). Therefore, effective and relevant nutrition education and health promotion initiatives are necessary for promoting positive and sustainable behavior change with the goal to improve the health and quality of life of individuals and the public at large.

Developing effective and relevant nutrition education and health promotion programs requires the involvement of the target audience and key stakeholders in the program development process. The Social Marketing Theory (SMT) is a program development model that engages the target audience in the process (Lefebvre & Rochlin, 1997; Storey et al., 2008). The first step is planning, selecting the target audience, and conducting a needs assessment of the audience's knowledge, beliefs, attitudes, and values (Lefebvre & Rochlin, 1997; Storey et al.,

2008). In this way, SMT is focused on the consumers' real needs, rather than perceived needs (Lefebvre & Rochlin, 1997; Storey et al., 2008). Using SMT has been effective for other nutrition and health-related programs (Snow & Benedict, 2003; Roy et al., 2016; Keane & Francis, 2018). This success makes it a helpful model for Extension to use when evaluating current programs and informing the direction of future programming.

Extension is tasked with making research-based and reliable nutrition and wellness information and programming accessible to the public and local communities (National Institute of Food and Agriculture, n.d.). With high rates of chronic disease, changes in technology use, growing populations of Black, Indigenous, and People of Color (BIPOC), and broad social and economic diversity, Extension must adapt accordingly to meet the needs of a changing population (NCCDPHP, 2021; U.S. Census Bureau, 2019; Frey, 2020). Therefore, understanding the needs and preferences of Iowans is necessary for Iowa State University (ISU) Extension and Outreach to modify existing programs, create new ones, and evaluate the impact of current programming efforts.

Currently, ISU Extension provides Supplemental Nutrition Assistance Program Education (SNAP-Ed) to families with limited incomes and oversees SNAP outreach to older Iowans. SNAP aims to reduce hunger and increase food security and food access for those who are income-eligible (Yaktine & Caswell, Eds., 2013). Notably, research suggests SNAP participants may have poorer diet quality than non-participants as measured by the Healthy Eating Index (Gregory et al., 2013). Moreover, poor diet quality and food insecurity are associated with chronic disease (Centers for Disease Control and Prevention, 2020; Gregory & Coleman-Jensen, 2017). Strategies have been proposed to improve the food choices of SNAP participants, such as incentives and restrictions (Leung et al., 2013). However, previous research

has not gathered insight from food retailers as key stakeholders in program development and delivery, which is crucial for retailer buy-in and success of the prospective nutrition programs.

In summary, creating effective community nutrition and health-related programs require the input and insight from the target audience and key stakeholders. This can be done in a timely, cost-effective manner through a comprehensive online needs and preference assessment and qualitative interviews, using SMT as a theoretical framework.

Goals and Objectives

Study 1. Consumer Preferences and SDOH Predictors for Extension Program Interest and Utilization

Study Objective: The aim of this study was to identify prospective Extension and Outreach (E & O) customer's nutrition, wellness, and food safety needs and preferences. The goal of this study was to collect information from a representative sample of Iowans to assess current programming and inform future programming efforts. The following research questions were addressed:

1. What are the nutrition, wellness, and consumer food safety needs of prospective E & O customers?
2. What attributes are prospective E & O customers looking for in nutrition, wellness, and consumer food safety programming?
3. How do social determinant of health variables predict Extension program use, and interest in participating in a health-related program?

Study 2. Food Retailers' Perspectives on Pilot Program Strategies to Promote Healthy Eating in SNAP Participants

Study Objective: The aim of this study was to gather food retailers' perspectives on the feasibility of expert-proposed strategies to improve food choices of SNAP participants. The goal is to use retailers' insight to inform development of nutrition pilot programs for SNAP and promote food retailer buy-in and participation. The following research questions were addressed:

1. Which nutrition pilot program strategies:
    a. are regarded as most effective for improving diet quality?
    b. would food retailers be willing to participate in for promoting healthy food choices?
2. What are the benefits and challenges of each expert-proposed strategy?

Thesis Organization

The following thesis will begin with Chapter 2, a review of literature providing a description of the sociodemographics and health status of Iowans, social determinants of health, the SNAP, Cooperative Extension, and the SMT theoretical framework. Chapter 3 will detail the methodology of the two studies, followed by two separate manuscripts, the first prepared for submission to the *Journal of Human Sciences and Extension* and the second under review for publication in the *Journal of Human Sciences and Extension.* To close this thesis, conclusions of the studies will be provided.

References

Centers for Disease Control and Prevention. (2020). *Poor nutrition.* Retrieved from: https://www.cdc.gov/chronicdisease/resources/publications/factsheets/nutrition.htm.

Frey, W. H. (2020, July 1). *The nation is diversifying even faster than predicted, according to new census data.* Brookings. Retrieved from: https://www.brookings.edu/research/new-census-data-shows-the-nation-is-diversifying-even-faster-than-predicted/

Gregory, C. A., & Coleman-Jensen, A. (2017). *Food insecurity, chronic disease, and health among working-age adults (ERR-235)*. United States Department of Agriculture, Economic Research Service. Retrieved from: https://www.ers.usda.gov/webdocs/publications/84467/err-235.pdf?v=%2042942.

Gregory, C., Ver Ploeg, M., Andrews, M., & Coleman-Jensen, A. (2013). *Supplemental Nutrition Assistance Program (SNAP) participation leads to modest changes in diet quality (ERR-147).* United States Department of Agriculture, Economic Research Service. Retrieved from: https://www.ers.usda.gov/webdocs/publications/45059/36939_err147.pdf?v=1053.8.

Keane, M. N., & Francis, S. L. (2018). Latinos Living Well—A diabetes education program for rural-residing Latinos. *Journal of Extension.* 56(4), v56-4rb1. Retrieved from: https://joe.org/joe/2018august/rb1.php

Lefebvre, R.C. & Rochlin, L. (1997). Social Marketing. In K. Glanz, F.M. Lewis, & B.K. Rimer. (Eds.), *Health behavior and health education theory*, 2nd edition (pp. 384- 402). San Francisco, CA: Jossey Bass Publishing.

Leung, C. W., Hoffnagle, E. E., Lindsay, A. C., Lofink, H. E., Hoffman, V. A., Turrell, S., Willett, W. C., & Blumenthal, S. J. (2013). A qualitative study of diverse experts' views about barriers and strategies to improve the diets and health of Supplemental Nutrition Assistance Program (SNAP) beneficiaries. *Journal of the Academy of Nutrition and Dietetics*, *113*(1), 70-76.

National Center for Chronic Disease Prevention and Health Promotion; Division of Nutrition, Physical Activity, and Obesity. (n.d.). *Data, trend and maps [online]*. Centers for Disease Control and Prevention. Retrieved on January 18, 2021 from: https://www.cdc.gov/nccdphp/dnpao/data-trends-maps/index.html.

National Center for Chronic Disease Prevention and Health Promotion, Division of Population Health. (2015). *BRFSS prevalence & trends data [online]*. Centers for Disease Control and Prevention. Retrieved February 12, 2021 from: https://www.cdc.gov/brfss/brfssprevalence/

National Center for Chronic Disease Prevention and Health Promotion. (2021). *Chronic disease in America.* Centers for Disease Control and Prevention. Retrieved on January 15, 2021 from: https://www.cdc.gov/chronicdisease/resources/infographic/chronic-diseases.htm

National Institute of Food and Agriculture. (n.d.). *Extension.* United States Department of Agriculture. Retrieved on December 14, 2020 from: https://nifa.usda.gov/extension

Roy, A., Francis, S. L., Shaw, A., & Rajagopal, L. (2016). Promoting food safety awareness for older adults by using online education modules. *Journal of Extension*, *54*(1), v54-1tt8. Retrieved from: https://www.joe.org/joe/2016february/tt8.php

Snow, G., & Benedict, J. (2003). Using social marketing to plan a nutrition education program targeting teens. *Journal of Extension, 41*(6), 6FEA4. Retrieved from: https://www.joe.org/joe/2003december/a4.php

Storey, J. D., Saffitz, G. B., & Rimon, J. G. (2008). Social marketing. In Glanz, K., Rimer, B. K., & Viswanath, K. (Eds.), *Health behavior and health education: Theory, research, and practice*. John Wiley & Sons.

U.S. Census Bureau. (2019). *Quick Facts: United States; Iowa.* U.S. Department of Commerce. Retrieved on December 14, 2020 from: https://www.census.gov/quickfacts/fact/table/US,IA/PST045219

World Health Organization. (n.d.). *Constitution*. Retrieved from: https://www.who.int/about/who-we-are/constitution

World Health Organization. (n.d.). *Social determinants of health*. Retrieved from: https://www.who.int/social_determinants/sdh_definition/en/

Yaktine, A. L., Caswell, J. A., Eds. (2013). History, background and goals of the Supplemental Nutrition Assistance Program. In *Supplemental nutrition assistance program: Examining the evidence to define benefit adequacy.* Washington, DC: The National Academies Press.

CHAPTER 2. REVIEW OF LITERATURE

The social and physical environments that surround individuals, as well as their health-related behaviors greatly impact their general health, wellbeing, and quality of life. In Iowa and across the United States, sedentary behavior, poor diet quality, and unsafe food handling may contribute to the poor nutrition status and the development of chronic disease. In addition, low socioeconomic status, presence of food insecurity, and residing in rural areas may place individuals at disproportionate risk for developing chronic disease. In response, nutrition education and health-related programming provided by federal agencies and community organizations such as Extension and Outreach are well-positioned to address these adverse health behaviors and noted health disparities.

Social Determinants of Health

Personal responsibility is often emphasized in pursuance of health; however, it is important to consider the greater social and environmental context that may affect health status when identifying correlations between factors such as living location, age, education level, and income level with poorer health outcomes. Social determinants of health (SDOH) identify the external factors that may affect one's overall wellbeing or health status. SDOH are the "conditions in which people are born, grow, work, live, and age," which may contribute to health inequities and disparities (World Health Organization, n.d.).

SDOH are separated into five main categories: (1) economic stability; (2) education; (3) social and community context; (4) health care; (5) neighborhood and built environment; and food often is listed as a sixth (6) category (Artiga & Hinton, 2018; NEJM Catalyst, 2017). Cumulatively and often in an interrelated manner, these can impact one's health, wellbeing, quality of life, and longevity. Awareness of SDOH can inform health and wellness programming

to better address and alleviate essential barriers and health disparities, rather than addressing the surface-level behaviors that result from such disparities and inequities.

For many, health and wellness programs offered through local agencies and community settings may work to overcome some of the inherent barriers associated with SDOH. Community-delivered programming offered in local areas may increase the accessibility of culturally relevant health and nutrition information by offering educational resources outside of a health care setting in more convenient and existing locations while also contributing to social engagement (Office of Disease Prevention and Health Promotion [ODPHP], "Educational and community-based programs"; Keane & Francis, 2018). For example, a non-profit organization in Nebraska is utilizing grant funding to reach Black and Hispanic Americans in community and cultural centers to improve nutrition status, increase access to physical activity, and strengthen relationships with clinics to address risky health behaviors (National Center for Chronic Disease Prevention and Health Promotion [NCCDPHP], 2020).

Within each of the SDOH categories are more specific and detailed issues that may affect an individual's ability to experience health and general wellness (Figure 2-1). Although many social considerations affect wellbeing, there are multiple factors within the categories that are of particular interest when considering how social determinants may impact nutrition status and the development of nutrition-related chronic diseases, including poverty, food security, access to health care, and access to food (ODPHP, "Social determinants of health").

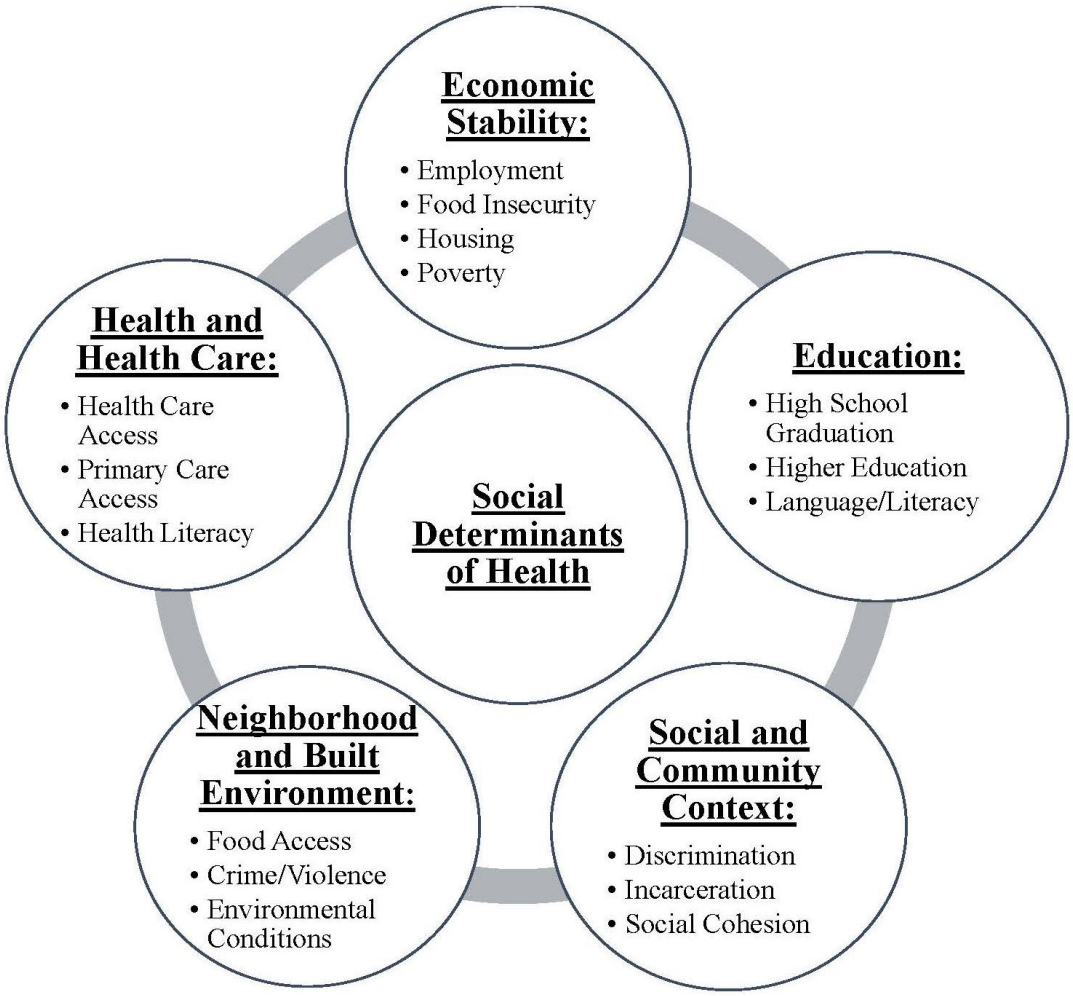

Figure 2-1. Social Determinants of Health

SDOH and Health in Iowa

Chronic Disease

As the United States experiences higher rates of obesity and chronic disease, Iowa is noticing similar trends. In 2019, 18.0% of Americans and 14.4% of Iowans self-reported poor or fair health status (NCCDPHP, 2015). According to America's Health Rankings data analysis (2019a), Iowa ranked 20th in overall health status in the U.S.; however, Iowa has a greater percentage of obese adults (35.3%) compared to the U.S. average (30.9%) and ranked 44th in this measure (America's Health Rankings, 2019b). In 2019, 9.5% of Americans and 8.5% of Iowans

reported they have been diagnosed with three or more chronic conditions (America's Health Rankings, 2020a). Approximately 10.3% and 6.3% of Iowans self-reported a diabetes or cardiovascular disease diagnosis, respectively, with higher rates noted in older adults, those who have less education, and those with lower household income (NCCDPHP, 2015). High rates of chronic disease and multiple chronic conditions is associated with higher health care costs; however, it is suggested that public health interventions can provide significant savings, emphasizing the benefit of local health agencies like Extension providing health-related education programs (Machlin & Soni, 2013; Masters et al., 2017).

The development and/or presence of chronic disease is affected by many factors. Adverse health behaviors such as sedentary behavior, poor diet quality or food choices, and failure to practice food safety may increase the risk of developing chronic disease, as may one's social and environmental context as previously discussed.

Sedentary Behavior

Sedentary behavior and physical inactivity (i.e., not engaging in exercise or activity outside of their occupation) are prevalent in the United States. Nationally, 1 in 4 Americans and Iowans (26.4% and 26.5%, respectively) reported being physically inactive in 2019, with higher rates of physical inactivity in older adults, certain racial and ethnic groups (Black, Indigenous groups, and Hispanic/Latinos), and those with less education and lower incomes (America's Health Rankings, 2020b). Of note, only 23.2% and 20% of American and Iowa adults, respectively, reported meeting the physical activity guidelines in 2019 (NCCDPHP, 2015).

Sedentary time is an independent risk factor (distinct from inadequate amounts of physical activity) associated with the development of chronic diseases such as metabolic syndrome, cardiovascular disease and type 2 diabetes mellitus (Owen et al., 2010; Bankoski et al., 2011; Young et al., 2016). Conversely, replacing sedentary time with physical activity can

reduce the risk of all-cause mortality, and increased amounts of physical activity can reduce the risk of developing chronic diseases, including cardiovascular disease, diabetes, colon cancer, breast cancer, as well as heart attacks and stroke (Dohrn et al., 2018; Matthews et al., 2015; Kyu et al., 2016, Rockette-Wagner et al., 2015). The correlation between physical activity and chronic disease risk reduction highlights the importance of promoting physical activity to improve general health and wellbeing.

Diet Quality

Diet quality also influences the risk of developing chronic diseases. There is evidence to suggest that high quality diets, correlating with higher scores on the Healthy Eating Index [HEI], may decrease the risk of all-cause mortality by 22% and development of multiple chronic diseases, including cardiovascular disease and type 2 diabetes, by 22% and 18% respectively (Schwingshackl et al., 2018). The HEI is a tool used to assess diet quality as compared to the Dietary Guidelines for Americans. Adequate intake of selected components (e.g., fruits, vegetables, whole grains) and moderate consumption of nutrients of concern (e.g., sodium and saturated fat) are awarded more points, and higher scores correlate with a higher quality diet (Center for Nutrition Policy and Promotion [CNPP], 2018). Food intake data from National Health and Nutrition Examination Survey (NHANES) reports a national average HEI score of 59 out of a maximum 100 points, with higher average scores reported for older adults over 65 years of age (66 points) and lower average scores in children less than 18 years of age (53 points) (CNPP, 2019).

Consuming produce items appears to be a specific challenge. Only 8% of adults in the U.S. report consuming the recommended two or more fruits and three or more vegetables daily, with lower rates in men, those with less education, and those with lower incomes (America's Health Rankings, 2020c). In 2019, 59.6% and 77.3% of Iowans reported consuming fruit at least

once per day and vegetables at least once per day, respectively, nearly matching national percentages (60.7% and 79.3%, respectively) (NCCDPHP, 2015). Qualitative research with a low-income population suggests that cost, transportation, convenience, quality, and variety are key barriers that may reduce access to fruits and vegetables (Haynes-Maslow et al., 2013). In response to poor diet quality and perceived barriers to access, nutrition education programs may increase the quality of participant's diets as measured by the HEI and improve their self-reported nutrition knowledge and behaviors (Campbell et al., 2013; Guenther & Luick, 2015; Sankavaram & Mehta, 2017; McClelland et al., 2013).

Food Safety

Foodborne illness affects about 48 million people each year (Centers for Disease Control and Prevention [CDC], 2018). The CDC (2018) estimates 128,000 people are hospitalized and 3,000 die annually from these infections. There are approximately 31 pathogens known to cause foodborne illness, with the top five including: *Norovirus, Salmonella, Clostridium perfringens, Campylobacter spp.,* and *staphylococcus aureus* (CDC, 2018). Certain populations are at increased risk for contracting a foodborne illness, including young children, older adults, individuals who are immuno-compromised, and pregnant women (CDC, 2020).

The CDC recommends four key steps to practice food safety and prevent foodborne illness: Clean, Separate, Cook, Chill. These steps emphasize the importance of proper handwashing and equipment sanitation, preventing cross-contamination, cooking food to the minimum recommended internal temperature, and avoiding the temperature danger zone by cooling food appropriately (CDC, 2020).

Improving consumer food safety knowledge is key for positive behavior change to reduce the risk and burden of foodborne illness. A survey by the Academy of Nutrition and Dietetics (2011) assessed consumer knowledge of food safety practices. Results varied and some

behaviors have improved over time; however, it appears there is still a discrepancy of food safety knowledge and behaviors. Areas of concern include not using a thermometer or cooking to required temperatures, failure to store leftovers within 2 hours, and risk of cross-contamination (Academy of Nutrition and Dietetics, 2011). A more recent survey by the Food and Drug Administration (FDA) and Food Safety and Inspection Service (FSIS) suggests consumers do not wash their hands after using their smart devices in the kitchen (U.S. FDA, 2017). With the demonstrated need to address unsafe food handling behaviors, food safety education effectively increases participant knowledge of food safety concepts and food safety practices in consumers and food handlers (Adedokun et al., 2018; Yeung et al., 2019).

Rural Environment and Health

Rurality presents unique challenges in nutrition education and health promotion endeavors. Rural-residing individuals may experience the effect of specific social determinants in addition to barriers inherent to living in a rural area. The Rural Health Information Hub (2020) highlights the contribution of several factors that may affect rural residents, such as higher rates of poverty, lower education level, poor health literacy, less infrastructure, and reduced access to shelter, transportation, food, and healthcare.

The majority of Iowa counties (78 out of 99) are classified as rural or "non-metro" with a rural-urban continuum code of four or higher (Economic Research Service [ERS], 2013). The rurality of the state poses challenges when addressing the health and wellbeing of Iowans. Approximately 16.4% of rural-residing Americans lived in poverty in 2017, compared to 12.9% of urban-residing Americans (Pender et al., 2019). In addition to the prevalence of poverty, rural-residing individuals are considered a health disparity population and are more likely to be affected by chronic disease, disability, and premature death than those who reside in urban or suburban centers (Rural Health Information Hub, 2018). Rural-residing individuals are also less

likely than their non-rural counterparts to maintain a “normal” body weight (body mass index of 18.5 to 24.9 kilograms per meters squared) and meet physical activity recommendations (150 minutes of moderate activity or 75 minutes of vigorous activity weekly) (Matthews et al., 2017).

Related to weight status and participation in physical activity, it has been suggested that rural populations have an overall lower prevalence of practicing four out of five health behaviors (non-smoking, non- or moderate drinking, maintaining normal body weight, getting adequate physical activity, and getting adequate sleep), than do those who reside in non-rural areas (Matthews et al., 2017). Those who live in rural areas tend to have specific social determinants that limit health, such as limited access to health care, nutritious food, and safe spaces to engage in physical activity compared to their urban and suburban counterparts (NCCDPHP, 2019; Rural Health Information Hub, 2018).

With noted disparities in access to health care and nutritious food for rural-residing individuals, Extension and Outreach is able to provide free and reduced-cost nutrition and wellness programming that considers SDOH, addresses key health topics, and promotes positive behavior changes (Andress & Fitch, 2016). Potential barriers to accessing healthcare and health-related educational opportunities in rural and limited-resource populations include poor literacy, lack of education, discomfort in group settings, as well as lack of financial resources, time, transportation, and childcare (Benavente et al., 2009; Rural Health Information Hub, 2018). Low-cost and locally delivered Extension programs may alleviate some of the barriers to access such as, transportation, limited financial resources, and lack of insurance coverage.

In addition to large rural-residing population of Iowa, the population is becoming more diverse. The population percentage of Black, Indigenous, and People of Color (BIPOC) is on the rise from 7.38% in 2000 to 11.33% in 2010, with a 140.7% increase in the Latino population

from 2000 to 2019 and 199.3% increase in the Black population from 1980 to 2018 (Iowa Community Indicators Program, n.d.; State Data Center of Iowa & Office of Latino Affairs, 2020; State Data Center of Iowa & Iowa Commission on the Status of African-Americans, 2020). The increase in BIPOC populations indicates a need to develop culturally relevant programming to meet the education needs and preferences of an increasingly diverse population.

Socioeconomic Status and Health

As a measure encompassing multiple SDOH components, socioeconomic status is defined as social standing encompassing education level, income level, and occupation (American Psychological Association, n.d.). Iowans are educated and have the highest rate of high school graduation in the U.S. [91.0%] (America's Health Rankings, 2019a) with a majority of individuals aged 25 years and older having graduated high school and 28.6% of individuals aged 25 years and older have a Bachelor's degree or higher (U.S. Census Bureau, 2019). In 2019, approximately 10.5% of Americans were living in poverty, including 11.2% of Iowans (U.S. Census Bureau, 2019). Poverty rates are declining, yet still account for 34 million Americans as of 2019 (Semega et al., 2020). Those with incomes at 50%, 125%, and 150% of the poverty threshold are predominantly females, those who are Black or Hispanic, and children under the age of 18 (Semega et al., 2020). Each year, poverty guidelines by the number of persons in a household are created based on Census data for determining federal assistance program eligibility (Office of the Assistant Secretary for Planning and Evaluation, 2020). For example, to qualify for the Supplemental Nutrition Assistance Program (SNAP), gross income must be at or below 130% of the federal poverty threshold (Food and Nutrition Service [FNS], 2020a).

Lower socioeconomic status and income level is associated with a greater risk for adverse health outcomes. Research suggests that lower income and less education along with the

presence of other baseline factors (e.g., smoking, higher BMI, occupation, etc.) were significantly more likely to have a poor health outcome (e.g., cardiovascular disease, depression, etc.) at follow-up. Those with the least education and lowest income earnings had a 21% higher absolute risk of developing a poor health outcome in the future, compared to those in the highest income and education groups (Shea et al., 2016). Jensen et al. (2017) demonstrated that lower educational attainment was associated with higher numbers of comorbid diseases, higher rates of mortality, and premature death, yet these associations were not significant when adjusted for potentially confounding lifestyle factors (e.g., physical activity, alcohol use).

Food Insecurity and Health

Food insecurity is another SDOH and may be related to the aforementioned socioeconomic status as it may be mediated by income level, employment status, presence of disability, and specific racial and ethnic groups (ODPHP, "Food Insecurity"). Food security is defined as having "access at all times to enough food for an active, healthy life" (ERS, 2021). There are four levels of food security, including: high food security, marginal food insecurity, low food security, and very low food security. High food security indicates that individuals and households do not have difficulty accessing adequate amounts and variety of food. Marginal food security indicates that there may be a few instances of worry about adequacy of food, but no disruptions in diet quality or amount. Low food security is the first level of food *insecurity* and indicates that diet quality and variety may be compromised but amount of food consumed is not. Finally, very low food security indicates diet quality, variety, and amount of food intake are all affected, and eating patterns may be disrupted due to dietary insufficiency (ERS, 2020).

Nationally, it is estimated that the average rate of household food insecurity from 2014-2016 to 2017-2019 has decreased from 13.0% to 11.1%, respectively (Coleman-Jensen et al., 2020). An average of 7.9% of Iowa households were food insecure between 2017 and 2019,

which is less than the general Midwest region, with an estimated food insecurity rate of 10.5% in 2019 (Coleman-Jensen et al., 2020). Food insecurity is common for lower income families and individuals, as they may have limited resources to procure food in addition to other necessary or unexpected expenses, with higher rates observed in rural and principal city households, households with children and single parents, and those who are Black or Hispanic (Holben & Marshall, 2017; Coleman-Jensen et al., 2020). Higher rates of food insecurity in these populations require organizations like Extension to make relevant low- or no-cost nutrition programming accessible in local communities to meet this need.

Furthermore, food insecurity is linked to chronic disease risk and poor health outcomes. Multiple sources have highlighted the association between food insecurity and chronic conditions such as diabetes, kidney disease, hypertension, cancer, stroke, arthritis, heart disease, hyperlipidemia, hepatitis, chronic obstructive pulmonary disease, and depression (Holben & Marshall, 2017; Seligman et al., 2010). Therefore, it has been suggested that food insecurity may correlate with increased health care costs associated with select chronic diseases in older adults. This accounts for approximately 11% higher health care costs in food insecure older adults compared to older adults who are food secure (Garcia et al., 2018).

One component that may help explain the relationship between food insecurity and risk for certain nutrition-related chronic diseases is the associated lower diet quality as measured by the HEI and Alternate Healthy Eating Index [AHEI], as those who were food insecure had significantly lower HEI and AHEI scores that those who were food secure (Leung et al., 2014). Those who were food insecure demonstrated higher intakes of high fat dairy, salty snacks, sugar-sweetened beverages, and processed meats along with fewer vegetables (Leung et al., 2014). According to Weinfield et al. (2014), food insecure households may cope by purchasing

inexpensive foods (that tend to be less healthy), receiving help from others, watering down food and drink, selling personal items, or growing food in a garden. Moreover, Weinfield et al. (2014) reports food insecure households often have to choose between purchasing food and paying for other necessities such as medical bills, living expenses, and transportation.

In a situation of food insecurity with diet insufficiency, individuals may be at risk for malnutrition, which can lead to poor overall health, low energy availability, nutrient deficiencies, decreased immune system, and physical impairment. It is reported that food insecurity and subsequent malnutrition can interfere with activities of daily life and cause one to live as if they were fourteen years older (Ziliak et al., 2009).

There are many programs dedicated to addressing and increasing the access to healthy, nutritious foods for those who are food insecure and program eligible, including but not limited to the National School Lunch Program and Breakfast Program, the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), and the Supplemental Nutrition Assistance Program (Holben & Marshall, 2017).

The Supplemental Nutrition Assistance Program (SNAP)

SNAP is one of the major federal food and nutrition assistance programs and is provisionally included in the Farm Bill legislation (FNS, 2019). The goal of the SNAP is to reduce hunger by increasing food security and food access for income-eligible households and individuals (Yaktine & Caswell, Eds., 2013). Individuals who are receiving other federal assistance may be categorically eligible for receiving SNAP benefits, or individuals are required to meet certain thresholds of income and assets to qualify for receiving benefits (FNS, 2020a). National SNAP participation data in 2019 indicates approximately 35.7 million households received supplemental food income totaling almost 55.6 billion dollars in benefits (FNS, 2020b).

SNAP benefits are a supplement to the household's income and are delivered via an electronic benefits transfer (EBT) card. Participants may purchase beverages, snacks, seeds and food-producing plants, grain products, fruits, vegetables, dairy products, and protein products such as meat, fish and poultry (FNS, 2020c). Benefits may not be used on non-food items, toiletries, pet food, hot prepared food, or food meant to be consumed onsite (e.g., restaurant, etc.) (FNS, 2020c).

SNAP Participation in Iowa

In Iowa, SNAP is known as Food Assistance and delivered by the Iowa Department of Human Services. In 2019, approximately 154,000 households and 344,000 individuals received monthly food assistance with an annual total of about $424 million in program benefits (State Data Center of Iowa, 2020). The average benefits per person per month was $110.31 (State Data Center of Iowa, 2020). Polk County and Linn County had the highest program participation with 29,247 households and 64,717 monthly participants and 12,182 households and 326,340 monthly participants, respectively (State Data Center of Iowa, 2020).

Despite the nutrition education component of SNAP (SNAP-Ed), the program itself does not include a nutrition requirement in terms of the foods that are purchased. Currently, programs such as "Double Up Food Bucks" exist, which incentivizes fruit and vegetable purchases, but previous research suggests participation in such programs can be confusing for participants (Cohen et al., 2019). Federal funding is available for nutrition interventions to improve the diet quality of SNAP participants, yet there is not sufficient research on the most effective methods and program models to do so, which keep all the stakeholders' needs and preferences in mind.

Cooperative Extension

State-level Extension and Outreach organizations are uniquely tasked and equipped to develop client-centered nutrition and health programming, provide the public with access to

research-based information, and meet the unique health and education needs of their local community. Historically, Cooperative Extension was established in partnership with land-grant universities and assigned the responsibility to conduct research and provide education related to agriculture in order to address rural concerns. It has since expanded from agriculture to serve the general public by addressing other diverse topics, including nutrition, wellness, and food safety (National Institute of Food and Agriculture, n.d.).

Iowa State University (ISU) is the land-grant university and home to the state Extension service in Iowa. One of the primary goals of ISU Extension and Outreach is to "engage all Iowans with access to research-based education and information" by way of making reliable information accessible, providing educational experiences, forming partnerships to increase Iowan's access to education, and utilizing program feedback for improvement and future programming needs. Moreover, ISU Extension and Outreach aims to reach underserved groups and emphasize diversity and inclusion (Iowa State University Extension and Outreach, 2018).

Traditional Extension programming has primarily focused on group-based, face-to-face interactions. However, given limited resources available and consumer-demand, more indirect education methods are being implemented (Gould et al., 2014; Case et al., 2011; Bahl & Francis, 2016; Campbell et al., 2013). In the technology age, more individuals have access to the internet and social media, which presents new avenues and platforms to reach populations with educational resources and information.

In Iowa, it is estimated that a majority of households have a computer (89.0%) and a broadband internet subscription (80.8%) (U.S. Census Bureau, 2019). According to Pew Research Center (2019a), 96% of Americans own a cellphone and 81% own a smartphone. On a national level, the number of adults using social media had steadily increased from 2012 to 2016

but has now largely leveled off, with a notable exception in the increased use of Instagram (Perrin & Anderson, 2019).

Social media utilization appears to be affected by income, rurality, and race/ethnicity. Adults with lower incomes use social media platforms (e.g., Facebook, Instagram, Snap Chat, and YouTube) less than their counterparts with higher incomes (Pew Research Center, 2019b). Lower utilization in the lower income population may be due to limited smartphone access, as social media is often accessed on a smartphone (Pew Research Center, 2019a). In terms of rurality, fewer rural-residing adults utilize social media than those who dwell in suburban or urban areas. Finally, race and ethnicity also impacts social media platform preference. For example, it appears those who are Hispanic or Latino use WhatsApp more than other groups; whereas, those who are White report using Pinterest more than other groups (Pew Research Center, 2019b).

The near ubiquity of internet, social media, and mobile phones presents a unique challenge and opportunity for educational organizations such as Cooperative Extension to adapt to the current technological environment and provide learning opportunities and information on novel platforms that are relevant and accessible to the consumer. Moreover, economic, environmental, and racial differences in technology use may provide vital information to Extension and Outreach on how and where to reach historically underserved audiences.

In order for Extension specialists to create relevant programs and educational resources for their clientele, it is crucial to assess and understand the unique attributes and characteristics of their population, including values, beliefs, and preferences to best meet true needs and promote relevant change (Summer et al., 1997). The employment of Social Marketing Theory (SMT) in the program development process informs researchers and those who develop health

programming and messaging by identifying topics and themes relevant to the target population to bring about behavior change (Lefebvre & Rochlin, 1997).

Social Marketing Theory

The SMT cycle is a program development model consisting of six steps including 1) planning and strategy, 2) selecting channels and materials, 3) developing, testing, and refining the program, 4) implementation, 5) assessing effectiveness, and 6) using feedback to update or adapt the program (Figure 2-2; Lefebvre & Rochlin, 1997). SMT focuses on bringing about behavior change that benefits both individuals as well as society at large, utilizing an approach that includes the target audience or population in the process of program development (Lefebvre & Rochlin, 1997). In this way, SMT is consumer-focused and not expert-driven, which allows programming and messaging to meet the real and present needs of the target audience and not the perceived needs of that group (Lefebvre and Rochlin, 1997). SMT is effective for development of client-centered nutrition, wellness, and food safety programs (Snow & Benedict, 2003; Roy et al, 2016; Keane & Francis, 2018).

SMT emphasizes programs and messaging that are targeted and relevant to the desired audience and most importantly, effective. In this way, SMT employs commercial marketing principles like market segmentation and the concepts of the marketing mix (product, place, price and promotion) to encourage and create behavior change by emphasizing the value and the benefit to the consumer, while considering the greater environmental context that may affect decision-making (Lefebvre & Rochlin, 1997; Storey et al., 2008; Snow & Benedict, 2003).

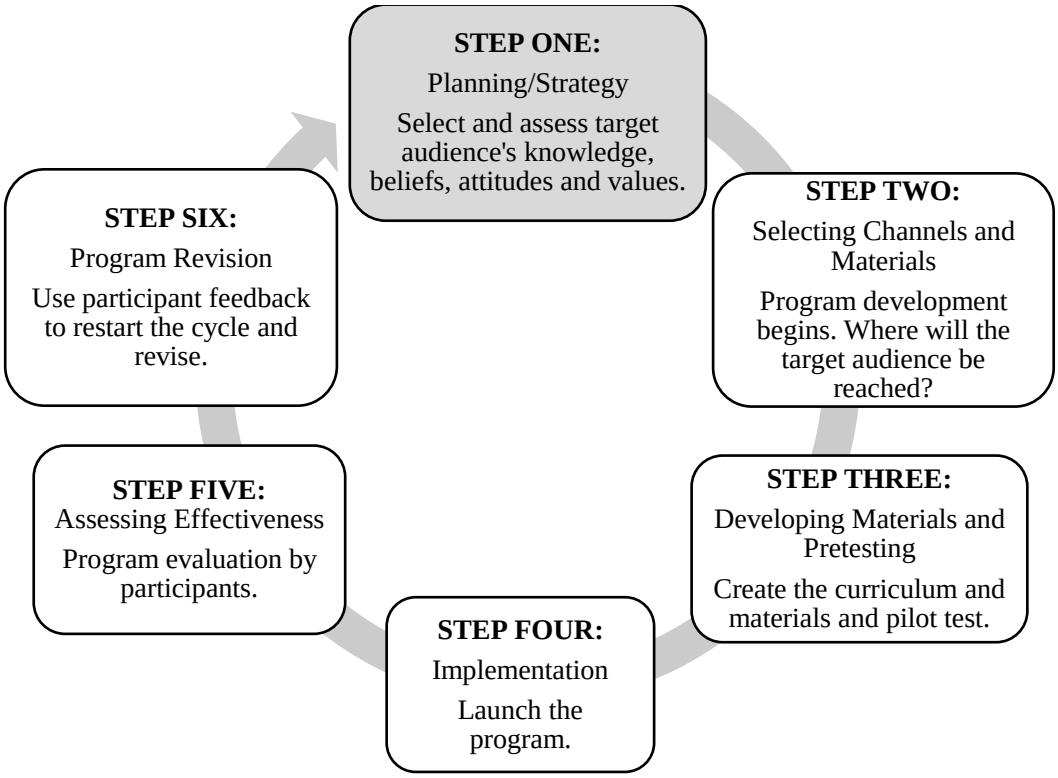

Figure 2-2. Social Marketing Theory Cycle

In the first stage of planning and strategy, SMT includes a comprehensive assessment of the needs and preferences of a target audience via modalities such as surveys, focus groups, and interviews to assess their current knowledge, beliefs, attitudes, and values, which may affect their likelihood to make a desired behavior change (Snow & Benedict, 2003; Francis et al., 2011). It is crucial to collect information on the audience's preferences, media use, communication styles, and unique factors that may affect behaviors (Storey et al., 2008).

Once a needs assessment has been conducted, the program development starts in stage two of selecting what materials will be used and where the target audience will be reached. Stage three marks the development of the program and piloting testing the program with the desired audience so that it can be modified as necessary. For example, Francis et al. (2011) conducted

usability testing with their target audience to assess how well participants navigated a website with targeted messaging.

Once the program is developed, tested, and modified, the program can be implemented fully, evaluated for effectiveness, and used to restart the process for program improvement (Lefebvre & Rochlin, 1997). For example, the aforementioned website developed by Francis et al. was found to be reaching a demographic different from who it had been developed to reach; therefore, it was revised and evaluated for effectiveness through online polls, quizzes, and website usage data (Francis et al., 2012). Due to the nature of continuous improvement, SMT is an excellent program development model to be used by Extension educators in order to ensure that programming is reaching the intended audience and promoting positive behavior change.

In summary, health is impacted by many factors. Community-based programs delivered through local agencies such as Extension and Outreach may help overcome SDOH barriers and increase consumer access to pertinent health information. However, in order to do so effectively, it is important to understand the needs and preferences of key stakeholders and target audiences, and involve them in the program development processes.

References

Academy of Nutrition and Dietetics. (2011). *Consumer knowledge of home food safety practices survey.* Retrieved from: http://www.eatright.org/~/media/homefoodsafety/multimedia/downloads/consumer%20knowledge%20of%20home%20food%20safety%20practices%20survey.ashx

Adedokun, O. A., Plonski, P., Jenkins-Howard, B., Cotterill, D. B., & Vail, A. (2018). Healthy Choices for Every Body adult curriculum improves participants' food resource management skills and food safety practices. *Journal of Nutrition Education and Behavior*, 50(6), 638-644.

American Psychological Association. (n.d.). *Socioeconomic status.* Retrieved from: https://www.apa.org/topics/socioeconomic-status/

America's Health Rankings. (2019a). *Annual report: Iowa summary 2019*. United Health Foundation. Retrieved from: https://www.americashealthrankings.org/explore/annual/measure/Overall/state/IA?edition-year=2019

America's Health Rankings. (2019b). *Annual report: Obesity in Iowa*. United Health Foundation. Retrieved from: https://www.americashealthrankings.org/explore/annual/measure/Obesity/state/IA?edition-year=2019

America's Health Rankings. (2020a). *Annual report: National multiple chronic conditions.* United Health Foundation. Retrieved from: https://www.americashealthrankings.org/explore/annual/measure/CHC/state/ALL

America's Health Rankings. (2020b). *Annual report: Physical inactivity*. United Health Foundation. Retrieved from: https://www.americashealthrankings.org/explore/annual/measure/Sedentary/state/ALL

America's Health Rankings. (2020c). *Annual report: Fruit and vegetable consumption.* United Health Foundation. Retrieved from: https://www.americashealthrankings.org/explore/annual/measure/fvcombo/state/ALL?edition-year=2020

Andress, L., & Fitch, C. (2016). Rural health inequities and the role of Cooperative Extension. *Journal of Extension*, 54(3), n3. Retrieved from: https://joe.org/joe/2016june/a4.php

Artiga, S. & Hinton, E. (2018). *Beyond health care: The role of social determinants in promoting health and health equity*. Kaiser Family Foundation. Retrieved from: https://www.kff.org/disparities-policy/issue-brief/beyond-health-care-the-role-of-social-determinants-in-promoting-health-and-health-equity/

Bahl, M., & Francis, S. L. (2016). Promoting nutrition and wellness statewide through an electronic newsletter. *Journal of Extension, 54*(3), 3TOT4. Retrieved from: https://joe.org/joe/2016june/tt4.php

Bankoski, A., Harris, T. B., McClain, J. J., Brychta, R. J., Caserotti, P., Chen, K. Y., Berrigan, D., Troiano, R. P., & Koster, A. (2011). Sedentary activity associated with metabolic syndrome independent of physical activity. *Diabetes care*, *34*(2), 497-503. doi: 10.2337/dc10-0987

Benavente, L. M., Jayaratne, K. S. U., & Jones, L. (2009). Challenges, alternatives, and educational strategies in reaching limited income audiences. *Journal of Extension, 47*(6), 1-9. Retrieved from: https://www.joe.org/joe/2009december/rb2.php

Campbell, C., Koszewski, W. M., & Behrends, D. (2013). The effectiveness of distance education, using blended method of delivery for limited-resource audiences in the nutrition education program. *Journal of Extension, 51*(4). Retrieved from: https://www.joe.org/joe/2013august/a4.php

Case, P., Cluskey, M., & Hino, J. (2011). Online nutrition education: Enhancing opportunities for limited-resource learners. *Journal of Extension*, *49*(6), n6. Retrieved from: https://joe.org/joe/2011december/rb5.php

Center for Nutrition Policy and Promotion. (2018). *How the HEI is scored.* United States Department of Agriculture, Food and Nutrition Service. Retrieved from: https://www.fns.usda.gov/how-hei-scored

Center for Nutrition Policy and Promotion. (2019). *HEI scores for Americans.* United States Department of Agriculture, Food and Nutrition Service. Retrieved from: https://www.fns.usda.gov/hei-scores-americans

Centers for Disease Control and Prevention. (2018). *Estimates of foodborne illness in the United States.* Retrieved from: https://www.cdc.gov/foodborneburden/2011-foodborne-estimates.html

Centers for Disease Control and Prevention. (2020). *Key facts about food poisoning*. Retrieved from: https://www.cdc.gov/foodsafety/food-poisoning.html

Cohen, A. J., Oatmen, K. E., Heisler, M., Hesterman, O. B., Murphy, E. C., Zick, S. M., & Richardson, C. R. (2019). Facilitators and barriers to Supplemental Nutrition Assistance Program incentive use: Findings from a clinic intervention for low-income patients. *American Journal of Preventive Medicine*, *56*(4), 571-579.

Coleman-Jensen, A., Rabbitt, M. P., Gregory, C. A., & Singh, A. (2020). *Household food security in the United States in 2019 (ERR-275).* United States Department of Agriculture, Economic Research Service. Retrieved from: https://www.ers.usda.gov/publications/pub-details/?pubid=99281

Dohrn, I. M., Kwak, L., Oja, P., Sjöström, M., & Hagströmer, M. (2018). Replacing sedentary time with physical activity: a 15-year follow-up of mortality in a national cohort. *Clinical Epidemiology*, *10*, 179–186. doi:10.2147/CLEP.S151613

Economic Research Service. (2013). *Rural-urban continuum codes.* United States Department of Agriculture. Retrieved from: https://www.ers.usda.gov/data-products/rural-urban-continuum-codes/

Economic Research Service. (2020). *Definitions of food security*. U.S. Department of Agriculture. Retrieved from: https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/definitions-of-food-security/

Economic Research Service. (2021). *Food security in the U.S.: Overview*. United States Department of Agriculture. Retrieved from: https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/

Food and Nutrition Service. (2019). *Farm bill*. United States Department of Agriculture. Retrieved from: https://www.fns.usda.gov/farmbill

Food and Nutrition Service. (2020a). *SNAP eligibility*. United States Department of Agriculture. Retrieved from: https://www.fns.usda.gov/snap/recipient/eligibility

Food and Nutrition Service. (2020b). *SNAP data tables: National level annual summary*. United States Department of Agriculture. Retrieved on December 16, 2020 from: https://www.fns.usda.gov/pd/supplemental-nutrition-assistance-program-snap#:~:text=SNAP%20Data%20Tables%20%20%20National%20Level%20Annual,%20%20%20%203%20more%20rows%20.

Food and Nutrition Service. (2020c). *What can SNAP buy?* United States Department of Agriculture. Retrieved from: https://www.fns.usda.gov/snap/eligible-food-items

Francis, S. L., Martin, P., & Taylor, K. (2011). Revising an Extension education website for limited resource audiences using social marketing theory. *Journal of Extension*, *49*(6), 6FEA7. Retrieved from: https://joe.org/joe/2011december/a7.php

Francis, S. L., Martin, P., & Taylor, K. (2012). Consumer-centered Extension education website increases usage. *Journal of Extension*, *50(5*), 5TOT2. Retrieved from: https://www.joe.org/joe/2012october/tt2.php

Garcia, S. P., Haddix, A., & Barnett, K. (2018). Peer reviewed: Incremental health care costs associated with food insecurity and chronic conditions among older adults. *Preventing chronic disease*, *15*.

Gould, F. I., Steele, D., & Woodrum, W. J. (2014). Cooperative Extension: A century of innovation. *Journal of Extension*, *52*(1), 1-5. Retrieved from: https://www.joe.org/joe/2014february/comm1.php

Guenther, P. M., & Luick, B. R. (2015). Improved overall quality of diets reported by Expanded Food and Nutrition Education Program participants in the mountain region. *Journal of Nutrition Education and Behavior*, *47*(5), 421-426.

Haynes-Maslow, L., Parsons, S. E., Wheeler, S. B., & Leone, L. A. (2013). Peer reviewed: A qualitative study of perceived barriers to fruit and vegetable consumption among low-income populations, North Carolina, 2011. *Preventing chronic disease*, *10*.

Holben, D. H., & Marshall, M. B. (2017). Position of the academy of nutrition and dietetics: Food insecurity in the United States. *Journal of the Academy of Nutrition and Dietetics*, *117*(12), 1991-2002.

Iowa Community Indicators Program. (n.d.). *Racial and ethnic minority group percentage of the population, historical.* Retrieved on January 7, 2020 from: https://www.icip.iastate.edu/tables/population/minority

Iowa State University Extension and Outreach. (2018). *Extension and Outreach strategic plan, 2017-2022.* Retrieved from: https://www.extension.iastate.edu/sites/www.extension.iastate.edu/files/www/2017-2022-ExtensionOutreachStrategicPlan.pdf

Jensen, N. L., Pedersen, H. S., Vestergaard, M., Mercer, S. W., Glümer, C., & Prior, A. (2017). The impact of socioeconomic status and multimorbidity on mortality: A population-based cohort study. *Clinical Epidemiology*, *9*, 279.

Keane, M. N., & Francis, S. L. (2018). Latinos Living Well—A diabetes education program for rural-residing Latinos. *Journal of Extension.* 56(4), v56-4rb1. Retrieved from: https://joe.org/joe/2018august/rb1.php

Kyu, H. H., Bachman, V. F., Alexander, L. T., Mumford, J. E., Afshin, A., Estep, K., Veerman, J. L., Delwiche, K., Iannarone, M. L., Moyer, M. L., Cercy, K., Vos, T., Murray, C. J. L., & Forouzanfar, M. H. (2016). Physical activity and risk of breast cancer, colon cancer, diabetes, ischemic heart disease, and ischemic stroke events: systematic review and dose-response meta-analysis for the Global Burden of Disease Study 2013. *BMJ*, *354*, i3857. doi: 10.1136/bmj.i3857

Lefebvre, R.C. & Rochlin, L. (1997). Social Marketing. In K. Glanz, F.M. Lewis, & B.K. Rimer. (Eds.), *Health behavior and health education theory*, 2nd edition (pp. 384- 402). San Francisco, CA: Jossey Bass Publishing.

Leung, C. W., Epel, E. S., Ritchie, L. D., Crawford, P. B., & Laraia, B. A. (2014). Food insecurity is inversely associated with diet quality of lower-income adults. *Journal of the Academy of Nutrition and Dietetics*, *114*(12), 1943-1953.

Machlin S. R., & Soni A. (2013). Health care expenditures for adults with multiple treated chronic conditions: Estimates from the medical expenditure panel survey, 2009. *Preventing chronic disease, 10:120172.* DOI: http://dx.doi.org/10.5888/pcd10.120172

Masters, R., Anwar, E., Collins, B., Cookson, R., & Capewell, S. (2017). Return on investment of public health interventions: A systematic review. *Journal of Epidemiology and Community Health*, *71*(8), 827-834.

Matthews, C. E., Moore, S. C., Sampson, J., Blair, A., Xiao, Q., Keadle, S. K., Hollenbeck, A., & Park, Y. (2015). Mortality benefits for replacing sitting time with different physical activities. *Medicine and Science in Sports and Exercise*, *47*(9), 1833–1840. doi:10.1249/MSS.0000000000000621

Matthews, K. A., Croft, J. B., Liu, Y., Lu, H., Kanny, D., Wheaton, A. G., Cunningham, T. J., Khan, L. K., Carabello, R. S., Holt, J. B., Eke, P. I., & Giles, W.H. (2017). Health-related behaviors by urban-rural county classification—United States, 2013. *MMWR Surveillance Summaries,* 66(5), 1-8. http://dx.doi.org/10.15585/mmwr.ss6605a1

McClelland, J. W., Jayaratne, K. S. U., & Bird, C. L. (2013). Nutrition education brings behavior and knowledge change in limited-resource older adults. *Journal of Extension*, *51*(2), n2. Retrieved from: https://www.joe.org/joe/2013april/a1.php

National Center for Chronic Disease Prevention and Health Promotion, Division of Population Health. (2015). *BRFSS prevalence & trends data [online]*. Centers for Disease Control and Prevention. Retrieved February 12, 2021 from: https://www.cdc.gov/brfss/brfssprevalence/

National Center for Chronic Disease Prevention and Health Promotion. (2019). *Rural health: Preventing chronic diseases and promoting health in rural communities.* Centers for Disease Control and Prevention. Retrieved on January 7, 2020 from: https://www.cdc.gov/chronicdisease/resources/publications/factsheets/rural-health.htm#targetText=Chronic%20diseases%20are%20the%20leading,some%20populations%20more%20than%20others.&targetText=Health%20Care%20Access%3A%20Rural%20counties,emergency%20facilities%2C%20and%20transportation%20options.

National Center for Chronic Disease Prevention and Health Promotion, Division of Nutrition, Physical Activity and Obesity. (2020). *REACH 2018 recipients*. Centers for Disease Control and Prevention. Retrieved from: https://www.cdc.gov/nccdphp/dnpao/state-local-programs/reach/current_programs/recipients.html#

National Institute of Food and Agriculture. (n.d.). *Cooperative extension history.* United States Department of Agriculture. Retrieved from: https://nifa.usda.gov/cooperative-extension-history.

NEJM Catalyst. (2017). *Social determinants of health (SDOH).* Retrieved from: https://catalyst.nejm.org/social-determinants-of-health/

Office of the Assistant Secretary for Planning and Evaluation. (2020). *Poverty guidelines*. U.S. Department of Health & Human Services. Retrieved from: https://aspe.hhs.gov/poverty-guidelines

Office of Disease Prevention and Health Promotion. (n.d.). Educational and community-based programs. *Healthy People 2020.* U.S. Department of Health and Human Services. Retrieved from: https://www.healthypeople.gov/2020/topics-objectives/topic/educational-and-community-based-programs

Office of Disease Prevention and Health Promotion. (n.d.). Food insecurity. *Healthy People 2020.* U.S. Department of Health and Human Services. Retrieved from: https://www.healthypeople.gov/2020/topics-objectives/topic/social-determinants-health/interventions-resources/food-insecurity

Office of Disease Prevention and Health Promotion. (n.d.). Social determinants of health. *Healthy People 2020.* U.S. Department of Health and Human Services. Retrieved from: https://www.healthypeople.gov/2020/topics-objectives/topic/social-determinants-of-health

Owen, N., Healy, G. N., Matthews, C. E., & Dunstan, D. W. (2010). Too much sitting: The population-health science of sedentary behavior. *Exercise and Sport Sciences Reviews*, *38*(3), 105. doi: 10.1097/JES.0b013e3181e373a2

Pender, J., Hertz, T., Cromartie, J., & Farrigan, T. (2019). *Rural America at a glance: 2019 edition*. United States Department of Agriculture, Economic Research Service. Retrieved from: https://www.ers.usda.gov/publications/pub-details/?pubid=95340

Perrin, A., & Anderson, M. (2019). *Share of U.S. adults using social media, including Facebook, is mostly unchanged since 2018.* Pew Research Center: Fact Tank, News in the Numbers. Retrieved on December 16, 2020 from: https://www.pewresearch.org/fact-tank/2019/04/10/share-of-u-s-adults-using-social-media-including-facebook-is-mostly-unchanged-since-2018/.

Pew Research Center. (2019a). *Mobile fact sheet.* Retrieved December 16, 2020 from: https://www.pewinternet.org/fact-sheet/mobile/

Pew Research Center. (2019b). *Social media fact sheet*. Retrieved on December 16, 2020 from: https://www.pewresearch.org/internet/fact-sheet/social-media/

Rockette-Wagner, B., Edelstein, S., Venditti, E. M., Reddy, D., Bray, G. A., Carrion-Petersen, M. L., Dabelea, D., Delahanty, L. M., Florez, H., Franks, P. W., Montez, M. G., Rubin, R., Kriska, A. M., & Diabetes Prevention Program Research Group. (2015). The impact of lifestyle intervention on sedentary time in individuals at high risk of diabetes. *Diabetologia*, *58*(6), 1198-1202. doi: 10.1007/s00125-015-3565-0

Roy, A., Francis, S. L., Shaw, A., & Rajagopal, L. (2016). Promoting food safety awareness for older adults by using online education modules. *Journal of Extension*, *54*(1), v54-1tt8. Retrieved from: https://www.joe.org/joe/2016february/tt8.php

Rural Health Information Hub. (2018). *Barriers to health promotion and disease prevention in rural areas.* Retrieved on January 22, 2020 from: https://www.ruralhealthinfo.org/toolkits/health-promotion/1/barriers

Rural Health Information Hub. (2020). *Social determinants of health for rural people*. Retrieved from: https://www.ruralhealthinfo.org/topics/social-determinants-of-health

Sankavaram, K., & Mehta, M. (2017). Maryland Expanded Food and Nutrition Education program participants show improved diet quality as determined by HEI scores. *Journal of Nutrition Education and Behavior*, *49*(7), S57-S58.

Schwingshackl, L., Bogensberger, B., & Hoffmann, G. (2018). Diet quality as assessed by the healthy eating index, alternate healthy eating index, dietary approaches to stop hypertension score, and health outcomes: An updated systematic review and meta-analysis of cohort studies. *Journal of the Academy of Nutrition and Dietetics*, *118*(1), 74-100. doi: 10.1016/j.jand.2017.08.024

Seligman, H. K., Laraia, B. A., & Kushel, M. B. (2010). Food insecurity is associated with chronic disease among low-income NHANES participants. *The Journal of Nutrition*, 140(2), 304-310.

Semega, J., Kollar, M., Shrider, E. A., & Creamer, J. (2020). Income and poverty in the United States: 2019. *U.S. Census Bureau, Current Population Reports, P60-270.* Retrieved from: https://www.census.gov/content/dam/Census/library/publications/2020/demo/p60-270.pdf

Shea, S., Lima, J., Diez-Roux, A., Jorgensen, N. W., & McClelland, R. L. (2016). Socioeconomic status and poor health outcome at 10 years of follow-up in the multi-ethnic study of atherosclerosis. *PLoS One*, *11*(11).

Snow, G., & Benedict, J. (2003). Using social marketing to plan a nutrition education program targeting teens. *Journal of Extension*, *41*(6), 6FEA4. Retrieved from: https://www.joe.org/joe/2003december/a4.php

State Data Center of Iowa. (2020). *Food assistance program*. Iowa Department of Human Services. Retrieved on December 16, 2020 from: https://www.iowadatacenter.org/data/dhs/food

State Data Center of Iowa & Iowa Commission on the Status of African-Americans. (2020). *African-Americans in Iowa: 2020.* Retrieved from: https://www.iowadatacenter.org/Publications/aaprofile2020.pdf

State Data Center of Iowa & Office of Latino Affairs. (2020). *Latinos in Iowa: 2020.* Retrieved from: https://www.iowadatacenter.org/Publications/latinos2020.pdf

Storey, J. D., Saffitz, G. B., & Rimon, J. G. (2008). Social marketing. In Glanz, K., Rimer, B. K., & Viswanath, K. (Eds.), *Health behavior and health education: Theory, research, and practice*. John Wiley & Sons.

Summer, L., Briggs, R., & Bell, L. (1997). *Needs assessment resource manual: A guide for state nutrition education networks.* Washington, DC: Health Systems Research, Inc.

U.S. Census Bureau. (2019). *Quick Facts: United States; Iowa.* U.S. Department of Commerce. Retrieved on December 14, 2020 from: https://www.census.gov/quickfacts/fact/table/US,IA/PST045219

U.S. Food and Drug Administration. (2017). *2016 Food safety survey report.* Retrieved from: https://www.fda.gov/food/cfsan-consumer-behavior-research/2016-food-safety-survey-report

Weinfield, N. S., Mills, G., Borger, C., Gearing, M., Macaluso, T., Montaquila, J., & Zedlewski, S. (2014). *Hunger in America 2014 – National report.* Feeding America. Retrieved from: https://www.feedingamerica.org/sites/default/files/2020-02/hunger-in-america-2014-full-report.pdf

World Health Organization. (n.d.). *Social determinants of health*. Retrieved from: https://www.who.int/social_determinants/sdh_definition/en/

Yaktine, A. L., Caswell, J. A., Eds. (2013). History, background and goals of the Supplemental Nutrition Assistance Program. In *Supplemental nutrition assistance program: Examining the evidence to define benefit adequacy.* Washington, DC: The National Academies Press.

Yeung, H. F., Bruhn, C., Blackburn, M., Ganthavorn, C., Martin, A., Mendoza, C., Neelon, M., Smith, D., Soule, K., Spezzano, T. M., Barrett, T., & Feng, Y. (2019). Evaluation of in-person and on-line food safety education programs for community volunteers. *Food Control*, 99, 34-39.

Young, D. R., Hivert, M. F., Alhassan, S., Camhi, S. M., Ferguson, J. F., Katzmarzyk, P. T., Lewis, C. E., Owen, N., Perry, C. K., Siddique, J., & Yong, C. M. (2016). Sedentary behavior and cardiovascular morbidity and mortality: A science advisory from the American Heart Association. *Circulation*, *134*(13), e262-e279. doi: 10.1161/CIR.0000000000000440

Ziliak, J. P., Gundersen, C., & Haist, M. (2009). The causes, consequences, and future of senior hunger in America, 2008. *University of Kentucky Center for Poverty Research Special Reports.* Retrieved from: https://pdfs.semanticscholar.org/8b96/75cf8502c5830aa48bfe59e3c3d4a3c99245.pdf

CHAPTER 3. METHODOLOGY

Research Design

A mixed-methods research approach was utilized to identify and assess community nutrition programming needs. Quantitative research methodology was used in Study One to identify current and prospective Extension customers' health and wellness programming needs and preferences. Logistic regression was done with social determinant of health (SDOH) variables to predict Extension program use, and interest in participating in health-related programming. Qualitative research methodology was used in Study Two to gather food retailers' perspectives on expert-proposed strategies to improve food choices in SNAP participants. Both study protocols were reviewed by Iowa State University's Institutional Review Board and declared exempt (Chapters 4, Appendix A; Chapter 5, Appendix A).

Study One. Consumer Programming Preferences and Social Determinant of Health Predictors for Program Interest and Utilization

Survey Development

Iowa State University Extension and Outreach (ISUEO) conducted a statewide, comprehensive, online health and wellness needs assessment to identify programming needs and preferences of current and prospective Extension customers in Iowa. The needs assessment survey was developed collaboratively by a team of State Extension Specialists and a graduate research assistant from the Food Science and Human Nutrition (FSHN), and Apparel, Events & Hospitality Management (AESHM) departments at Iowa State University.

The survey consisted of 70 questions on various topics, including: sociodemographics, Extension program interest and preferences, food and nutrition behaviors, physical activity, general health and chronic disease, food safety, and food security (Chapter 4, Appendix B). Participants also answered 10 questions about the impact of the COVID-19 pandemic on their

food procurement, food practices, stress level, and physical activity routines, which has been described elsewhere (Bahl et al., 2020). Additionally, the COVID-19 addendum to the survey was necessary to control for pandemic-related changes to the normal food, nutrition, physical activity, and health behaviors the needs assessment intended to assess. The survey instructions clearly delineated the questions inquiring about pandemic-related behavior from the questions inquiring about normal, pre-pandemic behavior (Chapter 4, Appendix B).

Validated tools and questionnaires

Validated tools and questionnaires were selected and included in the survey when available and relevant. Scoring information for three validated tools is shown in Table 3-1. The Rapid Eating Assessment for Participants [Shortened Version] (REAP-S) is a 13-question food frequency questionnaire that was used to assess diet quality, with a minimum score of 13 and maximum score of 39 (Segal-Isaacson et al., 2004). Diet quality scores correlate with the Healthy Eating Index [HEI], with higher scores indicating higher diet quality. Multiple health-related questions were selected from The Behavioral Risk Factor Surveillance System (BRFSS) questionnaire for ease of comparison, including self-reported health status, diagnoses of chronic diseases, and general self-reported physical activity level (Centers for Disease Control and Prevention, 2018).

Questions regarding daily physical activity type and amount of sedentary time were selected from the National Health Interview Survey (NHIS) (National Center for Health Statistics, n.d.). A 10-question food safety questionnaire was included to assess consumer food safety behaviors, with a minimum score of 0 and maximum score of 10 (University of Hawaii Cooperative Extension Service, 2006). Higher scores indicate more food safety behaviors are practiced. The last validated tool included in the needs assessment survey was a 2-question food

security module (Hager et al., 2010). A score of 0 (no food concerns) indicates food security, while a score of 1 or 2 indicates food insecurity.

Table 3-1. Validated Tool Scoring Matrices

Validated Tool	**Scoring Matrix**			**Score Ranges**	
REAP-S[a] (diet quality)	Usually/Often	Sometimes	Rarely/Never	Minimum	Maximum
	1 point	2 points	3 points	13 points	39 points
Food Safety[b]	Yes	No	Sometimes	0 points	10 points
	1 point	0 points	0.5 points		
Food Security[c]	Often true/ Sometimes true	Never true	Don't know	0 points	1-2 points
	1 point	0 points	0 points		

[a]Segal-Isaacson et al., 2004
[b]University of Hawaii Cooperative Extension Service, 2006
[c]Hager et al., 2010

Recruitment and Data Collection

The survey was created and distributed online via Qualtrics™ between April and June 2020. Data collection was managed by Qualtrics™ to collect responses from participants with diverse social characteristics (i.e., age, race, income level, and location). Iowa's population was approximately 3.15 million in 2019 with approximately 60% of individuals between the ages of 18 and 65 years. Iowa's population is predominantly White (90.6%); however, approximately 9% of the population includes those who identify as BIPOC (Black [4.1%], Asian [2.7%], Indigenous or multiple races [2.7%]) (U.S. Census Bureau, 2019). The aim was to recruit a representative sample from Iowa. However, oversampling was done for those between ages 25 and 35 years, age 55 years and older, persons of color, and those with limited resources.

The desired sample size was at least 450 respondents. To complete the survey, participants had to be at least 18 years of age, a resident of Iowa, literate, have access to the internet, and serve on one of the market research panels contracted with Qualtrics™. If they did not meet these criteria, they were excluded from participating. Eligible participants received an

email invitation to complete the survey, including the duration of time expected to complete the survey, and what incentives were available for completion. The invitation to participate did not include any information about the content of the survey to avoid self-selection bias. Respondents were able to earn incentives for participating in the survey from the Qualtrics™ market panel, however, this was not directly provided by the research team.

Data Analysis

Statistical analyses were conducted with the IBM Statistical Package for Social Sciences (SPSS), version 26.0. Survey responses were coded, and text-box responses were reviewed, categorized, and coded if possible. Survey responses were analyzed using general descriptive statistics. Average ranks for preferred program formats among respondents were computed by dividing the total sum of rankings by the number of respondents. They were placed in order from lowest to highest, with lowest score being most preferred (i.e. ranked highest). Diet quality, food safety, and food security scores were computed in accordance with the validated tools scoring values (Table 3-1).

Presence of chronic disease was determined by creating a new variable from the chronic condition table (Chapter 4, Appendix B: Q48). First, a sum of the number of conditions reported was calculated, then a dichotomous variable was created for the presence of chronic disease (i.e. at least 1 condition reported = yes vs. zero conditions reported = no).

Other selected variables were recoded into dichotomous or condensed variables for statistical analysis, listed below:

- Educational attainment: “Less than high school” and “More than high school”
- Marital status: “Married” and “Not married”
- Race: “White” and “BIPOC”

- Income: "< $39,999", "$40,000-$89,999", and "> $90,000"
- Community Promotes Health: "Disagree/Strongly Disagree", "Neutral", and "Agree/Strongly Agree"
- Interest in Program Participation: "Yes", and "No/I'm not sure"

Logistic regression analysis

Binomial logistic regression was done to determine full and reduced models predicting survey respondents' current Extension program use, and interest in participating in a health, wellness, or food safety program, based on selected SDOH variables (11 total variables). Proxy variables selected for each SDOH category to be used logistic regression analysis are listed in Table 3-2 with the corresponding reference group, for ease of model interpretation.

Reference groups were selected to align with SDOH characteristics that are associated with better health outcomes, with the comparison groups representing characteristics generally associated with barriers to health (e.g. urban is the reference, because rurality is associated with more barriers to health; food security is the reference, because food insecurity is associated with more barriers to health, etc.).

Reduced models were selected with consideration of -2 log likelihood values, Nagelkerke R^2 values, and the p-values associated with the predicted variables. Chi-square tests for model coefficients and the Hosmer and Lemeshow goodness-of-fit test were done to evaluate the model fit. Odds ratios with 95% confidence intervals for predicted variables are provided for reduced models. An alpha level of $p < 0.05$ was used to determine statistical significance.

Table 3-2. SDOH Proxy Variables and Logistic Regression Reference Groups

SDOH Categories	Proxy Variables	Reference Groups
Health and Health Care	General Health Status	Poor health
	Presence of Chronic Disease	No chronic disease
Economic Stability	Household Size	1 to 2 (people)
	Income Level	>$90,000
	Food Security Status	Food secure
Neighborhood and Built Environment	Perception of Community Promoting Health	Disagree or Strongly Disagree
	Rural vs. Urban Location	Urban
Social and Community Context	Race	White
	Ethnicity	Not Hispanic or Latino
	Marital Status	Married
Education	Educational Attainment	More than high school

Study Two. Food Retailers' Perspectives on Pilot Program Strategies to Promote Healthy Eating in SNAP Participants

Purpose and Training

Qualitative key informant interviews were conducted to gain insight and perspectives from food retailers on the feasibility, benefits, and challenges of selected expert-proposed strategies (i.e. incentives, disincentives, restrictions, stocking standards, and marketing programs) to promote healthy food choices in SNAP participants. Two of the primary investigators and four county-level Extension program specialists conducted interviews. The Extension program specialists were trained on the interview invitation protocol, informed consent protocol, audio recording protocol, and interview questions (Chapter 5, Appendix B).

Recruitment and Data Collection

To participate in an interview, the informants were required to be employed by a licensed food retail store participating in SNAP. Potential informants were identified based on Iowa counties with the highest participation in SNAP, the rural-urban code of the county, and the number and type of food retail settings by county (grocery or convenience store). Rural-urban codes allowed for comparison between rural and urban settings. A rural-urban code of 2 was used to identify urban counties and 6 for rural counties (Economic Research Service, 2013). The number and type of food retail settings identified the predominant retail settings serving SNAP participants in the selected counties. Once counties and food retailers were identified, corporate and local food retailer managers were invited to participate in an interview conducted by a member of the research team.

The primary investigators received contact information from corporate informants for local-level food retailer managers in the selected Iowa counties. The local Extension program specialists contacted the local-level food retailer managers within their respective counties to schedule interviews. The interview consisted of broad, open-ended questions regarding strategies to promote healthy eating and questions related to expert-recommended strategies, including: marketing, incentives, disincentives, restrictions and stocking standards (Chapter 5, Appendix B). Semi-structured in-person interviews were conducted with two corporate-level food retail managers and six local-level food retail managers (n=8). All interview recordings were submitted to Rev.com, an IRB-approved transcription service, to be transcribed verbatim. Interviewee identities were kept anonymous.

Data Analysis

Qualitative thematic analysis was conducted on the transcribed interviews. Members of the research team (n=4) independently reviewed and open-coded the two corporate-level

interviews. Key themes were agreed upon via consensus. Based on the key themes identified, two research team members collaboratively developed a codebook. The codebook was organized in the order of the interview questions (Chapter 5, Appendix B), and listed first-level codes with identified sub-codes, and second-level codes with identified sub-codes.

First-level codes summarized and described the general topic of the interview questions (e.g. Marketing: Product Placement) and related sub-codes provided specification within that group (e.g. store layout, shelf placement, "end caps"). Second-level codes and related sub-codes categorized and described more specific and analytical responses within the general topic (e.g. Marketing: Social Responsibility; sub-codes: stigma, corporate responsibility). A color-coded key was also applied to enhance the visualization of recurrent themes throughout the interviews.

Research team members used the final codebook to recode corporate-level interviews. Recoded interviews were compared for codebook consistency and reliability. Research team members used the codebook to code the local-level interviews (n=6). Results were discussed and agreed upon via consensus. Coded interviews were reviewed and qualitative data were compiled for corporate-level and local-level interviews separately. Key themes were then compared and contrasted between the two groups.

References

Bahl, M., Francis, S. L., Litchfield, R., Coleman, S., & Naig, A. (2020). Assessing and responding to COVID-19 pandemic nutrition and wellness impacts on Iowans. *Journal of Extension, 58*(6), v58-6rb2. Retrieved from: https://joe.org/joe/2020december/rb2.php

Centers for Disease Control and Prevention. (2018). *Behavioral Risk Factor Surveillance System Survey Questionnaire*. Atlanta, Georgia: U.S. Department of Health and Human Services.

Economic Research Service. (2013). *Rural-urban continuum codes.* United States Department of Agriculture. Retrieved from: https://www.ers.usda.gov/data-products/rural-urban-continuum-codes/

Hager, E. R., Quigg, A. M., Black, M. M., Coleman, S. M., Heeren, T., Rose-Jacobs, R., Cook, J. T., Ettinger de Cuba, S. A., Casey, P. H., Chilton, M., Cutts, D. B., Meyers, A. F., & Frank, D. A. (2010). Development and validity of a 2-item screen to identify families at risk for food insecurity. *Pediatrics*, 126(1), e26–e32. https://doi.org/10.1542/peds.2009-3146

National Center for Health Statistics. (n.d.). *Adult physical activity questions on the National Health Interview Survey, 1975-2012.* Centers for Disease Control and Prevention. Retrieved on December 29, 2020 from: https://www.cdc.gov/nchs/data/nhis/physicalactivity/pa_questions.pdf

Segal-Isaacson, C. J., Wylie-Rosett, J., & Gans, K. M. (2004). Validation of a short dietary assessment questionnaire: The Rapid Eating and Activity Assessment for Participants short version (REAP-S). *The Diabetes Educator*, *30*(5), 774-781.

University of Hawaii Cooperative Extension Service (2006). *Be safe: A home guide to help keep food safe*. Retrieved from: http://www.ctahr.hawaii.edu/oc/freepubs/pdf/FN-5.pdf

U.S. Census Bureau. (2019). *Quick Facts: United States; Iowa.* U.S. Department of Commerce. Retrieved on December 14, 2020 from: https://www.census.gov/quickfacts/fact/table/US,IA/PST045219

CHAPTER 4. CONSUMER PREFERENCES AND SOCIAL DETERMINANT OF HEALTH PREDICTORS FOR EXTENSION PROGRAM INTEREST AND UTILIZATION

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Abstract

Social determinants of health (SDOH) and lifestyle behaviors (e.g. sedentary time) are contributing to the rise in chronic diseases and poor health. Extension delivers research-based programming and is well-positioned nationally to address health disparities by creating and providing programming to underserved audiences. This study assessed the nutrition and wellness needs and preferences of Iowans (n=452). Respondents were primarily female (70.6%), non-Hispanic (89.6%), White (79.2%), and about one-half were 35 years or younger (47.6%). Respondents were split evenly between rural/urban, and food secure/insecure populations. General descriptive statistics assessed respondent characteristics and programming preferences. A binomial logistic regression analysis predicted the influence of SDOH variables on Extension use and interest in participating in a health-related program. Respondents preferred short, low-cost, online programs. Most have not used Extension (76.8%), but many were interested in participating in a health-related program (47.6%). Those who are persons of color ($p < 0.001$), Hispanic/Latino ($p= 0.030$), and food insecure ($p < 0.001$) were more likely to use Extension.

Those with less education (p= 0.011), and those with a presence of chronic disease (p= 0.036) were less likely to be interested in program participation. These results provide valuable information that informs future directions for program recruitment, content, and format.

Key words: Needs assessment, social determinants of health, Extension programming, online program delivery

Introduction

Chronic health conditions have been increasing due to lifestyle behaviors like sedentary behavior and poor diet quality. According to the National Center for Chronic Disease Prevention and Health Promotion [NCCDPHP] (2021), 60% of U.S. adults have at least one chronic disease and 40% have two or more. In addition to personal health-related behaviors, health outcomes are also influenced by the Social Determinants of Health (SDOH). SDOH are broadly defined as the conditions in which people spend their day-to-day lives, and are known to impact one's health and quality of life (Office of Disease Prevention and Health Promotion [ODPHP], n.d.).

There are five SDOH categories: economic stability (e.g. food insecurity, etc.), education (e.g. high school graduation), social and community context (e.g. location, marital status, etc.), health and health care (e.g. access to health care, insurance, etc.), neighborhood and built environment (e.g. food access, community safety, etc.) (ODPHP, n.d.). Addressing SDOH in public policy and program development is crucial for reducing health disparities and inequities (Andress & Fitch, 2016). Cooperative Extension is well-equipped for this task with a core mission of making reliable information available to all, providing research-based nutrition and wellness programming, and placing emphasis on reaching underserved audiences (National Institute of Food and Agriculture, n.d.; Iowa State University Extension and Outreach, 2018).

The role of Extension has adapted and expanded to provide educational opportunities on a wider variety of topics such as nutrition, wellness, and food safety to meet the ever changing

needs of the United States population. In the past decade, populations of Black, Indigenous, and People of Color (BIPOC) have been increasing nationally (Frey, 2020; Vespa et al., 2020) and in Iowa (Kaiser Family Foundation, n.d.). In addition to the increasing diversity and the impact of a more diverse population on health and wellness programming needs, Extension is also faced with responding to the recent advances in technology.

Technological advancements have been significant and have subsequently increased consumer technology use. About 82.7% and 80.8% of U.S. households and Iowa households, respectively, have internet access at home, which has grown from 2016 data (81.4%, and 79.6%, respectively) (U.S. Census Bureau, 2019; Ryan, 2017). Historically, Extension has focused efforts on providing in-person programs; however, with the broad use of the internet and easy access to smart devices, use of indirect education methods and online learning opportunities is of interest for health-related programming (Elmer et al., 2016; Roy et al., 2016; Stotz, et al., 2019; Bahl et al., 2020).

Subsequently, these broad changes in health status, diversity, and technology use impact the topics addressed by Extension and the type of outreach conducted. In order to ensure the provision of client-centered programming, it is important to assess if current Extension programs are adequately addressing the existing, as well as the emerging nutrition, wellness, and food safety issues of prospective clients. It is also necessary to understand the educational approaches preferred by prospective clientele. The Social Marketing Theory (SMT) provides a program development framework that includes the target audience in the process to ensure programs are client-focused, rather than expert driven (Lefebvre & Rochlin, 1997; Storey et al., 2008). The SMT is comprised of six steps (Figure 4-1). Step 1 focuses on planning and strategy. One way to do this is to conduct a comprehensive needs and preference assessment, as was conducted in the

present study. The purpose of this study was two-fold: (1) to identify current and prospective Extension customers' nutrition, wellness, and food safety program needs and preferences; (2) to examine to what extent SDOH variables predict Extension program use and health-related program interest.

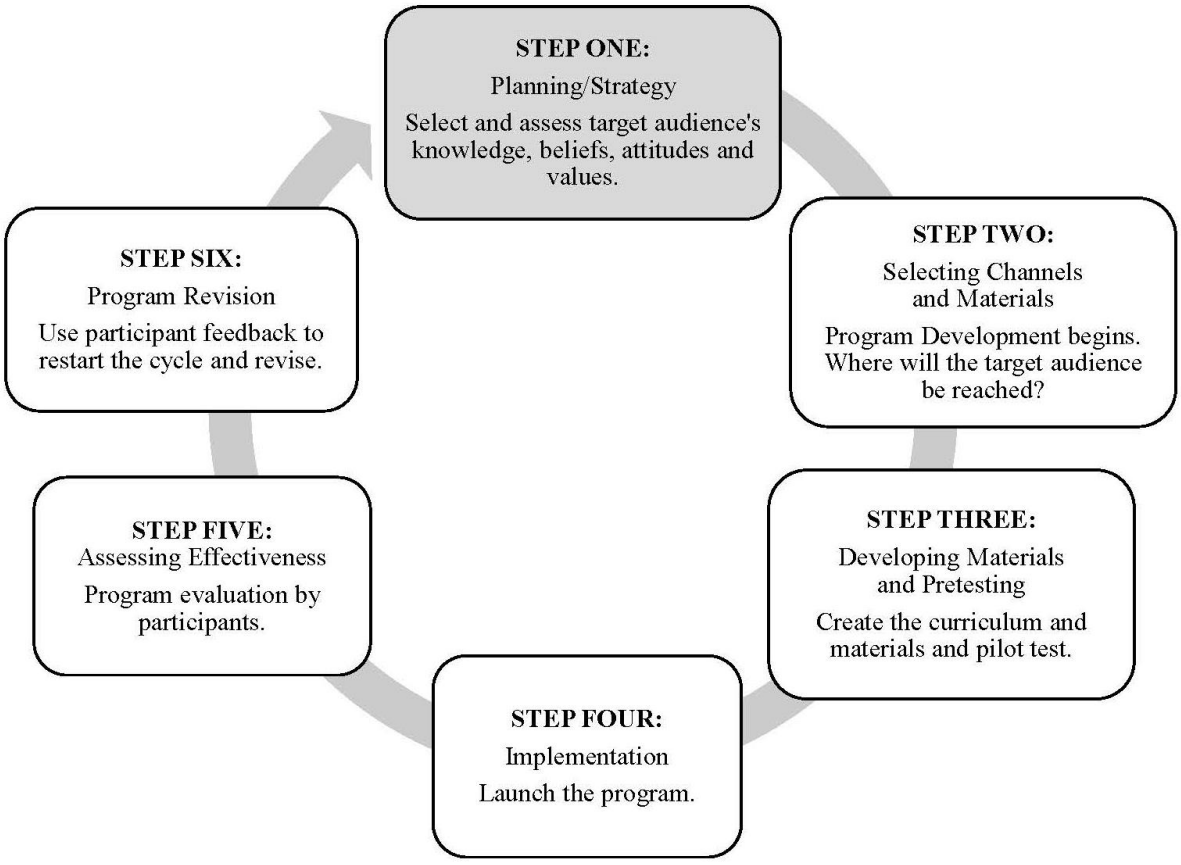

Figure 4-1. Social Marketing Theory Cycle (Lefebvre & Rochlin, 1997; Storey et al., 2008)

Methods

A comprehensive needs assessment survey was developed using a variety of validated tools. The survey was distributed online and managed by Qualtrics™. In order to recruit a diverse study population, oversampling by BIPOC, those ages 25-35 years and 55 years and older, and those with lower incomes was done. Convenience sampling continued until the goal of 450 respondents (n=452) was met.

In order to participate, respondents had to be at least 18 years of age, a resident of Iowa, literate, have access to the internet, and serve on a market research panel through Qualtrics™. Participants were invited to participate in the study via email and offered an incentive for completion of the survey. The email did not provide any information about the survey other than the expected length of time it would take to complete. The study was reviewed and declared exempt by the Iowa State University Institutional Review Board (ID 20-122, Appendix A).

Survey Description

The survey consisted of 70 questions including 10 COVID-19 impact questions, which is reported elsewhere (Bahl, et al. 2020). The remaining 60 survey questions were a compilation of valid and reliable assessment tools, sociodemographic questions, and programming questions (See Appendix B). Perceived general health and chronic health conditions were assessed using questions from the Behavioral Risk Factor Surveillance System (BRFSS). BRFSS is a health-related survey inquiring about risk behaviors, chronic health conditions and preventative care; data collected is utilized for identifying targets for health-related programming, similar to the purpose of this survey (Centers for Disease Control and Prevention, 2018).

Respondent food security was measured using the two questions validated by Hager et al. (2010). A food frequency questionnaire, Rapid Eating Assessment for Participants [Shortened Version] (REAP-S), was used to evaluate respondents' dietary practices (Segal-Isaacson et al., 2004). The REAP-S has 16 questions focused on food intake including questions about whole grains, fruit, vegetables, dairy, protein, processed meats, fried foods, high-fat snacks, sugar-sweetened beverage (Segal-Isaacson et al., 2004). Responses for the first 13 questions regarding specific food groups were added to calculate a diet quality score (maximum score of 39 points). Johnston and others (2018) demonstrated the REAP-S correlates with the Healthy Eating Index-2010, with higher scores indicating higher diet quality.

Physical activity practices were examined using adult physical activity questions from the National Health Interview Survey (NHIS) (National Center for Health Statistics, n.d.); however, these data are not reported here. General food safety practices were assessed via a 10-question food safety questionnaire (University of Hawaii Cooperative Extension Service, 2006). This questionnaire asks about home food safety practices such as handwashing, cross-contamination, sanitation, and control of time and temperature, with frequency of practiced behaviors assigned a point value, and a maximum score of 10 points.

Data Analysis

Frequency data analysis and logistic regression were conducted using the Statistical Package of Social Sciences (SPSS, v26.0, IBM). Ranks for program delivery platforms were determined by ordering the mean ranking among respondents from lowest to highest, with lowest score being the most preferred. Scores for diet quality, food safety practices, and food security were calculated as described by the validated tools. Ranges for the number of chronic conditions were calculated by adding the number of chronic conditions reported. Percentages for some questions do not add up to 100% because respondents were allowed to select more than one answer.

Binomial logistic regression was performed to investigate the effects of the 11 selected SDOH variables (Figure 4-2) on Extension program use (i.e. yes or no), and interest in participating in health-related programming (i.e. yes or no/not sure). For the purposes of logistic regression analysis, responses of “no” and “not sure” for interest in program participation were combined.

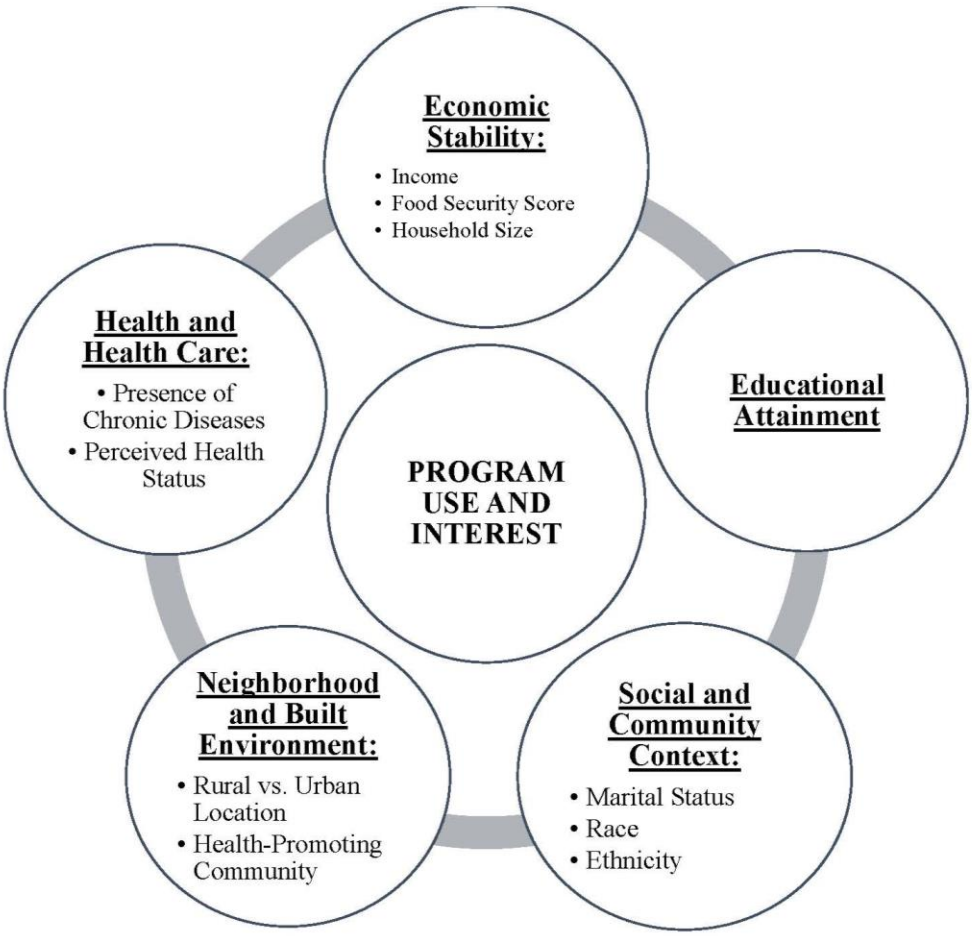

Figure 4-2. Social Determinant of Health Survey Variables

Other dichotomous and/or condensed variables were created for analysis including: race (White/BIPOC), education (less than high school/more than high school), marital status (married/not married), income level (<$39,999; $40,000-$89,999; >$90,000), community promotes health (disagree/strongly disagree; neutral; agree/strongly agree), and presence of chronic disease (yes/no). Model selection was done with consideration of -2 log likelihood values, Nagelkerke R^2, and the p-values associated with predicted variable. Chi-square test of coefficients and Hosmer and Lemeshow goodness-of-fit tests were conducted to assess model fit. An alpha level of $p < 0.05$ was used to determine statistical significance.

Results

Demographics

The survey was completed by a convenience sample of 452 respondents. Table 4-1 describes the sociodemographic characteristics of respondents. Most respondents were female, non-Hispanic, White, and preferred to speak English. Many respondents were not married (i.e. single, divorced, widowed; 55.7%). Nearly one-half (47.6%) of respondents were 35 years or younger. The sample was evenly split between those living in rural areas and in urban areas. Many (46.9%) stated their household size was 1 to 2 people. The majority of respondents (72.9%) reported more than a high school education. About two-thirds earned less than $90,000 annually.

Table 4-1. Demographic Characteristics of Respondents (n= 452)

Characteristic	Number	Percent
Age		
18 to 24 years	92	20.4
25 to 34 years	123	27.2
35 to 44 years	53	11.7
45 to 54 years	45	9.9
55 to 64 years	83	18.4
65 years and over	56	12.4
Gender		
Female	319	70.6
Male	127	28.1
Other	6	1.3
Ethnicity		
Not Hispanic or Latino	405	89.6
Hispanic or Latino	46	10.2
Missing	1	0.2

Table 4-1 continued.

Race		
White	358	79.2
Black	40	8.8
Asian	21	4.6
American Indian or Alaska Native	17	3.8
Hispanic/Latino	7	1.5
Native Hawaiian or Pacific Islander	2	0.4
Mixed Race	6	1.3
Other	1	0.2
Preferred Language		
English	424	93.8
Chinese	12	2.7
French	6	1.3
Spanish	5	1.1
German	1	0.2
Missing	4	0.9
Marital Status		
Married	197	43.6
Single, never married	154	34.1
Divorced	68	15.0
Widowed	21	4.6
Separated	9	2.0
Missing	3	0.7
Location		
Rural	231	51.1
Urban	221	48.9
Household Size		
1 to 2	212	46.9
3 to 4	171	37.8
5 to 6	56	12.4
More than 7	12	2.7
Missing	1	0.2

Table 4-1 continued.

Highest Education Received		
Less than high school	22	4.9
High school/GED	98	21.7
Some college	94	20.8
Associates	64	14.2
Technical school	12	2.7
Bachelors	117	25.9
Graduate	42	9.3
Missing	3	0.7
Income		
Less than $39,999	156	34.5
$40,000 to $89,999	158	35.0
More than $90,000	82	18.1
Missing	56	12.4

Health Characteristics

Table 4-2 describes the health characteristics of the respondents. Many regarded themselves as being in good health (43.4%) and "agreed or strongly agreed" that their city/town provided health and wellness-promoting opportunities (42.9%). Nearly two-thirds of respondents (63.3%) received a diet quality score between 22 and 30 points out of the maximum 39 points, suggesting moderate diet quality (Segal-Issacson et al., 2004; Johnston et al., 2018; Basiotis et al., 2002). In addition, 54.2% reported they would be "somewhat" or "very willing" to change their eating habits in order to be healthier.

Nearly two-thirds (61.5%) followed many food safety practices, scoring 8 points or more out of the maximum 10 points. Food security was almost evenly split with 50.4% classified as food secure and 48.5% classified as food insecure. One quarter reported they did not have a chronic health condition. Of those with a chronic health condition, 27.9% reported having 1 or 2.

Table 4-2. Health Characteristics of Respondents (n=452)

Characteristic	Number	%
Self-reported Health		
Poor	23	5.1
Fair	107	23.7
Good	196	43.4
Very good	96	21.2
Excellent	28	6.2
Missing	2	0.4
Health-Promoting Community		
Strongly Disagree	25	5.5
Disagree	61	13.5
Neutral	168	37.2
Agree	153	33.8
Strongly Agree	41	9.1
Missing	4	0.9
Diet Quality (Maximum score = 39 points)		
Poor (13-21 points)	49	10.8
Moderate (22-30 points)	286	63.3
Good (31-39 points)	107	23.7
Missing	10	2.2
Willingness to Change Eating Habits for Health		
Very willing	104	23.0
Somewhat willing	141	31.2
Neutral	138	30.5
Somewhat unwilling	46	10.2
Very unwilling	19	4.2
Missing	4	0.9
Food Security (Maximum Score = 2)		
Food secure (0 points)	228	50.4
Food insecure (1-2 points)	219	48.5
Missing	5	1.1
Food Safety Practices (Maximum Score = 10 points)		
Follow few practices (< 5 points)	50	11.1
Follow some practices (5.5-7.5 points)	85	18.8
Follow many practices (> 8 points)	278	61.5
Missing	39	8.6

Table 4-2 continued.

Presence of Chronic Disease (Maximum: 15 chronic conditions)		
No conditions reported	114	25.2
1-2 conditions reported	126	27.9
3-4 conditions reported	59	13.1
>5 conditions reported	33	7.3
Missing	120	26.5

Program Interest and Utilization

Interest in, utilization of, and desired attributes of nutrition and wellness programs are presented in Table 4-3. The majority of respondents (76.8%) had not knowingly participated in Extension programming or accessed Extension resources. For those who had, training for child care providers and ServSafe (food safety training for food service personnel) were the most likely used. Almost half (47.6%) were interested in participating in a health-related program. A large portion of respondents (42.6%) stated they would not attend a sequential program. Among respondents who would attend a sequential program, shorter programs in length and duration were preferred with 24.8% indicating a preference for a maximum of three weeks. Similarly, 32.1% reported a maximum class duration of one hour.

The majority of respondents indicated they would only attend free in-person events (67.7%) and access free online content (70.8%). The preferred program platforms in order of preference were: 1. recorded webinar platform, 2. self-directed online lessons, 3. interactive apps, 4. live webinars, 5. online group session, and 6. in-person group session. Electronic program promotion via social media and email were preferred by most (41.2% and 40.2%, respectively).

Table 4-3. Respondent Feedback on Program Use, Interest, and Preferences

	Number	Percent (%)
Extension Program Utilization[a]		
No, I have not used nutrition, wellness, or food safety programs.	347	76.8
Yes, I have used nutrition, wellness, or food safety programs.	105	23.2
Attendance/Participation in Selected Extension Programs[b]		
Child Care training	30	28.6
ServSafe®	24	22.9
Healthy and Homemade	23	21.9
Words on Wellness (nutrition newsletter; Bahl & Francis, 2016)	23	21.9
Food Preservation 101	21	20.0
Whole Grains (MacNab et al., 2017)	20	19.0
Safe Food (general food safety)	20	19.0
Latinos Living Well (diabetes program; Keane & Francis, 2018)	19	18.1
Nutrition Education with Seniors (commodity and supplemental food program)	19	18.1
Plan Shop Save Cook (SNAP-Ed)	19	18.1
Home-Based Food Operators	16	15.2
Wellness and Independence through Nutrition (SNAP Outreach; Francis et al., 2015)	16	15.2
Spend Smart. Eat Smart. (general wellness)	15	14.3
MyWellbeing (worksite wellness)	14	13.3
Veg Out! (produce awareness program; Bahl et al., 2019)	14	13.3
Buy. Eat. Live Healthy. (EFNEP/SNAP-Ed)	12	11.4
Preserve the Taste of Summer (food preservation; Francis, 2014)	12	11.4
HACCP (food safety for professionals)	11	10.5
Stay Independent: A Healthy Aging Series	10	9.5
Answerline (home and family hotline)	10	9.5
Interest in Health-Related Program Participation		
No	116	25.7
Yes	215	47.6
Not sure	121	26.8
Maximum Program Length (weeks)		
Would not attend a sequential program	194	42.9
3 weeks	112	24.8
4 weeks	82	18.1
5 weeks	10	2.2
6 weeks	49	10.8
Missing	5	1.1

Table 4-3 continued.

Maximum Program Duration (hours/week)		
Would not attend a sequential program	172	38.1
1 hour	145	32.1
2 hours	88	19.5
3 hours	19	4.2
4 hours	27	6.0
Missing	1	0.2
Maximum Willing to Pay for In-Person Program (2 hours x 4 weeks)		
Would only attend free events	306	67.7
$10	41	9.1
$15	20	4.4
$20	31	6.9
$25	21	4.6
$30	10	2.2
$35	6	1.3
$40	16	3.5
Missing	1	0.2
Maximum Willing To Pay For Online Program (8 hours)		
Free content only	320	70.8
$10	39	8.6
$15	19	4.2
$20	31	6.9
$25	18	4.0
$30	8	1.8
$35	6	1.3
$40	10	2.2
Missing	1	0.2
Preferred Program Advertising Method[c]		
Social media	186	41.2
Email program announcements	182	40.2
Extension websites	116	25.7
Word of mouth	107	23.7
Extension newsletters	85	18.8
Local newspaper	78	17.3
Local radio	57	12.6
Personal Invitation	53	11.7
Flyers posted around town	24	5.3
Other	13	2.9

Table 4-3 continued.

[a]Extension Nutrition and Wellness programs were listed by name following this question on the survey.
[b]Among those who said "yes" to Extension Program Use (*n*=105)
[c]Respondents were able to select more than one, the percentage does not add up to 100.

Binomial Logistic Regression Analysis

Extension program use

Results of Chi-Square tests for the full model (with all SDOH variables) and the reduced model (with selected SDOH variables) are shown in Table 4-4. Both logistic regression models were significant. The full model explained 31.5% of the variance in Extension program use and correctly classified 83.3% of cases. The sensitivity and specificity of the full model was 35.5% and 96.5%, respectively.

The reduced model explained 29.0% of the variance in Extension program use and correctly classified 80.9% of cases (Table 4-4). Model sensitivity was 29.2% and specificity was 95.3%. Parameter estimates for the reduced model are shown in Table 4-5. Of the six SDOH variables included in the reduced model, four were significant including ethnicity ($p = 0.03$), race ($p < 0.001$), food security status ($p < 0.001$), and perception of whether or not their (the respondent's) community promotes health ($p = 0.001$).

Table 4-4. Model Chi-Square Tests for Logistic Regression; Extension Program Use

Model	Test Type	Chi Square	*df*	*p*	Nagelkerke R^2	-2 Log Likelihood
Full: All SDOH variables[a]	Test of Model Coefficients	65.638	18	<0.001	31.5	234.381
	Hosmer and Lemeshow Test	10.364	8	0.24		
Reduced: Selected SDOH variables[b]	Test of Model Coefficients	69.012	7	<0.001	29.0	277.222
	Hosmer and Lemeshow Test	2.633	8	0.955		

[a]Variables: Ethnicity, Race, Marital Status, Income Level, Food Security Status, Household Size, Education Level, Community Promotes Health, Location, General Health Status, Presence of Chronic Disease. [b]Parameter estimates shown in Table 4-5.

Table 4-5. Binomial Logistic Regression Predicting Likelihood of Extension Program Use by selected Social Determinant of Health Variables; Reduced Model.

REDUCED MODEL									
VARIABLE[a]	**CATEGORY**	**B**	**S.E.**	**Wald**	***df***	***p***	**Odds Ratios**	**95% C.I. for Odds Ratios**	
								Lower	Upper
ETHNICITY	Not Hispanic or Latino (Reference)								
	Hispanic or Latino	0.937	0.431	4.722	1	0.030[b]	2.553	1.096	5.944
PRESENCE OF CHRONIC DISEASE	No chronic disease (Reference)								
	At least one chronic disease reported	-0.470	0.322	2.132	1	0.144	0.625	0.333	1.175
FOOD SECURITY	Food Secure (Reference)								
	Food Insecure	1.468	0.338	18.870	1	0.000[b]	4.341	2.238	8.419
EDUCATION LEVEL	More than high school (Reference)								
	Less than high school	-0.688	0.373	3.406	1	0.065	0.503	0.242	1.044
COMMUNITY PROMOTES HEALTH	Disagree or strongly disagree (Reference)			13.194	2	0.001[b]			
	Neutral	-0.955	0.460	4.309	1	0.038	0.385	0.156	0.948
	Agree or strongly agree	0.431	0.399	1.166	1	0.280	1.539	0.704	3.367
RACE	White (Reference)								
	BIPOC	1.220	0.344	12.566	1	0.000[b]	3.388	1.726	6.651
CONSTANT	Constant	-2.047	0.474	18.687	1	0.000	0.129		

[a]SDOH variables removed from model: Household Size, Income Level, General Health Status, Location, and Marital status.
[b]Statistically significant ($p < 0.05$)

Of note, those who are Hispanic or Latino were over twice as likely to have participated in Extension programming compared to those who are not Hispanic or Latino (Odds Ratio [OR] 2.553, 95% Confidence Interval [CI: 1.096, 5.944]). Those who identify as BIPOC were over 3 times (OR 3.388, 95% CI [1.726, 6.651]), and those who were food insecure were approximately four times (OR 4.341, 95% CI [2.238, 8.419]) as likely to have participated in Extension programming compared to those who are White, and those who are food secure, respectively.

Interest in health-related program participation

Results of Chi-Square tests for the full model (with all SDOH variables) and the reduced model (with selected SDOH variables) are shown in Table 4-6. Both logistic regression models were significant. The full model with all SDOH variables explained 14.5% of the variance in interest in participating in a health-related program, and correctly classified 60.8% of cases. The sensitivity and specificity of the full model was 63.4% and 58%, respectively.

Table 4-6. Model Chi-Square Tests for Logistic Regression: Health-Related Program Interest

Model	Test Type	Chi Square	*df*	*p*	Nagelkerke R^2	-2 Log Likelihood
Full: All SDOH variables[a]	Test of Model Coefficients	33.159	18	0.016	14.5	366.080
	Hosmer and Lemeshow Test	6.679	8	0.572		
Reduced: Selected SDOH variables[b]	Test of Model Coefficients	23.623	6	0.001	9.2	433.806
	Hosmer and Lemeshow Test	5.657	7	0.58		

[a]Variables: Ethnicity, Race, Marital Status, Income Level, Food Security Status, Household Size, Education Level, Community Promotes Health, Location, General Health Status, Presence of Chronic Disease. [b]Parameter estimates for the reduced model is shown in Table 4-7.

The reduced model explained 9.2% of the variance in interest in participating in a health-related program and correctly classified 58.8% of cases (Table 4-6). Sensitivity and specificity of the reduced model was 49.7% and 67.7%, respectively. Parameter estimates for the reduced model are shown in Table 4-7.

Table 4-7. Binomial Logistic Regression Predicting Interest in Participating in a Health-Related Program by selected Social Determinant of Health Variables; Reduced Model.

Reduced Model									
								95% C.I. for Odds Ratios	
VARIABLE[a]	**CATEGORY**	**B**	**S.E.**	**Wald**	***df***	***p***	**Odds Ratios**	**Lower**	**Upper**
ETHNICITY	Not Hispanic or Latino (Reference)								
	Hispanic or Latino	0.610	0.398	2.353	1	0.125	1.841	0.844	4.015
FOOD SECURITY	Food Secure (Reference)								
	Food Insecure	0.388	0.246	2.499	1	0.114	1.474	0.911	2.386
EDUCATION LEVEL	More than high school (Reference)								
	Less than high school	-0.692	0.273	6.406	1	0.011[b]	0.501	0.293	0.855
COMMUNITY PROMOTES HEALTH	Disagree or strongly disagree (Reference)			7.171	2	0.028[b]			
	Neutral	-0.634	0.328	3.745	1	0.053	0.530	0.279	1.008
	Agree or strongly agree	0.017	0.315	0.003	1	0.957	1.017	0.549	1.884
PRESENCE OF CHRONIC DISEASE	No chronic disease reported (Reference)								
	At least 1 chronic disease reported	-0.518	0.247	4.404	1	0.036[b]	0.596	0.367	0.966
CONSTANT	Constant	0.466	0.347	1.798	1	0.180	1.593		

[a]SDOH variables removed from model: General Health Status, Household Size, Income Level, Location, Marital Status, and Race.
[b]Statistically significant ($p<0.05$)

Of the five SDOH variables included in the reduced model, three were significant including education level ($p = 0.011$), presence of chronic disease ($p = 0.036$), and perception of whether or not their (the respondent's) community promotes health ($p = 0.028$). Of note, those with an education level of less than high school were about one-half as likely to be interested in participating in a health-related program as compared to those with more than high school (OR 0.501, 95% CI [0.293, 0.855]). Additionally, those reporting at least one chronic disease were approximately one-half as likely to be interested in participating in a health-related program as compared to those with no chronic diseases reported (OR 0.596, 95% CI [0.367, 0.966]).

Discussion

These results are not generalizable due to a relatively limited sample size and the convenience sampling method of recruitment. However, the social characteristics suggest this sample is similar to the general Iowa population in age distribution and household size (U.S. Census Bureau, 2019). The study sample is more racially and ethnically (e.g. 79.2% versus 90.6% White; 10.2% versus 6.3% Hispanic/Latino), economically, and rurally diverse than Iowa (51.1% versus 35.7% rural), likely due to the oversampling by these characteristics (U.S. Census Bureau, 2019; State Data Center of Iowa, n.d.). The sample also had a higher proportion of females and higher educational attainment compared to Iowa (U.S. Census Bureau, 2019).

Of note, the sample had a much higher rate of food insecurity (48.5%) compared to the state average (7.9%; Coleman-Jensen et al., 2020). Although the survey delineated the sections on COVID-19 impact and general "pre-pandemic" behavior, the discrepancy in food insecurity rates may be due to respondents considering pandemic effects, as it's estimated an additional 17.1 million individuals may be experiencing food insecurity due to the pandemic (Feeding America, 2020). The discrepancy could also be related to the oversampling by lower incomes.

The diversity in social characteristics of the sample is a strength for gathering information regarding needs and preferences from specific, underserved populations. Frequencies were reported for the entire sample, therefore additional research to identify differences reported by group characteristic (i.e. market segmentation) would be useful for targeted program development as part of Step 1 in the SMT cycle (Lefebvre & Rochlin, 1997).

The diet quality of this sample is comparable to the national average (Center for Nutrition Policy and Promotion, 2019). In fact, a community health needs assessment done in 2016 determined nutrition issues, weight status, and physical activity to be key issues requiring attention in the majority of Iowa counties (Iowa Department of Public Health, n.d.). As identified, ISU Extension provides nutrition, physical activity, and food safety programming but these results suggest people are not utilizing Extension resources (ISU Extension, "Program Catalog").

Our sample viewed their health more negatively than other Iowans. The percentage of respondents who reported being in "poor or fair" health was double that reported by BRFSS data for Iowa (28.8% versus 14.4%, respectively) (NCCDPHP, 2015). Similarly, 20.4% of respondents reported three or more chronic conditions, compared to 8.5% of Iowans (America's Health Rankings, 2020). This discrepancy may be explained by the oversampling of respondents with characteristics related poorer health outcomes, including lower incomes, BIPOC, rural residence, and food insecurity (Shea et al., 2016; Rural Health Information Hub, 2018; Holben & Marshall, 2017).

With regards to Extension program utilization and interest in health-related programming, a few key findings and considerations emerged. The majority of respondents had not used Extension programs or resources. This may be due to lack of knowledge or familiarity

with Extension programs, as nearly half of respondents reported they would be interested in participating in a health-related program. Another Midwest Extension service surveyed a representative sample of residents and 21% reported they were familiar with Extension resources, which is comparable to the 23.2% of our respondents who reported they have used Extension (Loibl et al., 2010). Loibl and others (2010) suggest that greater efforts to advertise relevant programs and resources, and reach target audiences with lower rates of Extension usage may be necessary.

Results indicate respondents prefer to hear about programs via electronic platforms, and also prefer online programs, such as recorded webinars and self-directed online learning modules. Previous research suggests that Extension-delivered online programs are effective, well-received by participants, and valued for being convenient, cost-effective, and easy to use (MacNab & Francis, 2015; Dittmar et al., 2014; Rich et al., 2011). However, online learning opportunities such as webinars may expand the reach to new and diverse Extension clientele by reducing barriers of cost, time, and the travel to an in-person location (Rich et al., 2011). In general, shorter programs at low or no cost are preferred. Results from Loibl et al. (2010) suggests their respondents also value low or no cost programs as well as knowledgeable educators, useful and relevant information, and proximity to the educational opportunity.

Social determinants of health certainly impact health-related outcomes; therefore, it is also of interest how SDOH components impact program interest and preferences for the purpose of providing programs and resources to address health-related topics in populations at risk for health disparities and inequities (Andress & Fitch, 2016). Those who are Hispanic or Latino, food insecure, and identify as BIPOC were more likely to have participated in Extension programming. These data suggest ISU Extension is reaching historically underserved audiences,

and more socially diverse clients than might be expected based on the majority characteristics of Iowa's population. This could be attributed to the oversampling by BIPOC and lower incomes, the types of programs most frequently used, and the requirements of specific occupations (e.g. a job requires food safety training and ISU Extension provides professional food safety training).

The two programs respondents most frequently reported attending were child care trainings and ServSafe®. Of note, ISU Extension has translated ServSafe® classes into Spanish to increase accessibility for Spanish-speaking food service workers. In addition, ISU Extension has programs created for specific target audiences including nutrition programs for lower income audiences (e.g. Buy. Eat. Live Healthy., Spend Smart. Eat Smart., etc.), culturally relevant programs (e.g. Latinos Living Well), and occupation-specific programs (e.g. ServSafe, child care training, etc.) (ISU Extension, "Nutrition"; ISU Extension "Program Catalog").

The relationship between occupation type, income level, and food insecurity may provide insight to the observed results for Extension program use. Working in service, production, and transportation industries is associated with higher rates of food insecurity (Feeding America, 2020). Moreover, there are notable racial and ethnic differences by occupation type. In 2018, larger proportions of Asian (54%) and White (41%) workers were employed in management and professional roles, compared to Black (31%) and Hispanic/Latino (22%) workers (Bureau of Labor Statistics, 2019). In comparison, larger proportions of Black (16%, 24%) and Hispanic/Latino (16%, 24%) workers were employed in production and service roles, compared to White (11%, 16%) and Asian (10%, 17%) workers (Bureau of Labor Statistics, 2019).

While reaching individuals with any programming (e.g. food safety training) is beneficial for increasing familiarity with Extension (Dittmar et al., 2014), further research is needed to investigate the relationship between SDOH characteristics (including occupation) and types of

programs used. This information could help identify the populations using specific programs, identify programming gaps, and potentially identify channels/locations to reach target audiences.

Although most respondents had not used Extension programming, nearly half were interested in participating in a health-related program. Education level, perception of community promoting health, and presence of chronic disease were the most significant SDOH variables for predicting program participation interest. Those with less education were less likely to be interested compared to their counterparts. The study by Elmer et al. (2016) demonstrated that those with less education and who lived in rural areas were less interested in online education methods via social media; however, rurality was not a significant factor in the present study. Education-related barriers to participation in health-related programming could be discomfort in group settings and perceived irrelevance of the program; for example, expensive recipe ingredients are not practical for lower-income participants (Richardson et al., 2003; Elmer et al., 2016).

Perception on whether or not a respondent's community promotes health was a significant variable in interest in participation. Linnell et al. (2020) suggests that improving the health in communities requires "creating a culture of health," which can be done by Extension collaboration with other community partners and sectors, providing informed leadership, and creating policies to promote meaningful changes to support community health. It is unknown what factors the respondents' value in their community for promoting health. Future research investigating the impact of local Extension activity and the personal and community ratings of health would be useful.

Finally, those with at least one chronic disease were less likely to be interested in participating. In a study on participation in Chronic Disease Management Programs, there were

many reported barriers to participation including: being overwhelmed with everyday life, cost, poor health literacy, feelings of shame, perception that the program isn't relevant, accessibility of the program, previous negative experiences with health care (Goodridge et al., 2019). Reducing cost and accessibility barriers, creating relevant programs with participant input, and collaborating with trusted community partners may be useful for promoting participation.

Implications

Rates of low physical activity, moderate diet quality, food insecurity, and chronic disease and their known impact on health and wellbeing calls for client-centered nutrition and wellness programs and resources. Existing programs and resources on these topics could be modified to meet prospective customers' preferences for program platform, advertisement, cost, duration, and length. In addition, SDOH characteristics should be considered in program development and existing program evaluation efforts to meet the needs and preferences of the intended audience.

Although most respondents have not used Extension programming, many expressed interest in participating in health programming. Increased advertising efforts may be necessary to reach prospective clientele. In the technology age, Extension must expand offerings and advertising via electronic platforms and ensure these programs are low-cost, high-impact, and single touch. In doing so Extension can position itself as the go-to source for health information.

References

America's Health Rankings. (2020). *Annual report: National multiple chronic conditions.* United Health Foundation. Retrieved from: https://www.americashealthrankings.org/explore/annual/measure/CHC/state/ALL

Andress, L., & Fitch, C. (2016). Rural health inequities and the role of Cooperative Extension. *Journal of Extension, 54*(3), n3. https://www.joe.org/joe/2016june/a4.php

Bahl, M., & Francis, S. L. (2016). Promoting nutrition and wellness statewide through an electronic newsletter. *Journal of Extension,* 54(3), v54-3tt4. Retrieved from: https://joe.org/joe/2016june/tt4.php

Bahl, M., Francis, S. L., & Krisco, M. (2019). Veg Out! Use of an infomercial-style format in a produce awareness session. *Journal of Extension,* 57(6), v57-6tt4. Retrieved from: https://www.joe.org/joe/2019december/tt4.php

Bahl, M., Francis, S. L., Litchfield, R., Coleman, S., & Naig, A. (2020). Assessing and responding to COVID-19 pandemic nutrition and wellness impacts on Iowans. *Journal of Extension, 58*(6), v58-6rb2. Retrieved from: https://joe.org/joe/2020december/rb2.php

Basiotis P, Carlson A, Gerrior S, Juan W, & Lino M. (2002). *The Healthy Eating Index: 1999–2000*. Washington, DC: United States Department of Agriculture, Center for Nutrition Policy and Promotion, CNPP-12.

Bureau of Labor Statistics. (2019). *Labor force characteristics by race and ethnicity, 2018.* Report 1082. Retrieved from: https://www.bls.gov/opub/reports/race-and-ethnicity/2018/pdf/home.pdf

Centers for Disease Control and Prevention. (2018). *Behavioral Risk Factor Surveillance System Survey Questionnaire*. Atlanta, Georgia: U.S. Department of Health and Human Services.

Center for Nutrition Policy and Promotion. (2019). *HEI scores for Americans.* United States Department of Agriculture, Food and Nutrition Service. Retrieved from: https://www.fns.usda.gov/hei-scores-americans

Coleman-Jensen, A., Rabbitt, M. P., Gregory, C. A., & Singh, A. (2020). *Household food security in the United States in 2019 (ERR-275).* United States Department of Agriculture, Economic Research Service. Retrieved from: https://www.ers.usda.gov/publications/pub-details/?pubid=99281

Dittmar, R. S., Anding, J., & Green, S. (2014). Improving food safety knowledge through an online training program. *Journal of Extension,* 52(4), v52-4tt4. Retrieved from: https://www.joe.org/joe/2014august/tt4.php

Elmer, S. R., Harrison, J. A., & da Silva, V. R. (2016). Social media as a supplement to face-to-face education: The perspectives of Expanded Food and Nutrition Education Program paraprofessionals and graduates. *Journal of Extension,* 54(3), v54-3a5. Retrieved from: https://joe.org/joe/2016june/a5.php

Feeding America. (2020). *The impact of the coronavirus on food insecurity.* Retrieved from: https://www.feedingamerica.org/sites/default/files/2020-04/Brief_Impact%20of%20Covid%20on%20Food%20Insecurity%204.22%20%28002%29.pdf

Francis, S. L. (2014). Hybrid food preservation program improves food preservation and food safety knowledge. *Journal of Extension,* 52(4), v52-4tt8. Retrieved from: https://www.joe.org/joe/2014august/tt8.php

Francis, S. L., Oates, K., & Heuer, A. (2015). Promoting awareness of SNAP among Iowans age 50+ with Wellness and Independence through Nutrition (WIN) program. *Journal of Extension*, 53(5), v53-5tt8. Retrieved from: https://www.joe.org/joe/2015october/tt8.php

Frey, W. H. (2020, July 1). *The nation is diversifying even faster than predicted, according to new census data.* Brookings. Retrieved on January 19, 2021 from: https://www.brookings.edu/research/new-census-data-shows-the-nation-is-diversifying-even-faster-than-predicted/

Goodridge, D., Bandara, T., Marciniuk, D., Hutchinson, S., Crossman, L., Kachur, B., Higgins, D., & Bennett, A. (2019). Promoting chronic disease management in persons with complex social needs: a qualitative descriptive study. *Chronic Respiratory Disease*, *16*, 1479973119832025.

Hager, E. R., Quigg, A. M., Black, M. M., Coleman, S. M., Heeren, T., Rose-Jacobs, R., Cook, J. T., Ettinger de Cuba, S. A., Casey, P. H., Chilton, M., Cutts, D. B., Meyers, A. F., & Frank, D. A. (2010). Development and validity of a 2-item screen to identify families at risk for food insecurity. *Pediatrics*, 126(1), e26–e32. https://doi.org/10.1542/peds.2009-3146

Holben, D. H., & Marshall, M. B. (2017). Position of the Academy of Nutrition and Dietetics: Food insecurity in the United States. *Journal of the Academy of Nutrition and Dietetics*, *117*(12), 1991-2002.

Iowa Department of Public Health. (n.d.). *CHNA & HIP*. Retrieved from https://idph.iowa.gov/chnahip/community-health-needs

Iowa State University Extension and Outreach. (n.d.). *Nutrition.* Retrieved from: https://www.extension.iastate.edu/humansciences/nutrition

Iowa State University Extension and Outreach. (n.d.). *Program catalog.* Retrieved from: https://www.extension.iastate.edu/humansciences/catalog

Iowa State University Extension and Outreach. (2018). *Extension and Outreach strategic plan, 2017-2022.* Retrieved on December 14, 2020 from: https://www.extension.iastate.edu/vp/strategic-plan

Johnston, C. S., Bliss, C., Knurick, J. R., & Scholtz, C. (2018). Rapid Eating Assessment for Participants [shortened version] scores are associated with Healthy Eating Index-2010 scores and other indices of diet quality in healthy adult omnivores and vegetarians. *Nutrition Journal*, *17*(1), 89.

Kaiser Family Foundation. (n.d.). *State health facts: Population distribution by race/ethnicity, 2008-2019.* Retrieved on December 14, 2020 from: https://www.kff.org/other/state-indicator/distribution-by-raceethnicity/?activeTab=graph&currentTimeframe=0&startTimeframe=11&selectedDistributions=white--black--hispanic--asian&selectedRows=%7B%22wrapups%22:%7B%22united-states%22:%7B%7D%7D,%22states%22:%7B%22iowa%22:%7B%7D%7D%7D&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D

Keane, M. N., & Francis, S. L. (2018). Latinos Living Well—A diabetes education program for rural-residing Latinos. *Journal of Extension,* 56(4), v56-4rb1. Retrieved from: https://joe.org/joe/2018august/rb1.php

Lefebvre, R. C., & Rochlin, L. (1997). Social Marketing. In K. Glanz, F.M. Lewis, & B.K. Rimer. (Eds.), *Health behavior and health education theory,* 2nd edition (pp. 384- 402). San Francisco, CA: Jossey Bass Publishing.

Linnell, J. D., Case, P., & Kraemer, L. (2020). Extension's role in changing the context of health. *Journal of Extension,* 58(6), v58-6a4. Retrieved from: https://www.joe.org/joe/2020december/a4.php

Loibl, C., Diekmann, F., & Batte, M. T. (2010). Does the general public know the Extension service. A survey of Ohio residents. *Journal of Extension,* 48(2), v48-2rb3. Retrieved from: https://www.joe.org/joe/2010april/rb3.php

MacNab L. R., Davis, K., Francis, S. L., & Violette, C. (2017). Whole grain nutrition education program improves whole grain knowledge and behaviors among community-residing older adults. *Journal of Nutrition in Gerontology and Geriatrics,* 36(4):189-198. doi: 10.1080/21551197.2017.1384424.

MacNab, L. R., & Francis, S. L. (2015). Sequential online wellness programming is an effective strategy to promote behavior change. *Journal of Extension,* 53(2), v53-2tt8. Retrieved from: https://www.joe.org/joe/2015april/tt8.php

National Center for Chronic Disease Prevention and Health Promotion, Division of Population Health. (2015). *BRFSS prevalence & trends data [online]*. Centers for Disease Control and Prevention. Retrieved February 12, 2021 from: https://www.cdc.gov/brfss/brfssprevalence/

National Center for Chronic Disease Prevention and Health Promotion. (2021). *Chronic disease in America.* Centers for Disease Control and Prevention. Last reviewed January 12, 2021. Retrieved on January 15, 2021 from: https://www.cdc.gov/chronicdisease/resources/infographic/chronic-diseases.htm

National Center for Health Statistics. (n.d.). *Adult physical activity questions on the National Health Interview Survey, 1975-2012.* Centers for Disease Control and Prevention. Retrieved on December 29, 2020 from: https://www.cdc.gov/nchs/data/nhis/physicalactivity/pa_questions.pdf

National Institute of Food and Agriculture. (n.d.). *Extension.* United States Department of Agriculture. Retrieved on December 14, 2020 from: https://nifa.usda.gov/extension

Office of Disease Prevention and Health Promotion. (n.d.). Social determinants of health. *Healthy People 2020*. Retrieved on December 14, 2020 from: https://www.healthypeople.gov/2020/topics-objectives/topic/social-determinants-of-health

Rich, S. R., Komar, S., Schilling, B., Tomas, S. R., Carleo, J., & Colucci, S. J. (2011). Meeting Extension programming needs with technology: A case study of agritourism webinars. *Journal of Extension*, 49(6), v49-6a4. Retrieved from: https://www.joe.org/joe/2011december/a4.php

Richardson, J. G., Williams, J. Y., & Mustian, R. D. (2003). Barriers to participation in Extension expanded foods and nutrition program. *Journal of Extension*, 41(4), 4FEA6. Retrieved from: https://www.joe.org/joe/2003august/a6.php

Roy, A., Francis, S. L., Shaw, A., & Rajagopal, L. (2016). Promoting food safety awareness for older adults by using online education modules. *Journal of Extension*, 54(1), v54-1tt8. Retrieved from: https://www.joe.org/joe/2016february/tt8.php

Rural Health Information Hub. (2018). *Barriers to health promotion and disease prevention in rural areas.* Retrieved on January 22, 2020 from: https://www.ruralhealthinfo.org/toolkits/health-promotion/1/barriers

Ryan, C. (2017). Computer and internet use in the United States: 2016. *American Community Survey Reports (ACS-39).* U.S. Census Bureau, Washington DC. Retrieved from: https://www.census.gov/content/dam/Census/library/publications/2018/acs/ACS-39.pdf

Segal-Isaacson, C. J., Wylie-Rosett, J., & Gans, K. M. (2004). Validation of a short dietary assessment questionnaire: the Rapid Eating and Activity Assessment for Participants short version (REAP-S). *The Diabetes Educator*, *30*(5), 774-781.

Shea, S., Lima, J., Diez-Roux, A., Jorgensen, N. W., & McClelland, R. L. (2016). Socioeconomic status and poor health outcome at 10 years of follow-up in the multi-ethnic study of atherosclerosis. *PLoS One*, *11*(11).

State Data Center of Iowa. (n.d.). *Iowa Quick Facts.* Retrieved on January 18, 2021 from: https://www.iowadatacenter.org/quickfacts

Storey, J., Saffitz, G., & Rimon, J. (2008). *Social marketing. Health behavior and health education: Theory, research and practice.* Jossey Bass Publishing.

Stotz, S., Lee, J. S., Rong, H., & Murray, D. (2019). E-Learning nutrition education program for low-income adults: Perspectives of key stakeholders. *Journal of Extension*, 57(1), v57-1rb5. Retrieved from: https://www.joe.org/joe/2019february/rb5.php

University of Hawaii Cooperative Extension Service (2006). *Be safe: A home guide to help keep food safe.* Retrieved from: http://www.ctahr.hawaii.edu/oc/freepubs/pdf/FN-5.pdf

U.S. Census Bureau. (2019). *Quick Facts: United States; Iowa.* U.S. Department of Commerce. Retrieved on December 14, 2020 from https://www.census.gov/quickfacts/fact/table/US,IA/PST045219

Vespa, J., Medina, L., & Armstrong, D. M. (2020). Demographic turning points for the United States: Population projections for 2020 to 2060. *Current Population Reports (P25-1144).* Washington DC: U.S. Census Bureau. Retrieved from: https://www.census.gov/content/dam/Census/library/publications/2020/demo/p25-1144.pdf

Appendix A. Institutional Review Board Approval

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Institutional Review Board
Office for Responsible Research
Vice President for Research
2420 Lincoln Way, Suite 202
Ames, Iowa 50014
515 294-4566

Date: 03/16/2020

To: Sarah L Francis

From: Office for Responsible Research

Title: **2020 Nutrition and Wellness Needs Assessment**

IRB ID: **20-122**

Submission Type: Initial Submission **Exemption Date:** 03/16/2020

The project referenced above has been declared exempt from most requirements of the human subject protections regulations as described in 45 CFR 46.104 or 21 CFR 56.104 because it meets the following federal requirements for exemption:

2018 - 2 (i): Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording) when the information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects.

The determination of exemption means that:

- **You do not need to submit an application for continuing review. Instead, you will receive a request for a brief status update every three years. The status update is intended to verify that the study is still ongoing.**
- **You must carry out the research as described in the IRB application.** Review by IRB staff is required prior to implementing modifications that may change the exempt status of the research. In general, review is required for any *modifications to the research procedures* (e.g., method of data collection, nature or scope of information to be collected, nature or duration of behavioral interventions, use of deception, etc.), any change in *privacy or confidentiality protections*, modifications that result in the *inclusion of participants from vulnerable populations*, removing plans for informing participants about the study, any *change that may increase the risk or discomfort to participants, and/or* any change such that the revised procedures do not fall into one or more of the regulatory exemption categories. The purpose of review is to determine if the project still meets the federal criteria for exemption.
- All ***changes to key personnel*** must receive prior approval.
- **Promptly inform the IRB of any addition of or change in federal funding for this study.** Approval of the protocol referenced above applies only to funding sources that are specifically identified in the corresponding IRB application.

IRB 10/2019

Detailed information about requirements for submitting modifications for exempt research can be found on our website. For modifications that require prior approval, an amendment to the most recent IRB application must be submitted in IRBManager. A determination of exemption or approval from the IRB must be granted before implementing the proposed changes.

Non-exempt research is subject to many regulatory requirements that must be addressed prior to implementation of the study. Conducting non-exempt research without IRB review and approval may constitute non-compliance with federal regulations and/or academic misconduct according to ISU policy.

Additionally:

- All research involving human participants must be submitted for IRB review. **Only the IRB or its designees may make the determination of exemption**, even if you conduct a study in the future that is exactly like this study.

- **Please inform the IRB if the Principal Investigator and/or Supervising Investigator end their role or involvement with the project** with sufficient time to allow an alternate PI/Supervising Investigator to assume oversight responsibility. Projects must have an eligible PI to remain open.

- **Immediately inform the IRB of** (1) **all serious and/or unexpected adverse experiences** involving risks to subjects or others; and (2) **any other unanticipated problems involving risks** to subjects or others.

- **Approval from other entities may also be needed**. For example, access to data from private records (e.g., student, medical, or employment records, etc.) that are protected by FERPA, HIPAA or other confidentiality policies requires permission from the holders of those records. Similarly, for research conducted in institutions other than ISU (e.g., schools, other colleges or universities, medical facilities, companies, etc.), investigators must obtain permission from the institution(s) as required by their policies. **An IRB determination of exemption in no way implies or guarantees that permission from these other entities will be granted**.

- Your research study may be subject to **post-approval monitoring by Iowa State University's Office for Responsible Research**. In some cases, it may also be subject to formal audit or inspection by federal agencies and study sponsors.

- Upon completion of the project, transfer of IRB oversight to another IRB, or departure of the PI and/or Supervising Investigator, please initiate a Project Closure in IRBManager to officially close the project. For information on instances when a study may be closed, please refer to the IRB Study Closure Policy.

Please don't hesitate to contact us if you have questions or concerns at 515-294-4566 or IRB@iastate.edu.

Appendix B. Needs Assessment Questionnaire

DEMOGRAPHICS:

1. **What is your age?** _____ (years) Please enter numerical values.

2. **Please select your current household size:**
   - ☐ 1
   - ☐ 2
   - ☐ 3
   - ☐ 4
   - ☐ 5
   - ☐ 6
   - ☐ 7

3. **How many adults are currently residing in your household? Please enter a numerical value.**

4. **How many children/youth are in currently residing in your household? Please enter a numerical value.**

5. **What is your ethnicity? (Select the category you identify with)**
   - ☐ Hispanic or Latino
   - ☐ Not Hispanic or Latino

6. **Which one or more of the following would you say is your race?**
   - ☐ American Indian or Alaska Native
   - ☐ Asian
   - ☐ Black
   - ☐ Native Hawaiian or other Pacific islander
   - ☐ White
   - ☐ Other, please describe

7. **To which gender identity do you most identify?**
   - ☐ Female
   - ☐ Male
   - ☐ Transgender Female
   - ☐ Transgender Male
   - ☐ Gender Variant/Non-Conforming
   - ☐ Not Listed _____
   - ☐ Prefer not to answer

8. What is your annual household income?

- ☐ < $9,999
- ☐ $10,000-$12,999
- ☐ $13,000-$16,999
- ☐ $17,000-$19,999
- ☐ $20,000-$24,999
- ☐ $25,000-$29,999
- ☐ $30,000-$34,999
- ☐ $35,000-$39,999
- ☐ $40,000-$44,999
- ☐ $45,000-$49,999
- ☐ $50,000-$54,999
- ☐ $55,000-$59,999
- ☐ $60,000-$64,999
- ☐ $65,000-$69,999
- ☐ $70,000-$74,999
- ☐ $75,000-$79,999
- ☐ $80,000-$84,999
- ☐ $85,000-$89,999
- ☐ $90,000-$94,999
- ☐ $95,000-$99,999
- ☐ $100,000-$124,999
- ☐ $125,000-$149,999
- ☐ $150,000-$174,999
- ☐ $175,000-$199,999
- ☐ $200,000-$249,999
- ☐ $250,000+

9. How would you describe your primary area of occupation?

- ☐ Agriculture
- ☐ Early childhood Education
- ☐ Factory worker
- ☐ Food service
- ☐ General Office work (e.g. administrative assistant)
- ☐ Government
- ☐ Health care (e.g. hospital, clinic, assisted living, etc.)
- ☐ Higher Education (e.g. community college, college, university, etc.)
- ☐ K-12 Education (e.g. teacher, teacher aide, principal, etc.)
- ☐ Laborer (e.g. construction, farming, lawn care, etc.)
- ☐ Retail
- ☐ Retired
- ☐ Stay-at-home parent
- ☐ Student
- ☐ Other

10. We care about the quality of our survey data and hope to receive the most accurate measures of your opinions, so it is important to us that you thoughtfully provide your best answer to each question in the survey. Do you commit to providing thoughtful and honest answers to the questions in this survey?

- ☐ I will provide my best answers
- ☐ I will not provide my best answers
- ☐ I can't promise either way

COVID-19, the disease caused by the new coronavirus, has impacted the lives of all Iowans. The next few questions will help us better understand how COVID-19 and social distancing has impacted your food and activity behaviors.

11. To what extent has COVID 19 affected your frequency of grocery shopping/buying food?

- ☐ Increased it a lot
- ☐ Increased it somewhat
- ☐ Stayed the same
- ☐ Decreased it somewhat
- ☐ Decreased it a lot

12. To what extent has COVID 19 affected the type of food you have purchased:

	Purchasing a lot more	Purchasing somewhat more	Stayed the same	Purchasing somewhat less	Purchasing a lot less
Canned foods					
Frozen foods					
Fresh foods					
Dry goods/shelf-stable foods					
Beverages					
Snack-type items					
Ready-prepared foods					

13. How have you been getting your food during COVID-19? (mark all that apply?)

- ☐ Online Grocery shopping and pick-up
- ☐ Grocery delivery service
- ☐ Going to the grocery store during special hours
- ☐ Going to the grocery store as you did before COVID-19
- ☐ Ordering food online (e.g., Amazon)
- ☐ Neighbors
- ☐ Home meal delivery service (e.g., blue apron, hello fresh, etc.)
- ☐ Family
- ☐ Restaurants and fast food (take out, delivery)
- ☐ Meals on wheels/home-delivered meals
- ☐ School

14. To what extent has COVID-19 affected your food preparation/cooking at home?

- ☐ Increased it a lot
- ☐ Increased it somewhat
- ☐ Stayed the same
- ☐ Decreased it somewhat
- ☐ Decreased it a lot

15. What is your comfort level with preparing food multiple times per day?

- ☐ Extremely comfortable
- ☐ Somewhat comfortable
- ☐ Neither comfortable or uncomfortable
- ☐ Somewhat uncomfortable
- ☐ Extremely uncomfortable

16. During the COVID-19 social distancing directives, how many times per week did you eat foods prepared outside the home? (include restaurants, take-out, delivery, etc)

- ☐ None
- ☐ 1-2
- ☐ 3-4
- ☐ 5-6
- ☐ More than 6

17. To what extent has COVID-19 affected your awareness of food safety guidelines?

- ☐ Increased it a lot
- ☐ Increased it somewhat
- ☐ Stayed the same

18. How has COVID-19 affected your daily physical activity?

- ☐ A lot less physically active
- ☐ Somewhat less physically active
- ☐ No change
- ☐ Somewhat more physically active
- ☐ A lot more physically active

19. Please rank your stress level since COVID-19:

- ☐ Not at all stressed
- ☐ Not very stressed
- ☐ About the same as it was before COVID-19
- ☐ Somewhat stressed
- ☐ Very stressed

20. What COVID-19 related food, nutrition, food safety, or wellness resources would be helpful to you? [open ended]

For the remainder of the survey, please answer the questions based on your regular day-to-day behavior and lifestyle BEFORE COVID-19 directives were in place.

PROGRAM PROMOTION/INTEREST QUESTIONS

21. Do you use social media platforms? (If no, skip to Question 23)

- ☐ Yes
- ☐ No
- ☐ I'm not sure

22. Please rank which social media platforms you use most frequently (1) to least frequently (5).

- ☐ Facebook
- ☐ Instagram
- ☐ LinkedIn
- ☐ Pinterest
- ☐ YouTube

23. Where do you typically access your wellness or nutrition information? Select all that apply.

- ☐ Blogs
- ☐ Books
- ☐ Facebook
- ☐ Health care professionals
- ☐ Instagram
- ☐ LinkedIn
- ☐ Magazines or newspaper
- ☐ News channels
- ☐ Pinterest
- ☐ Podcasts
- ☐ Radio
- ☐ Research articles or academic journals
- ☐ Talk shows
- ☐ Videos
- ☐ Websites
- ☐ Other: _____
- ☐ I don't seek out wellness or nutrition information

24. Where do you typically access your food safety information? Select all that apply.

- ☐ Blogs
- ☐ Books
- ☐ Facebook
- ☐ Health care professionals
- ☐ Instagram
- ☐ LinkedIn
- ☐ Magazines or newspaper
- ☐ News channels
- ☐ Pinterest
- ☐ Podcasts
- ☐ Radio
- ☐ Research articles or academic journals
- ☐ Talk shows
- ☐ Videos
- ☐ Websites
- ☐ Other: _____
- ☐ I don't seek out food safety information

25. Would you participate in a program to receive information on health, wellness or food safety? (If no, skip to question 27)

- ☐ Yes
- ☐ No
- ☐ I'm not sure

26. Please rank your preference of the following formats for receiving information (1 is most preferred, 6 is least preferred).

- ☐ Group session, in-person (e.g. class or workshop)
- ☐ Group session, online using Zoom or Adobe connect
- ☐ Interactive app
- ☐ Live webinar
- ☐ Recorded webinar
- ☐ Online lessons (e.g. on your own)

27. Have you used nutrition, wellness, or food safety programs or resources offered by Extension and Outreach? (If yes, display question 28)

- ☐ Yes, I have used nutrition, wellness, or food safety programs or resources offered by Extension and Outreach.
- ☐ No, I have not used nutrition wellness or food safety programs and resources offered by Extension and Outreach.

28. How familiar are you with the following nutrition, wellness, or food safety programs or resources offered by Extension and Outreach?

Program name	Never heard of it	Heard of it, but have not attended	Attended/participated
Answerline			
Buy. Eat. Live Healthy.			
Child care training			
Food preservation 101 (one-time food preservation class)			
HACCP Bootcamp			
Healthy and Homemade series			
Home-Based Food Operations workshop			
Is it Whole Grain?			
Latinos Living Well			
MyWellbeing (worksite wellness)			
NEWS (Nutrition Education with Seniors) newsletter			
Plan Shop Save Cook			
Preserve the Taste of Summer (hands-on food preservation workshops)			
SafeFood			
ServSafe® classes			
Spend Smart. Eat Smart. website			
Stay Independent: A Healthy Aging Series			
Veg Out!			
WIN (Wellness and Independence through Nutrition			
Words on Wellness newsletter			

29. How would you prefer to learn about available wellness, nutrition, or food safety programs and resources offered through Extension and Outreach? Select all that apply.

- ☐ Email program announcements
- ☐ Extension newsletters
- ☐ Extension websites
- ☐ Flyers posted around town
- ☐ Local newspaper
- ☐ Local radio
- ☐ Personal invitation
- ☐ Social media (e.g. blog, Facebook, YouTube, etc)
- ☐ Word of mouth
- ☐ Other: _____

30. How likely are you to sign up for or attend the following programs?

	Very unlikely	Unlikely	Neutral	Likely	Very likely
Child care training for providers					
Cooking classes					
Diabetes prevention					
Food allergies					
FOOD PRESERVATION for personal use					
FOOD PRESERVATION for small food manufacturers (i.e. pickling, bbq sauces, salsa, etc.)					
FOOD SAFETY for personal use					
FOOD SAFETY for gardening (i.e. growing fresh produce)					
FOOD SAFETY for food service workers					
FOOD SAFETY for small food manufacturers					
Food systems (e.g. sustainable food practices, local, organic, GMOs etc.)					
General wellness					
General nutrition trends					
Grocery store tour					
Heart healthy eating					
Home food preservation					
Mindful practices (e.g. mindful eating, stress management, etc.)					
Food/Nutrition labeling					

Nutrition for adults ages 18-45					
Nutrition for adults ages 46 to 60					
Nutrition for adults ages 61 and older					
Nutrition myth busters (e.g., addresses leading nutrition fads)					
Physical activity					
Worksite wellness					
Other (please list)					

31. What is the maximum number of weeks you would be willing to commit to attending a sequential/weekly program?

- ☐ I would not attend a sequential program
- ☐ 3 weeks
- ☐ 4 weeks
- ☐ 5 weeks
- ☐ 6 weeks

32. What is the maximum number of hours you would be willing to attend a sequential/ weekly program each week?

- ☐ I would not attend a sequential program
- ☐ 1 hour
- ☐ 2 hours
- ☐ 3 hours
- ☐ 4 hours

33. What is the most you would be willing to pay for an <u>IN-PERSON</u> program meeting for two hours a week for four weeks?

- ☐ I would only attend free events.
- ☐ $10
- ☐ $15
- ☐ $20
- ☐ $25
- ☐ $30
- ☐ $35
- ☐ $40

34. What is the most you would be willing to pay for an <u>ONLINE</u> program providing eight hours of content?

- ☐ I would only access free content.
- ☐ $10
- ☐ $15
- ☐ $20
- ☐ $25
- ☐ $30
- ☐ $35
- ☐ $40

<u>NUTRITION AND FOOD BEHAVIOR QUESTIONS</u>

35. Do you follow any special dietary restrictions or meal plans? (Mark all that apply)

- ☐ Clean eating (e.g., limited processed foods)
- ☐ Dairy-free
- ☐ DASH diet
- ☐ Diabetes diet
- ☐ Flexitarian (i.e. plant-based or with the occasional inclusion of meat)
- ☐ Gluten-free
- ☐ Heart healthy diet (i.e., low fat, low cholesterol, low sodium)
- ☐ Keto diet (e.g. low carbohydrate)
- ☐ Lacto Vegetarian (no animal products except dairy)
- ☐ Lacto-ovo Vegetarian (no animal products except dairy and eggs)
- ☐ Mediterranean diet
- ☐ Ovo Vegetarian (no animal products except eggs)
- ☐ Pescatarian (restricts meat consumption to seafood only)
- ☐ Vegan (no animal products of any kind)
- ☐ Other (please list) _____
- ☐ I do not follow any special diet or meal plan.

36. The following questions inquire about food intake behaviors in an average week.

	Usually/ Often (4 or more times per week)	Sometimes (2-3 days per week)	Rarely/ Never (<2 days per week)
In an average week, how often do you skip breakfast?			
In an average week, how often do you eat 4 or more meals from sit-down or take out restaurants?			
In an average week, how often do you eat less than 2 servings of whole grain products or high fiber starches a day? Serving = 1 slice of 100% whole grain bread; 1 cup whole grain cereal like Shredded Wheat, Wheaties, Grape Nuts, high fiber cereals, oatmeal, 3-4 whole grain crackers, ½ cup brown rice or whole wheat pasta, boiled or baked potatoes, yuca, yams or plantain			
In an average week, how often do you eat less than 2 servings of fruit a day? Serving = ½ cup or 1 med. fruit or ¾ cup 100% fruit juice			
In an average week, how often do you eat less than 2 servings of vegetables a day? Serving = ½ cup vegetables, or 1 cup leafy raw vegetables.			
In an average week, how often do you eat or drink less than 2 servings of milk, yogurt, or cheese a day? Serving = 1 cup milk or yogurt; 1½ - 2 ounces cheese.			
In an average week, how often do you eat more than 8 ounces (see sizes below) of meat, chicken, turkey or fish per day? Note: 3 ounces of meat or chicken is the size of a deck of cards or ONE of the following: 1 regular hamburger, 1 chicken breast or leg (thigh and drumstick), or 1 pork chop.			
In an average week, how often do you use regular processed meats (like bologna, salami, corned			

beef, hotdogs, sausage or bacon) instead of low-fat processed meats (like roast beef, turkey, lean ham; low-fat cold cuts/hotdogs)?			
In an average week, how often do you eat fried foods such as fried chicken, fried fish, French fries, fried plantains, or fried yuca?			
In an average week, how often do you eat regular potato chips, nacho chips, corn chips, crackers, regular popcorn, nuts instead of pretzels, low-fat chips or low-fat crackers, air-popped popcorn?			
In an average week, how often do you add butter, margarine or oil to bread, potatoes, rice or vegetables at the table?			
In an average week, how often do you eat sweets like cake, cookies, pastries, donuts, muffins, chocolate and candies more than 2 times per day?			
In an average week, how often do you drink 16 ounces or more of non-diet soda, fruit drink/punch or Kool-Aid a day? Note: 1 can of soda = 12 ounces			
In an average week, how often do you or a member of your family usually shop and cook rather than eating sit-down or take-out restaurant food?			

37. How willing are you to make changes in your eating habits in order to be healthier?

1 Very willing	2	3	4	5 Not at all willing

38. Which statement <u>best</u> describes your status for purchasing meals/grocery items?

- ☐ I can take care of all my meal purchasing needs independently.
- ☐ I can shop independently for small purchases.
- ☐ I need to be accompanied while purchasing meal/grocery items.
- ☐ I need someone else to do all my purchasing.

39. Which of the following locations best describes where you buy the majority of your food?

- ☐ Convenience store (e.g. Casey's, Kum & Go)
- ☐ Dollar stores (e.g. Dollar General, Dollar Tree, Family Dollar)
- ☐ Food Co-op
- ☐ Grocery store (e.g., Hy-Vee, Fareway, Hometown Foods)
- ☐ Grocery superstores (e.g. Walmart, Target)
- ☐ I eat out (restaurants or fast food)
- ☐ Other: _____

40. Please rank the following factors in order of importance for you when buying food (1 is most important and 7 is the least important).

- ☐ Brand
- ☐ Convenience
- ☐ Nutritional value
- ☐ Price
- ☐ Shelf life
- ☐ Taste
- ☐ What I'm in the mood for

41. Which statement best describes your status for preparation of meals on <u>most</u> days?

- ☐ I can plan, prepare, and serve healthy meals independently.
- ☐ I can prepare adequate meals if supplied with ingredients.
- ☐ I can heat and serve my meals.
- ☐ I can plan, prepare, and serve my meals but I do not maintain a nutritious diet.
- ☐ I can plan and prepare my meals, but choose not to. I prefer frozen meals or eating out.
- ☐ I need to have my meals planned, prepared and served.

<u>PHYSICAL ACTIVITY QUESTIONS</u>

42. In general, how would you describe your activity level?

- ☐ No activity
- ☐ Low activity
- ☐ Somewhat low activity
- ☐ Somewhat high activity
- ☐ High activity

43. During the past month, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening, or walking for exercise?

- ☐ Yes
- ☐ No
- ☐ Don't know/not sure

44. Which one of the following BEST describes your usual daily activities related to moving around? Do NOT include exercises, sports, or physically active hobbies done in your leisure time. Pick the one you do MOST often.

- Sit during MOST of the day
- STAND during MOST of the day
- Walk around MOST of the day
- Don't Know

45. How many hours do you spend <u>per day</u> during the WEEKDAYS sitting? Include watching television or videos, working on the computer, playing video games, using the Internet, knitting, sewing, reading, fishing, taking long drives, watching ball games or doing other sitting activities.

- None
- _____ hours per day *(will have text box as option)*
- Don't know

46. How many hours do you spend <u>per day</u> during the WEEKENDS sitting? Include watching television or videos, working on the computer, playing video games, using the Internet, knitting, sewing, reading, fishing, taking long drives, watching ball games or doing other sitting activities.

- None
- _____ hours per day *(will have text box as option)*
- Don't know

<u>CHRONIC DISEASE AND GENERAL HEALTH QUESTIONS</u>

47. Would you say that in general your health is:

- Poor
- Fair
- Good
- Very good
- Excellent

48. Has a doctor, nurse or other health professional ever told you that you have any of the following? For each, respond Yes, No or I'm Not Sure.

Condition	YES	NO	NOT SURE
I have no medical conditions			
Angina (chest pain) or coronary artery disease			
Arthritis			
Depression			
Diabetes			
Food allergies			
High blood pressure			
High cholesterol			
History or current cancer diagnosis			
Kidney disease			
Lung disease (e.g. asthma, chronic obstructive pulmonary disease (COPD), emphysema or chronic bronchitis)			
Myocardial infarction or heart attack			
Oral health or mouth problems			
Osteoporosis			
Stroke			
Other (please list)			

FOOD SAFETY QUESTIONS

Garden food safety

49. Are you interested in food safety materials for produce gardening? (If no, skip to question 53)

- ☐ Yes
- ☐ No

50. What type of produce gardening do you do? Select all that apply.

- ☐ Personal garden
- ☐ Donation gardens
- ☐ School gardens
- ☐ Community gardens
- ☐ Other: _____

51.

Please indicate your level of agreement with each of the following statements	Strongly Disagree (1)	Disagree (2)	Agree (3)	Strongly Agree (4)
Practicing food safety in the garden is important.				
I want to use more food safety practices in my garden.				

52. How familiar are you with the food safety for fresh produce publications available at the Iowa State Extension and Outreach store?

- ☐ Not at all familiar
- ☐ Slightly familiar
- ☐ Somewhat familiar
- ☐ Very familiar
- ☐ Extremely familiar

General food safety (consumer)

53. Do you do your own cooking and shopping? (If no skip to question 55)

- ☐ Yes
- ☐ No

54. Please select YES, NO, or SOMETIMES in response to each statement.

	YES	NO	SOMETIMES
When grocery shopping, I pick up refrigerated and frozen foods just before checking out.			
I check "sell-by" or "use-by" dates on packages when shopping or eating.			
When I bring my groceries home, I refrigerate cold foods immediately.			
I wash my hands before I prepare food.			
I keep raw meat or poultry juice away from other foods by using separate cutting boards.			
I wash cutting boards that have touched raw meat or poultry between uses.			
I always thaw meat in the refrigerator.			
I refrigerate my leftovers immediately.			
Spoiled leftover food does not always smell, taste, or look bad, so when I'm in doubt, I throw it out.			
I keep kitchen towels and sponges clean.			

Food safety for small food manufacturers

55. Are you small food manufacturer? (If no, skip to question 59)

- ☐ Yes
- ☐ No

56. What type of food products do you process? (Check all that apply)

- □ Appetizers
- □ Baked goods (i.e, breads, pies, cookies, dessert products)
- □ Beverages (i.e. alcoholic and non-alcoholic, juices, etc.)
- □ Cereals (i.e. rice, pasta, etc.)
- □ Confectionery
- □ Dairy foods (i.e. egg, cheese, milk, etc.)
- □ Dried Foods (i.e. spices, fruit leather, etc.)
- □ Edible fungi
- □ Edible nuts and seeds
- □ Edible Plants
- □ Entrée items (quiche, casserole, etc)
- □ Fresh cut produce
- □ Honey
- □ Meat products
- □ Plant based foods
- □ Seafood (i.e. fish farms)
- □ Snack foods
- □ Syrups
- □ Thermally-processed canned foods (i.e. pickles, BBQ sauce, salsa, etc.)
- □ Other:

57. Do you currently have a food safety plan for your product(s)?

- □ Yes
- □ No

58. How interested are you with the <u>continuing education topics for small food manufacturers?</u>

	Not interested	Interested	Have participated/ attended
Procedures in place to meet relevant food safety requirements/laws			
Problem solving skills when quality or food safety issues arise			
Scientific methods for measuring product(s) quality and food safety (i.e. pH, water activity, moisture content, etc.)			
A food safety risk assessment and hazard assessment			
Process controls (i.e. temperature, time, etc.) In place to monitor the risk			
Scientific data to support shelf-life			
Current Good Manufacturing Practices (cGMPs)			
Hazard Analysis Critical Control Point (HACCP) – Non meat			
Safety Quality Food (SQF)			
Better Process Control School (canning for retail)			
Preventive Control for Human Foods (processed and prepared foods for retail)			
Product development and safety for low acid canned foods (i.e. canned vegetables, broths, salsa, sauces, etc.)			

Employer-required food safety training

59. Does your job require you to complete food safety training? (If yes, display question 60)

- ☐ No
- ☐ Yes

60. If yes, what company describes your employer best?

- ☐ Child care
- ☐ Food processing plant
- ☐ Food truck
- ☐ Home food producer
- ☐ Hospital/Healthcare/Long-term care
- ☐ Restaurant
- ☐ Retail establishment (i.e. grocery store, specialty shop, convenience store, etc.)
- ☐ Retirement community or senior center food service
- ☐ School food service
- ☐ Other (please describe)

Food preservation

61. Do you preserve food at home (i.e. canning, freezing, drying, pickling)?

- ☐ No
- ☐ No, but I would like to learn
- ☐ Yes
- ☐ Yes, but I would like to learn more

FOOD SECURITY QUESTIONS

62. For the below statements, please indicate if the statement was often true, sometimes true or never true for you/your household in the last 12 months. I/We worried whether my/our food would run out before I/we got money to buy more.

- ☐ Often true
- ☐ Sometimes true
- ☐ Never true
- ☐ Don't know

63. The food that I/we bought just didn't last and I/we didn't have money to get more.

- ☐ Often true
- ☐ Sometimes true
- ☐ Never true
- ☐ Don't know

64. In the past 12 months, have you or a household member used any of the following to receive food items? Select all that apply.

- ☐ Backpack program from schools
- ☐ Commodity Supplemental Food Program
- ☐ Congregate Meal Program (Senior lunch program)
- ☐ Family/Friends
- ☐ Food Pantries/Food Banks
- ☐ Meals on Wheels
- ☐ School lunch program
- ☐ Senior totes program
- ☐ Supplemental Nutrition Assistance Program (i.e. food stamps, food assistance)
- ☐ Other community food and nutrition programs (please list)
- ☐ Have not received any resources

DEMOGRAPHICS

65. What is your preferred language for obtaining information?

- ☐ Chinese
- ☐ English
- ☐ French
- ☐ German
- ☐ Spanish
- ☐ Other: _____

66. What is the highest degree of school you completed?

- ☐ Less than High School
- ☐ High School/GED
- ☐ Some College
- ☐ Associates
- ☐ Technical School
- ☐ Bachelor's
- ☐ Graduate

67. Are you…?

- ☐ Divorced
- ☐ Married
- ☐ Separated
- ☐ Single, never married
- ☐ Widowed

68. What Iowa county do you live in? (Fill in Blank)

_____

69. Please rate your level of agreement with this statement: *"I feel my city/town provides opportunities for promoting health and well-being* (e.g., offers a variety of programs, accessible services, etc).

- ☐ Strongly disagree
- ☐ Disagree
- ☐ Neutral
- ☐ Agree
- ☐ Strongly agree

70. Please select your current household size:

- ☐ 1-2
- ☐ 3-4
- ☐ 5-6
- ☐ >7

CHAPTER 5. FOOD RETAILERS' PERSPECTIVES ON PILOT PROGRAM STRATEGIES TO PROMOTE HEALTHY EATING IN SNAP PARTICIPANTS

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Abstract

Food retailers are key stakeholders in the development, implementation and effectiveness of Supplemental Nutrition Assistance Program (SNAP) nutrition pilot programs. Qualitative interviews were conducted to gather insight from food retailers regarding the feasibility of proposed strategies to improve food choices among SNAP participants. Two corporate and six local-level food retailer managers were identified for interviews based on SNAP participation, rural-urban code, and type of food retail settings in the selected counties. Qualitative thematic analysis was performed by four research team members and themes were identified via consensus. Marketing, incentive, and disincentive program models were well-received, while restriction and stocking standards models were less well-received. Food retailers viewed simple programs with easy implementation and educational components positively. Driving sales and programs that align with corporate and social responsibility goals were important factors related to willingness to participate in pilot programs. Insights from this present study can inform future pilot programs and promote food retailer buy-in.

Key words: Supplemental Nutrition Assistance Program, Food Retail Environments, Health Promotion

Introduction

The Supplemental Nutrition Assistance Program (SNAP) aims to reduce and prevent hunger (Yaktine & Caswell, Eds., 2013). In 2019, over 35 million Americans participated in SNAP with higher participation rates in rural areas (16%) and small towns (15%) compared to urban areas (13%) (Food and Nutrition Service, 2020; Food Research & Action Center, 2018). SNAP benefit allotments are based on the "Thrifty Food Plan", which is a meal plan designed to provide a nutritionally adequate diet with minimal financial resources (Carlson et al., 2007). Evidence suggests SNAP participants have poorer diet quality compared to non-participants (Gregory et al., 2013; Whiteman et al, 2018; Sanjeevi & Freeland-Graves, 2017). Poor diet quality and food insecurity are linked to higher rates of chronic diseases amongst those with limited incomes (Centers for Disease Control and Prevention, 2020; Gregory & Coleman-Jensen, 2017).

A variety of strategies to promote healthy eating have been recommended including incentives, disincentives, restrictions, improving the retail environment, and providing more robust nutrition education (Leung et al., 2013; Center for Science in the Public Interest, 2018). Previous research suggests SNAP participants find incentive programs acceptable (Leung et al., 2017; Rydell et al., 2017). However, there is limited research investigating the perspectives of food retailers and food retail managers on the feasibility of these proposed strategies. The purpose of this exploratory study is to gather insight from food retailers regarding the feasibility of proposed strategies to improve food choices among SNAP participants. The long-term goal is to use this information to implement strategies that improve the diet quality of SNAP participants with the buy-in of food retailers. The research protocol was reviewed and deemed "exempt" by the Iowa State University Institutional Review Board (IRB).

Methods

Potential interview participants were identified based on Iowa counties with the highest SNAP participation, the rural-urban code of the county, and the number and type of food retail settings in those counties. Informants were employed by a licensed food retail store participating in SNAP in these counties. These selection criteria allowed for comparison between rural and urban settings and identified the predominant retail settings serving SNAP participants in the identified counties. Qualitative key informant interviews were conducted in-person with two corporate-level food retail managers (Corporate) and six local-level food retail managers (Managers) (4 rural, 2 urban; 8 interviews total).

Two of the primary investigators conducted the Corporate interviews and four Extension program specialists conducted the Managers interviews. All were trained on the appropriate protocols. Interviews consisted of broad, open-ended questions regarding strategies to promote healthy eating and questions related to five expert-recommended strategies, including marketing, incentives, disincentives, restrictions, and stocking standards. All interview recordings were transcribed verbatim by Rev.com, an IRB-approved transcription service. Interviewee identities were kept anonymous.

Each member of the research team (n=4) independently reviewed and coded the two Corporate interviews and agreed on key themes. Following this discussion, a codebook was developed and organized by interview questions, with identified first-level codes, second-level codes and associated sub-codes. First-level codes captured simple descriptions (i.e. general perceptions of a specified strategy) and second-level codes captured focused codes or themes on an analytical level (i.e. challenges or benefits of a specified strategy). A color-coded key was used to emphasize recurring themes and provide a visual for identifying key benefits and challenges. The codebook was use to recode the Corporate interviews to ensure consistency and

reliability. The six Managers transcripts were also coded using the same codebook. All coding discrepancies were resolved by consensus. The key themes and information were compiled separately from the Corporate interviews and Managers interviews and subsequently compared and contrasted against each other.

Results

The urban grocery store participated in both the Corporate and Manager interviews. The rural grocery store responded via email at the Corporate level and participated in interviews at the Manager level. A predominantly rural convenience store did not respond to any communication. The predominantly urban convenience store participated in the Corporate level interview but declined interviews at the Manager level because all relevant decisions (including all marketing, shelf placement, etc.) are made at the corporate level.

The informants shared general perceptions and insights on the challenges and benefits of implementing a marketing pilot, stronger stocking standards, an incentive pilot, and a disincentive pilot for promoting healthy food choices among SNAP participants. They were also asked about their perceptions of utilizing food choice restrictions as a means to improve dietary quality of SNAP participants.

Key Themes

A number of drivers and influencers for the implementation of a nutrition pilot program were identified in the Corporate interviews. Key themes that emerged included: sales, product placement, corporate and social responsibility (i.e., company's desire and reputation for promoting healthy eating and supporting the health of the community), manufacturer/vendor buy-in, signage, and consumer demand (i.e., the pressure to provide what the consumer wants, whether it is healthful or not).

Managers mentioned sales, education, corporate buy-in, product placement and signage most frequently. Education included nutrition education opportunities, including education of retail associates and program participants, regarding SNAP benefits and logistics (e.g., allowable foods, qualifications, etc.). Both Corporate and Managers most often identified sales as a key benefit, driver, and factor when considering implementing a pilot program. Both groups frequently identified signage and product placement as effective interventions for promotion efforts and driving sales. Key stakeholder buy-in (manufacturers, vendors and corporate) was another common theme between Corporate and Managers, although they did differ in context. Corporate reported the importance of manufacturer and vendor buy-in, whereas, Managers reported the need for corporate buy-in more frequently than manufacturers and vendors.

Stigma was another recurrent theme in corporate and local interviews. Stigma identified concerns related to reduced autonomy of SNAP participants and targeting messages toward SNAP participants in a nutrition pilot program.

Marketing Pilot

Figure 5-1 illustrates the key concepts related to a SNAP marketing pilot. Marketing techniques including advertising, product placement, and pricing strategies were discussed. Product placement was the most widely discussed strategy, which included shelf placement, end caps, red zones, store layout, and checkouts. Pricing strategies included “two-fors” (i.e. two for $5), multiples, and buy-one-get-one (BOGO). Advertising encompassed a variety of channels including apps, in-store, digital and print ads, and signage.

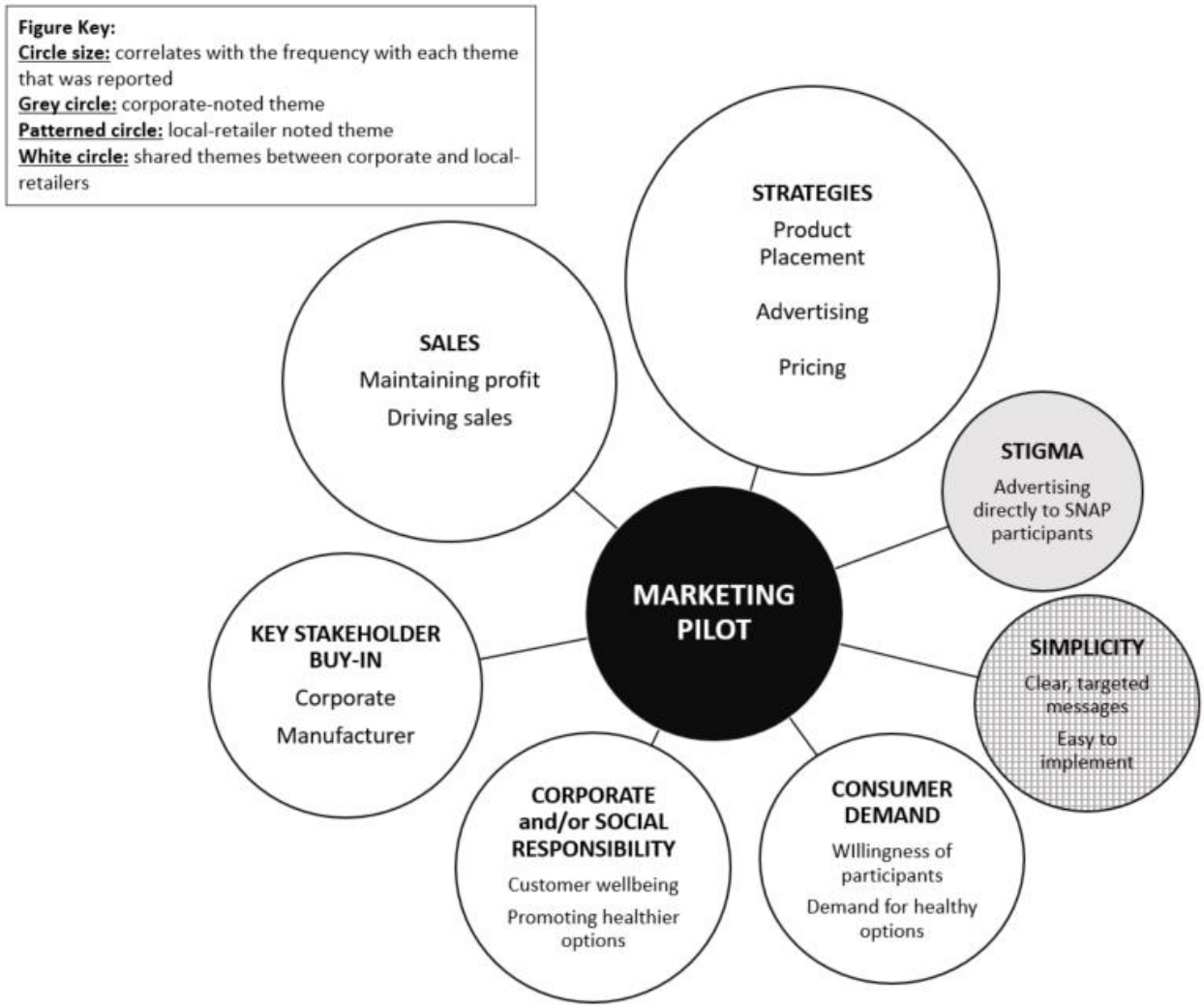

Figure 5-1. Marketing Pilot Key Concepts

Corporate reported advertising, product placement, and pricing strategies are effective marketing strategies. However, marketing healthy items required support from the manufacturers and vendors. Preventing stigma was a key concern related to targeted messaging to SNAP participants. Whether the SNAP participants would want to buy the healthier items was another concern shared. Managers saw healthy sales and increasing purchasing power for SNAP participants to be a potential benefit of a marketing pilot program; however, they were concerned about the potential cost or loss of money with participating in a SNAP marketing pilot program. Simplicity and ease of implementation were reported as important considerations for

participating in a SNAP marketing pilot. Both groups reported placement and pricing as the most promising SNAP marketing pilots. Supporting quotes include:

- "*Shelf talkers and signage is a great tool to use, because it draws their eye to that product*."
- "*It's just a little more eye level because we'll sell more…. That shelf placement is everything."*

Stocking Standards

Figure 5-2 illustrates the key concepts related to stocking standards. Stocking standards are the guidelines on variety and quantity of food items required in a food retail environment in order to be an authorized SNAP retailer. Corporate reported challenges and concerns related to this intervention. Food item variety was identified as positive; however, concern regarding the ability to meet the variety requirements due to space constraints was identified. There were also broader concerns mentioned related to unintended consequences. Smaller stores who cannot meet the requirements would be excluded, which may amplify limited food access and food deserts. Another consequence identified was the food waste related to expiration of food that did not sell.

Managers expressed similar sentiments related to food variety, space, and unintended consequences (e.g., eliminating SNAP vendors due to inability to meet standards). They anticipated that changing the stocking standards might cause SNAP customers shopping at convenience store to shift to grocery stores, increasing their customer base. Consequently, lack of space would present a challenge for smaller grocery stores and convenience stores to meet the stocking standards and could potentially limit food access in certain areas. Supporting quotes include:

- *"[…] I think increasing [stocking standards] to get it into grocery retail would improve the healthy stuff that they're buying."*
- "*Well, I think C-stores are probably the most challenged because we have the least space."*
- *"I always think that that would be great, but then I also really worry about food deserts and the SNAP beneficiaries' access to food because if you add in a cost of bus ride, and then you're toting everything back, … you're going to limit their access to what they can buy …."*

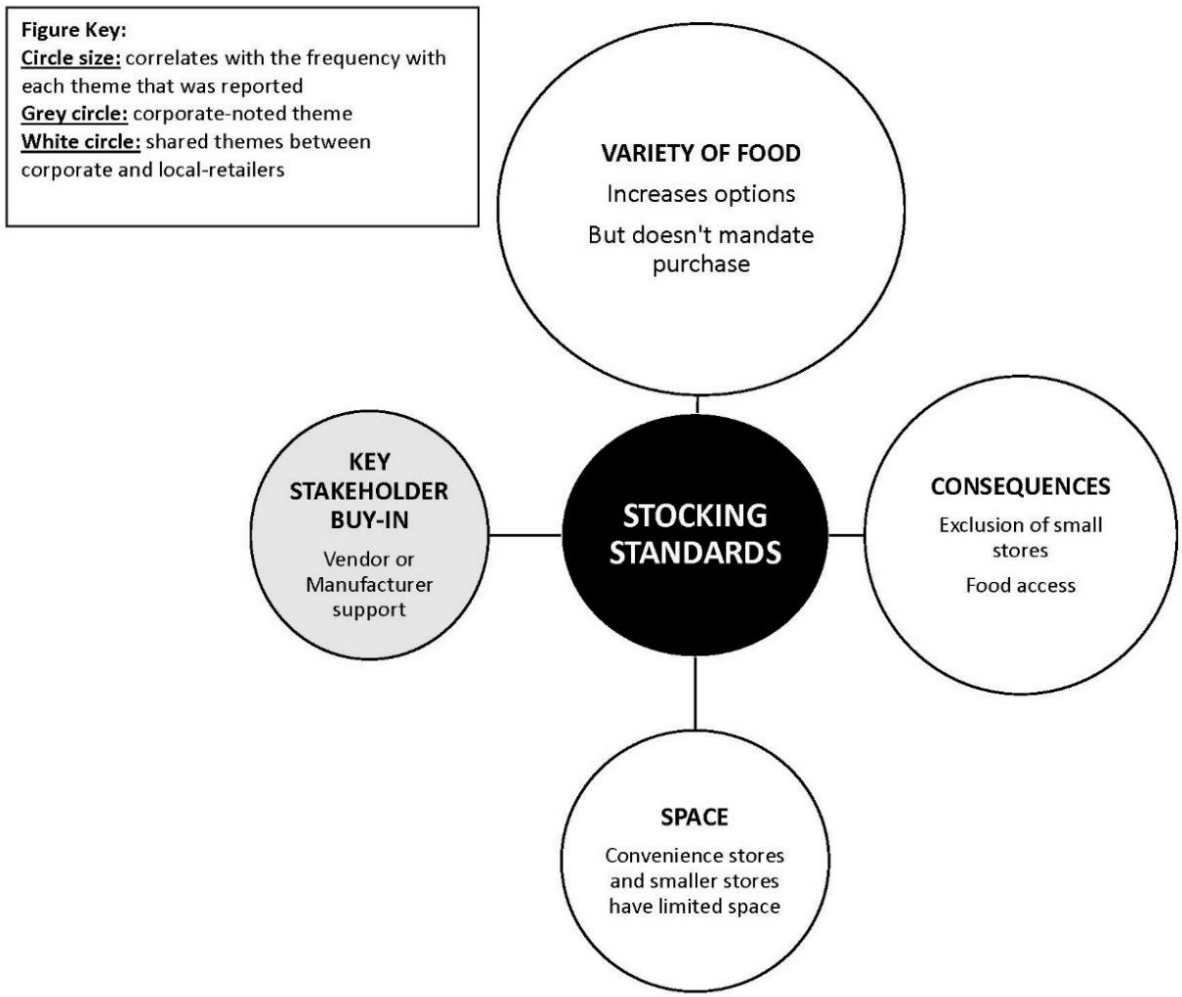

Figure 5-2. Stocking Standards Key Concepts

Incentive Pilot

A SNAP incentive pilot would provide rewards or benefits to the SNAP participant for purchasing healthy items such as fruits and vegetables (Figure 5-3). Corporate viewed this SNAP incentive pilot as an opportunity to provide nutrition education. They also perceived benefit from increased customers, sales and purchasing power for participants. Despite these benefits, there were challenges noted such as stigma, consumer privacy, procurement, regulations, and technology (Figure 5-3). There was a recognized need for vendor participation as well as education for the SNAP participant to ensure effective implementation of this strategy.

Managers identified similar challenges and benefits. A SNAP incentive program may drive sales and healthy purchases, but a few informants wanted SNAP to limit the program to fruits and vegetables. Logistics, technology, and lack of education for program participants and store associates were challenges reported, which was consistent with Corporate perspectives. Managers reported the need for corporate buy-in to participate in the program, whereas Corporate reported challenges related to procurement. A supporting quote includes:

- *"So, any way that you're able to get people to eat healthier and incentivize it by making them be able to do it…you want them to feel like they can get fruits and vegetables and those things as easy as they're able to go get the other stuff that's maybe not or cheaper or whatever for their families."*

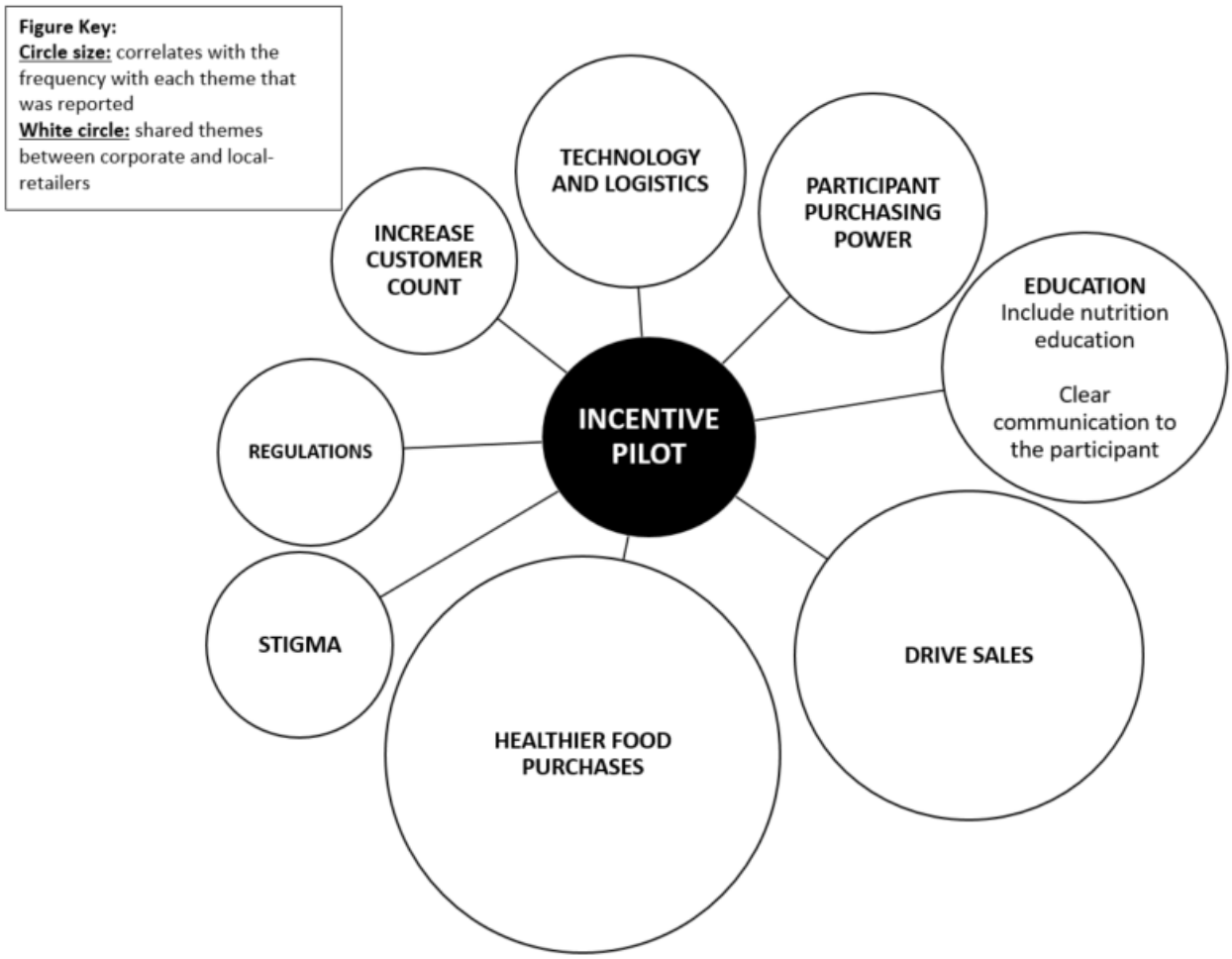

Figure 5-3. Incentive Pilot Key Concepts

Restriction and Disincentive Pilot

Restriction and disincentive programs have been suggested as a means to promote healthy food selection among SNAP participants. A restriction program would remove sugar-sweetened beverages (SSB) from the list of eligible items for purchase with SNAP benefits. A disincentive program would incentivize purchase of healthy food as well as providing an incentive if participants do not buy unhealthy food (e.g. receiving more benefits if you buy fruits and vegetables and do not buy SSB). Both groups saw benefits but expressed concerns about stigma and reduced SNAP participant autonomy with both restriction and disincentives (Figure 5-4). Both groups agreed on the anticipated benefits and challenges of the disincentive strategy.

Increasing healthy sales and social responsibility were seen as benefits as it would discourage unhealthy purchases and promote wellbeing. However, educating SNAP participants, potential customer loss and stakeholder buy-in were challenges to implementing this strategy. Further, Managers reported concern that disincentives may stigmatize SNAP participants, whereas Corporate did not identify this concern. For example, one stated:

- *"If you're taking away one of those unhealthy options, that is coincidentally probably one of the more popular ones and replacing that with the healthy alternative. They're not going to have that as an option, so it's definitely going to help with the healthiness."*

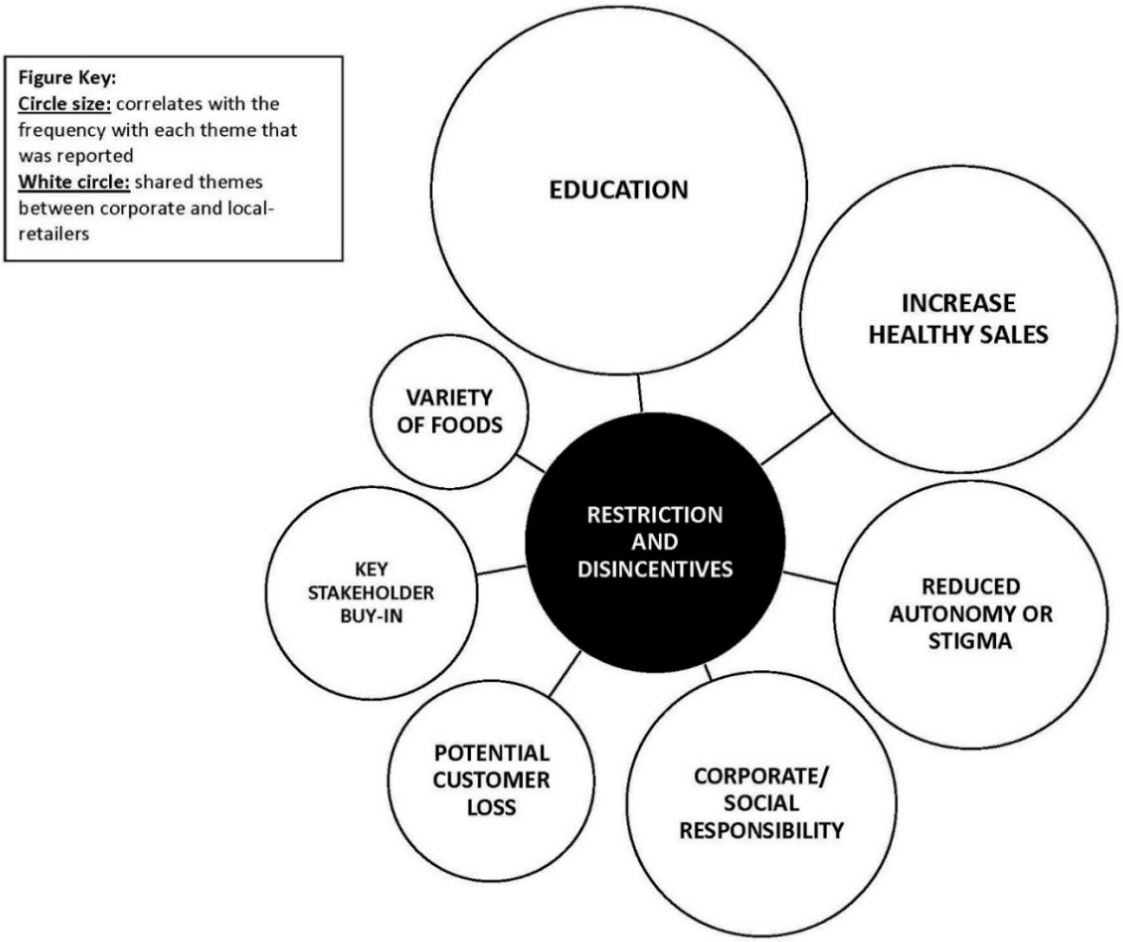

Figure 5-4. Restriction and Disincentive Pilot Key Concepts

Other Strategies

Managers frequently recommended education and targeted messaging as a good strategy to promote healthy eating including cooking classes, store tours, and simple nutrition swap ideas. Managers noted that SNAP participants are knowledgeable about what they can buy and some stores have an in-store dietitian available; however, it might be challenging to provide in-store nutrition education for this population due to the associated cost for the service.

Manager Beliefs and Stereotypes about SNAP Participants

Some but not all managers shared retailer-held beliefs and stereotypes about SNAP participants including consuming a lot of soda, using benefits on non-essential items (e.g. SSB and "junk foods"), and taking advantage of financial assistance. Supporting quotes include:

- *"I think it's wrong that when people get financial assistance that they're blowing on a non-essential item. So that would be the biggest benefit I think for us seeing that those programs are getting taken advantage of. And you'll always have people that will try to."*
- Another noted a benefit of restricting SSB was "*they wouldn't be drinking all that crap because they [already] do"*.

Discussion

This study provides valuable information regarding the feasibility of pilot programs to improve SNAP participants' food choices from the perspective of food retailers. Food retailers are crucial for successful pilot program implementation. Therefore, their insight on the feasibility of different strategies within the retail environment adds to the existing research of stakeholder perspectives on how to improve food choices among SNAP participants. Leung et al. (2013) identified potential pilot programs including incentives and restrictions, modifying benefit distribution, providing nutrition education, improving food retailer environment (e.g. stocking

standards) and improving program implementation as key strategies to improve food choices among SNAP participants. These strategies were identified by experts from government, industry, advocacy, and research sectors.

Key themes in the present study are supported by previous research suggesting store sales, stakeholder buy-in (manufacturers, vendors and corporate), corporate/social responsibility (CSR), ease of implementation/program logistics, and consumer demand are crucial drivers and factors for store participation in new pilot programs (Houghtaling et al., 2019). Of note, consumer demand was less frequently cited as a key consideration related to program participation whereas store-related factors (i.e. store sales) were most frequently cited.

Leung et al. (2013) reported those from the advocacy sector expressed concern about stigma related to enforcing restrictions and instructing SNAP participants what they can and cannot buy. Both groups in our study reported the same concern about stigmatizing SNAP participants relative to restrictions, marketing and targeted messaging. Retailer-held beliefs and biases about SNAP participants and food purchases were also evident. To the authors' knowledge, there is no current research on the effect of retailer's bias towards SNAP participants, although this could be a future area of study.

Nutrition education was not a topic specifically discussed in the interview script. However, it was widely recommended as a strategy to improve the food choices of SNAP participants in this current study as well as in previous research (Leung et al., 2013; Houghtaling et al., 2019; Karpyn et al., 2018).

Marketing Pilot

Both groups reported product placement and pricing strategies as the most promising marketing pilot programs to improve diet quality in SNAP participants. Houghtaling et al. (2019) explored the feasibility of implementing marketing principles such as place (physical

environment), profile (food variety), portion, pricing, promotion (e.g. signage, demonstrations) priming (e.g. displays, floor stickers), prompting (e.g. shelf talkers), and proximity (product placement and location) to promote healthier food choices by SNAP participants. The majority of the rural food retail managers in that study reported prompting and proximity as the most feasible marketing interventions (Houghtaling et al., 2019). Participants in the current study noted that product placement (i.e. end caps, red zone, shelf placement, and checkout) was the key to driving sales. Signage, especially at the shelf, was also a useful advertising strategy.

Stocking Standards

Respondents in this study noted that increasing the variety of food products was a benefit to increase options. However, this could be difficult to achieve for smaller stores, and may lead to the unintended consequence of losing SNAP-authorized retailers (e.g. convenience stores). Corporate and local-level managers were concerned this loss could decrease food access.

Previous research conducted in gas stations and small stores in rural, urban, and suburban areas in four states demonstrated the majority of food retailers believed their stores were close to meeting stocking standards; however, none of the stores met minimum stocking standards, indicating a discrepancy between perception and implementation (Karpyn et al., 2018). Although small food retailers felt they would be able to meet SNAP requirements, they expressed concerns about space, procurement, and consumer demand as barriers. They also identified financial assistance, wholesaler support, subsidies for healthy food, and nutrition education as facilitators for meeting stocking standards (Karpyn et al., 2018).

In this study, Corporate was similarly concerned about space, consumer demand, and expiration of food that did not sell. Furthermore, one participant noted that increasing the variety of food available does not ensure the purchase of healthier items. The same individual suggested that adjusting the definition of what qualifies for different types of food would be helpful for

convenience stores to meet the guidelines. For example, allowing apples and apple juice to count as separate items instead of just one type of fruit (apple).

As described in the results, food deserts and reduced food access was reported as a potential unintended consequence of stronger stocking standards. In the context of the present study, both rural and urban counties in Iowa have large populations with low access to food. Two urban counties had more than 50,000 people with low access to food in 2015. Twenty-two (22.2%) of Iowa counties (14 rural, 8 urban) had between 5,001 and 50,000 people with low access to food in 2015 (Economic Research Service, 2020). These data suggest the potential consequence of reduced food access is an important consideration relevant to implementation of stronger stocking standards.

In communities with low access to food, individuals may be relying on non-traditional food retailers (e.g. dollar stores, gas stations, convenience stores) to procure food. For example, Racine et al. (2016) found over half of the documented food deserts, in the counties within the study area, had at least one dollar store participating in SNAP. These stores generally stocked healthy staple foods (canned and frozen produce, milk, cheese, and dry goods) but no fresh fruits and vegetables. Increasing the variety of healthful foods and fresh produce in convenience stores, dollar stores, gas stations, and small grocery stores participating in SNAP is necessary to promote food access and availability for this population.

Incentives, Disincentives, and Restriction Pilots

Both groups in this study viewed incentive programs positively and saw these programs as opportunities for increasing customers and sales as well as providing nutrition education and increasing purchasing power for SNAP participants. For disincentive and restriction programs, they reported discouraging unhealthy purchases as a benefit for social responsibility and promoting health. For all three types of programs, both groups were concerned about

stigmatizing SNAP participants and potentially losing customers; however, there was more concern about stigma and reduction of autonomy related to restriction and disincentive programs compared to incentive programs.

Double Up Food Bucks, an existing fruit and vegetable incentive program, has been shown to encourage SNAP participants to visit farmers markets to purchase fruits and vegetables and increase purchasing power of SNAP dollars. However, participants reported some confusion about how to use the benefits at the markets (Cohen et al., 2019). A Corporate participant cited the Double Up Food Bucks program as an example of why education is more crucial than a pilot program:

- *"We both feel that doing a pilot program is not the way to combat the issues that you were addressing in these questions. We both feel that educating the participants to understand the program and what the government to trying to convey to them is the key first. Here is an example, […] the client/customers don't understand why we are giving them free bucks back so they can buy more fresh fruits and vegetables, some goes as far as either throwing them away or shredding them as they have told us because they feel they are a hassle. Our cashiers have tried to explain this to the customers about bringing them back and using again then getting more."*

Generally, both groups suggested incentive programs increase purchasing power but require clear education about program implementation (e.g. technology and logistics) for participants and employees processing the benefits. Cohen et al. (2019) increased awareness of the incentive program by providing nutrition education in a local clinic waiting room, which was well-received by SNAP participants. Providing nutrition education and thorough explanation

about how to redeem benefits appears to be both necessary for the effectiveness of the program as well as an opportunity to reach SNAP participants with nutrition information (Cohen et al., 2019).

Incentivizing purchase of nutritious foods through SNAP has been suggested to be health-promoting and cost-effective. A microsimulation study by Mozaffarian et al. (2018) investigated three proposed interventions similar to those discussed with food retailers in the present study. The interventions included a fruit and vegetable incentive, fruit and vegetable incentive with a SSB restriction, and a combination program of incentivizing a wider range of nutritious food and dis-incentivizing SSB, "junk food" and processed meats. All three programs prevented substantial cases of cardiovascular events and diabetes. This saves healthcare and government program dollars.

The combination of incentive and disincentives maintains the most consumer autonomy and provides the most significant health-related benefits and healthcare savings in the model utilized (Mozaffarian et al., 2018). This program included a wider range of nutritious food eligible for incentives (i.e. whole grains, nuts, fish); however, some managers in the present study were in favor of limiting incentives to just fruits and vegetables rather than expanding incentives to other foods like whole grains and dairy. The modeled fruit and vegetable incentive program was the most expensive, but also demonstrated similar positive outcomes for health (Mozaffarian et al., 2018).

To the authors' knowledge, this is one of the only studies to gather perspectives from food retail managers regarding the feasibility of pilot programs to promote healthy eating in SNAP participants. Open-ended and probing interview questions facilitated an open discussion interviewees on expert-recommended strategies as well as strategies recommended from the food

retail managers themselves. The generalizability of these findings are limited due to the small sample size and lack of local-level convenience store interviews. However, due to the exploratory nature of the study and the recurrence of key themes, the findings are still useful for future program development (Cené et al., 2013). Contact with convenience stores was repeatedly attempted; however, there was either no response or no agreement to participate. Future research with convenience stores may be contribute to the literature on approaches to promote healthy eating in the SNAP population.

Implications for Research and Practice

These findings provide insight from food retailer managers regarding the feasibility, effectiveness, benefits and challenges of proposed strategies to improve diet quality of SNAP participants. Key themes identified in the study inform the future direction of SNAP nutrition pilot programs, as food retailers are a crucial player in the implementation of programs for this population. Results suggest programs need to be simple and easy to implement, include education components, and are received positively by managers if they promote store sales and fit with corporate and social responsibility goals. Stocking standards and restriction programs were less well-received in comparison with marketing, incentive, and disincentive program models. Integrating insights from key stakeholders, including food retailers, can improve the effectiveness of SNAP nutrition programs and promote smooth implementation and function.

References

Carlson, A., Lino, M., Juan, W., Hanson, K., & Basiotis, P. P. (2007). *Thrifty food plan, 2006*. (CNPP-19). United States Department of Agriculture, Center for Nutrition Policy and Promotion.

Cené, C. W., Haymore, L. B., Ellis, D., Whitaker, S., Henderson, S., Lin, F., & Corbie-Smith, G. (2013). Implementation of the power to prevent diabetes prevention educational curriculum into rural African American communities: A feasibility study. *The Diabetes Educator*, 39(6), 776–785.

Center for Science in the Public Interest. (2018). *2018 Farm bill: Supporting healthy eating through the Supplemental Nutrition Assistance Program (SNAP).* Retrieved from: https://cspinet.org/sites/default/files/attachment/Support%20Healthy%20Eating%20in%20SNAP%20fact%20sheet%20CSPI.pdf.

Centers for Disease Control and Prevention. (2020). *Poor nutrition.* Retrieved from: https://www.cdc.gov/chronicdisease/resources/publications/factsheets/nutrition.htm.

Cohen, A. J., Oatmen, K. E., Heisler, M., Hesterman, O. B., Murphy, E. C., Zick, S. M., & Richardson, C. R. (2019). Facilitators and barriers to Supplemental Nutrition Assistance Program incentive use: Findings from a clinic intervention for low-income patients. *American Journal of Preventive Medicine*, *56*(4), 571-579.

Economic Research Service. (2020). *Food environment atlas.* U.S. Department of Agriculture. Retrieved June 29, 2020 from: https://www.ers.usda.gov/data-products/food-environment-atlas/

Food and Nutrition Service. (2020). *SNAP data tables.* United States Department of Agriculture. Retrieved July 2, 2020 from: https://www.fns.usda.gov/pd/supplemental-nutrition-assistance-program-snap#:~:text=SNAP%20Data%20Tables%20%20%20National%20Level%20Annual,%20%20%20%203%20more%20rows%20.

Food Research & Action Center. (2018). *Rural hunger in America: Supplemental Nutrition Assistance Program.* Retrieved from: https://frac.org/wp-content/uploads/rural-hunger-in-america-snap-get-the-facts.pdf.

Gregory, C. A., & Coleman-Jensen, A. (2017). *Food insecurity, chronic disease, and health among working-age adults, ERR-235*. United States Department of Agriculture, Economic Research Service. Retrieved from: https://www.ers.usda.gov/webdocs/publications/84467/err-235.pdf?v=%2042942.

Gregory, C., Ver Ploeg, M., Andrews, M., & Coleman-Jensen, A. (2013). *Supplemental Nutrition Assistance Program (SNAP) participation leads to modest changes in diet quality, ERR-147.* U.S. Department of Agriculture, Economic Research Service. Retrieved from: https://www.ers.usda.gov/webdocs/publications/45059/36939_err147.pdf?v=1053.8.

Houghtaling, B., Serrano, E., Dobson, L., Chen, S., Kraak, V. I., Harden, S. M., Davis, G.C., & Misyak, S. (2019). Rural independent and corporate Supplemental Nutrition Assistance Program (SNAP)-authorized store owners' and managers' perceived feasibility to implement marketing-mix and choice-architecture strategies to encourage healthy consumer purchases. *Translational Behavioral Medicine*, *9*(5), 888-898.

Karpyn, A., DeWeese, R. S., Pelletier, J. E., Laska, M. N., Ohri-Vachaspati, P., Deahl-Greenlaw, A., Ughwanogho, O., & Pitts, S. B. J. (2018). Examining the feasibility of healthy minimum stocking standards for small food stores. *Journal of the Academy of Nutrition and Dietetics*, *118*(9), 1655-1663.

Leung, C. W., Hoffnagle, E. E., Lindsay, A. C., Lofink, H. E., Hoffman, V. A., Turrell, S., Willett, W. C., & Blumenthal, S. J. (2013). A qualitative study of diverse experts' views about barriers and strategies to improve the diets and health of Supplemental Nutrition Assistance Program (SNAP) beneficiaries. *Journal of the Academy of Nutrition and Dietetics*, *113*(1), 70-76.

Leung, C. W., Musicus, A. A., Willett, W. C., & Rimm, E. B. (2017). Improving the nutritional impact of the supplemental nutrition assistance program: Perspectives from the participants. *American Journal of Preventive Medicine*, *52*(2), S193-S198.

Mozaffarian, D., Liu, J., Sy, S., Huang, Y., Rehm, C., Lee, Y., Wilde, P., Abrahams-Gessel, S., Jardim, T. S.V., Gaziano, T., & Micha, R. (2018). Cost-effectiveness of financial incentives and disincentives for improving food purchases and health through the US Supplemental Nutrition Assistance Program (SNAP): A microsimulation study. *PLoS Medicine*, *15*(10), e1002661.

Racine, E. F., Batada, A., Solomon, C. A., & Story, M. (2016). Availability of foods and beverages in Supplemental Nutrition Assistance Program− authorized dollar stores in a region of North Carolina. *Journal of the Academy of Nutrition and Dietetics*, *116*(10), 1613-1620.

Rydell, S. A., Turner, R. M., Lasswell, T. A., French, S. A., Oakes, J. M., Elbel, B., & Harnack, L. J. (2018). Participant satisfaction with a food benefit program with restrictions and incentives. *Journal of the Academy of Nutrition and Dietetics*, *118*(2), 294-300.

Sanjeevi, N., & Freeland-Graves, J. (2019). Monthly variations in dietary intake of women participating in the supplemental nutrition assistance program. *Journal of the Academy of Nutrition and Dietetics*, *119*(2), 261-271.

Whiteman, E. D., Chrisinger, B. W., & Hillier, A. (2018). Diet quality over the monthly Supplemental Nutrition Assistance Program cycle. *American Journal of Preventive Medicine*, *55*(2), 205-212.

Yaktine, A. L., Caswell, J. A., Eds. (2013). History, background and goals of the Supplemental Nutrition Assistance Program. In *Supplemental nutrition assistance program: Examining the evidence to define benefit adequacy.* Washington, DC: The National Academies Press.

Appendix A. Institutional Review Board Approval

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Institutional Review Board
Office for Responsible Research
Vice President for Research
2420 Lincoln Way, Suite 202
Ames, Iowa 50014
515 294-4566

Date: 10/15/2019

To: Ruth Litchfield

From: Office for Responsible Research

Title: **Retailers Perceptions of SNAP Incentives**

IRB ID: **19-517**

Submission Type: Initial Submission **Exemption Date:** 10/15/2019

The project referenced above has been declared exempt from most requirements of the human subject protections regulations as described in 45 CFR 46.104 or 21 CFR 56.104 because it meets the following federal requirements for exemption:

2018 - 2 (i): Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording) when the information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects.

The determination of exemption means that:

- **You do not need to submit an application for continuing review. Instead, you will receive a request for a brief status update every three years. The status update is intended to verify that the study is still ongoing.**
- **You must carry out the research as described in the IRB application.** Review by IRB staff is required prior to implementing modifications that may change the exempt status of the research. In general, review is required for any *modifications to the research procedures* (e.g., method of data collection, nature or scope of information to be collected, nature or duration of behavioral interventions, use of deception, etc.), any change in *privacy or confidentiality protections*, modifications that result in the *inclusion of participants from vulnerable populations*, removing plans for informing participants about the study, any *change that may increase the risk or discomfort to participants, and/or* any change such that the revised procedures do not fall into one or more of the regulatory exemption categories. The purpose of review is to determine if the project still meets the federal criteria for exemption.
- All ***changes to key personnel*** must receive prior approval.
- **Promptly inform the IRB of any addition of or change in federal funding for this study.** Approval of the protocol referenced above applies only to funding sources that are specifically identified in the corresponding IRB application.

IRB 10/2019

Detailed information about requirements for submitting modifications for exempt research can be found on our website. For modifications that require prior approval, an amendment to the most recent IRB application must be submitted in IRBManager. A determination of exemption or approval from the IRB must be granted before implementing the proposed changes.

Non-exempt research is subject to many regulatory requirements that must be addressed prior to implementation of the study. Conducting non-exempt research without IRB review and approval may constitute non-compliance with federal regulations and/or academic misconduct according to ISU policy.

Additionally:

- All research involving human participants must be submitted for IRB review. **Only the IRB or its designees may make the determination of exemption**, even if you conduct a study in the future that is exactly like this study.

- **Please inform the IRB if the Principal Investigator and/or Supervising Investigator end their role or involvement with the project** with sufficient time to allow an alternate PI/Supervising Investigator to assume oversight responsibility. Projects must have an eligible PI to remain open.

- **Immediately inform the IRB of** (1) **all serious and/or unexpected adverse experiences** involving risks to subjects or others; and (2) **any other unanticipated problems involving risks** to subjects or others.

- **Approval from other entities may also be needed**. For example, access to data from private records (e.g., student, medical, or employment records, etc.) that are protected by FERPA, HIPAA or other confidentiality policies requires permission from the holders of those records. Similarly, for research conducted in institutions other than ISU (e.g., schools, other colleges or universities, medical facilities, companies, etc.), investigators must obtain permission from the institution(s) as required by their policies. **An IRB determination of exemption in no way implies or guarantees that permission from these other entities will be granted**.

- Your research study may be subject to **post-approval monitoring by Iowa State University's Office for Responsible Research**. In some cases, it may also be subject to formal audit or inspection by federal agencies and study sponsors.

- Upon completion of the project, transfer of IRB oversight to another IRB, or departure of the PI and/or Supervising Investigator, please initiate a Project Closure in IRBManager to officially close the project. For information on instances when a study may be closed, please refer to the IRB Study Closure Policy.

Please don't hesitate to contact us if you have questions or concerns at 515-294-4566 or IRB@iastate.edu.

Appendix B. Food Retailer Study Interview Script and Recruitment Email

Healthy SNAP in IA

- Retailer Interview Script -

Thank you for your willingness to participate in today's interview. My name is [insert interviewer name] and I'm a researcher at Iowa State University working with the Harkin Institute at Drake University.

Purpose of Interview:

The purpose of this interview is to inform the development of some research pilot projects to identify effective approaches to help improve the eating patterns of low-income families, especially those participating in the Food Assistance program—or SNAP—in Iowa.

Researchers and policy makers rely on pilot projects to assess the impact different interventions or strategies have on the diets of SNAP participants. For instance, the fruit and vegetable incentives that are currently allowed through SNAP began as a pilot project, which allowed researchers to understand the impact of the incentives on diet and retailers to better understand how incentives could be implemented."

During today's interview, we would like to get your perspective on the program and what types of retail strategies you think could support people's efforts to purchase healthier foods and beverages. We'll only be asking questions related to nutrition improvements, rather than access to the SNAP benefits.

Logistics and Confidentiality:

In terms of logistics, we anticipate the interview will take about an hour. This interview will be audio recorded so that we have an accurate record of your thoughts for our analysis. To ensure confidentiality, we will not share the audio recording or the transcript publicly; they will only be accessible to key staff on this project. We will not report your name or company name in any published results or quotes, but rather use generic identifying information, such as rural or urban county and grocery or convenience store. If, at any time, you feel that a question is sensitive, I would be happy to turn off the recorder during that portion of questioning. Your participation is voluntary, and you may decline to answer any of the questions or stop the interview at any time.

If you have any questions about the study, you may contact the Principal Investigator, Ruth Litchfield, at 515-294-9484 or litch@iastate.edu.

Do you have any questions for me? [Answer any questions]

Are you ready to begin? I'm going to start recording now.

Great, now we will begin!

Introduction (5 minutes)

viii. To get us started, can you briefly describe your work title and your role?

ix. What has been your experience with SNAP?

i. *Probe for participation estimates (% customers redeeming or $$ redeemed per month) at current store location, past experience at other retail stores*

Perceptions of supporting healthy eating through SNAP (10 minutes)

As I mentioned earlier, we are interested in exploring retail strategies to improve healthy eating among SNAP participants.

i. Have you observed or taken part in any strategies like this?

a. *Probe with examples such as in store cooking demos, store tours, coupons, in-store signage and displays? Please describe them. How are SNAP customers engaged with these strategies.*

b. What kind of factors influenced the success of this strategy? Barriers? Facilitators? *Keep broad for now. If any strategies listed below come up, jump to those questions.*

Now I will ask you about specific strategies that a number of experts have proposed as ways to improve nutrition for SNAP participants. (30 minutes)

Marketing Strategies

x. Studies and market research show that **<u>in-store promotions, pricing and shelf placement</u>**—for instance, placing items at eye level, or putting products in promotional displays, end-of-aisle displays, or at checkout—affect what people purchase.

i. How much do you think that these affect what people purchase? Probe on each.

a. How much do you think that shelf placement—like putting items at eye level or on end-of-aisle shelves or checkout—affects what or how much people purchase?

b. How much do you think that pricing strategies—like 2-for-1 specials or coupons—affect what or how much people purchase?

c. How much do you think that in store advertising or promotions—like shelf talkers or other signage—affects what or how much people purchase?

ii. Do you think in-store marketing strategies would be an effective strategy to help support healthy eating among SNAP participants? Why or why not? Which approaches do you think are likely to be most effective?

iii. Do you think your store would likely be willing to work with a researcher and participate in a healthy in-store marketing pilot project? Why or why not?

v. What ***challenges*** do you foresee with implementing in-store marketing strategies to improve nutrition? Do you have suggestions on how to mitigate challenges?

vi. What ***benefits*** do you foresee with the implementation of in-store marketing to your store? To SNAP participants? Do you have suggestions on how to expand these benefits?

vii. What do you think would be the most promising pilots to test related to shelf placement, displays, pricing, or other in-store promotions to support healthy purchases among SNAP participants?

viii. Does your store receive placement fees from food and beverage manufacturers?

ix. If so, would manufacturers still pay placement fees if you asked them to only stock healthy items in certain areas of your store?

a. Has your store considered or provided healthy aisle check outs?

x. The United States Department of Agriculture (USDA) proposed an increase to the minimum number of staple foods that SNAP retailers must carry, known as **"stocking standards."** Currently, SNAP retailers have to stock 36 units of staple foods for fruits and vegetables, protein, dairy, and grains. For instance, three bananas, apples, pears; three items of packaged chicken, fish, and beef; three cereals, breads, and bagels; and three dairy products such as milk, yogurt, and cheese.

i. Do you think stronger stocking standards (i.e. requiring more units to qualify as an EBT establishment) would be an effective strategy to help support healthy eating and drinking among SNAP participants? Why or why not?

ii. What ***challenges*** do you foresee with the implementation of stronger stocking standards? Do you have suggestions on how to mitigate challenges?

iii. What ***benefits*** do you foresee with the implementation of stronger stocking standards? Do you have suggestions on how to expand these benefits?

Incentives

xi. Another approach to support healthy eating through SNAP is to offer **financial incentives** to participants to facilitate the purchase of healthy foods, most often fresh fruits and vegetables. Incentives are funded through SNAP and/or other sources and provide additional dollars to SNAP participants for the purchase of fruits and vegetables. The latest farm bill increased funding for fruit and vegetable incentives. The farm bill also established funding for a pilot fruit and vegetable prescription program.

i. What do you think about this strategy?

ii. Has your store participated in a fruit and vegetable incentive program?

iii. Do you think increasing the amount of the fruit and vegetable incentives would be an effective strategy to help support healthy eating by SNAP participants? Why or why not?

iv. Do you think providing incentives for additional healthy foods—like whole grains or milk—would be an effective strategy to help support healthy eating by SNAP participants? Why or why not?

v. Would your store likely be interested in participating in an incentive pilot? Why or why not?

vi. What ***challenges*** do you foresee with the implementation of additional incentives? Do you have suggestions on how to mitigate challenges?

vii. What ***benefits*** do you foresee with the implementation additional incentives to your store? Benefits to SNAP participants? Do you have suggestions on how to expand these benefits?

Recruitment email:
Subject Line: Interview Request: Healthy Eating SNAP Pilot in IA

Dear <<INSERT NAME>>,

My name is <<INSERT NAME>> and I am a researcher at Iowa State University working with The Harkin Institute at Drake University. We are working with stakeholders across the state to identify strategies that may improve diet quality among SNAP participants in Iowa. In order to develop successful strategies, we are asking leadership from licensed food retail stores redeeming SNAP benefits to participate in a single, one-on-one interview with a member of our research team. Our goal is to understand the perspective of food retailers regarding the effectiveness and feasibility of strategies to promote the purchase of healthier foods and beverages.

<<INSERT CORPORATE NAME>> provided your contact information because they believe you have valuable information to share about strategies to support healthy eating through SNAP. If you agree to participate, a member of our research team will set up a time to interview you at your <<INSERT LOCATION>>. The interview will take approximately one-hour. Once you have agreed to participate I will send you the questions we intend to ask.

If you are able to participate, **please send me a few dates/times that you are available.**

CHAPTER 6. GENERAL CONCLUSIONS

Recently, increased research efforts have focused on investigating Social Determinants of Health (SDOH), demonstrating that one's social, economic, and neighborhood contexts, as well as education and access to health care impact their health status and risk for adverse health outcomes. SDOH also illuminate specific populations at risk for health disparities and inequities. Whether due to SDOH, adverse lifestyle choices, or both, rates of chronic disease are high in the United States. Chronic diseases greatly impact the quality of life and wellbeing of Americans and places a tremendous burden on the U.S. economy (National Center for Chronic Disease Prevention and Health Promotion, n.d.). Multiple chronic diseases may be nutrition-related (e.g. type 2 diabetes, cardiovascular disease, hypertension, etc.), therefore nutrition education is a useful intervention. Disease prevention and symptom management promotes health, improves quality of life, and reduces health care expenditures. These disease management efforts can be provided through community-delivered health promotion programs or federal agencies.

Results from the present research emphasizes the need for health-related programming and resources in Iowa aligning with national health trends (i.e. physical activity, diet quality, food security, chronic disease) and preferred program attributes reported by participants. Although Extension already provides a variety of programs on the identified health topics, current and prospective customers prefer programs that are shorter, low-cost and delivered online; therefore, programs can be modified to match these preferences.

SDOH characteristics appear to have an impact on Extension programming and material use and interest in program participation. Results suggest Iowa State University Extension is currently reaching historically underserved audiences. However more research is needed to better understand the programs that are being utilized by these audiences and what it is about these

programs that is appealing to this audience. This information can provide clarification on utilization of health-related programming and identification of any SDOH-related gaps that could be addressed by modifying or creating new programming. Those with less education and presence of chronic disease were less interested in participating in health-related programming. Future research investigating why this may be occurring would be helpful.

The SNAP pilot program assessment revealed that in general, SNAP retailers' prefer simple pilot programs that are easy to implement. Nutrition education components, and programs that promote store sales and fit with corporate and social responsibility goals were viewed positively. In addition, marketing, incentive, and disincentive program models were viewed more positively than stocking standards and restriction programs. With this information, creation and launch of nutrition pilot programs in alignment with retailers' needs and preferences is needed to evaluate the effectiveness for promoting healthy food choices.

Results from both studies have provided valuable insights from key stakeholders and target audiences to inform future SNAP and Extension program efforts and evaluate current program efforts. Including these voices in the program development process provides essential information to create relevant programming, improve program effectiveness, support ease in program implementation, and ensure reaching the intended audience. Conducting needs and preference assessments and exploratory research ensures community nutrition and health-related programs are perceived valuable and relevant by current and prospective clients because the programs were developed with them in mind.

Reference

National Center for Chronic Disease Prevention and Health Promotion. (n.d.). *Health and economic cost of chronic diseases.* Centers for Disease Control and Prevention. Retrieved from: https://www.cdc.gov/chronicdisease/about/costs/index.htm