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**EVALUATING BEHAVIOR CHANGE AMONG PARTICIPANTS OF  
THE HAWAI'I EXPANDED FOOD AND NUTRITION EDUCATION  
PROGRAM (EFNEP)**

**A THESIS SUBMITTED TO THE GRADUATE DIVISION OF THE UNIVERSITY  
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**By  
Margaret J. Pulver**

**Thesis Committee:**

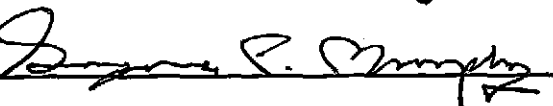
**Pat Tschida, Chairperson  
Dian Dooley  
Suzanne Murphy**

We certify that we have read this thesis and that, in our opinion, it is satisfactory in scope and quality as a thesis for the degree of Master of Science in Nutritional Sciences.

THESIS COMMITTEE

  
\_\_\_\_\_  
Chairperson

  
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This thesis is dedicated to my *hanai* nana, Mrs. Gail Feitelberg, as it would not have been completed without her “emergency grandmother interventions” over the last 7 years.

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## **LIST OF ABBREVIATIONS AND TERMS**

<b>Asian</b>	Any EFNEP participant between 1999 and 2006 who self-reported being of Chinese, Korean, or Japanese ethnicity
<b>Caucasian</b>	Any EFNEP participant between 1999 and 2006 who self-reported being of Caucasian, Portuguese, or Middle Eastern ethnicity
<b>CRS</b>	County reporting system sub-level of the NEERS5
<b>CRS5</b>	County Reporting System version 5
<b>CSFP</b>	Commodity Supplemental Food Program
<b>CSREES</b>	Cooperative State Research, Education, and Extension Services
<b>CVD</b>	Cardiovascular disease
<b>EFNEP</b>	Expanded Food and Nutrition Education Program
<b>ERS4</b>	Evaluation and Reporting System version 4.0
<b>FBC</b>	Food behavior checklist
<b>FGP</b>	Food Guide Pyramid
<b>FSP</b>	Food Stamp Program
<b>HBM</b>	Health Belief Model
<b>HDL</b>	High-density lipoprotein; a complex of lipids and proteins that plays a role in the transport and distribution of lipids in the bloodstream
<b>HTN</b>	Hypertension; high blood pressure
<b>LDL</b>	Low-density lipoprotein; a family of lipid and protein complexes that plays a role in the transport and distribution of lipids in the bloodstream
<b>Mixed</b>	Any EFNEP participant between 1999 and 2006 who self-reported being either Mixed non-Hawaiian ethnicity, or Asian and/or Pacific Islander

<b>Native Hawaiian</b>	Any person living within the border of the United States with roots or cultural ties to pre-contact Hawai'i and countries within the Pacific.
<b>NHANES</b>	National Health and Nutrition Examination Survey; a continuous, annual cross-sectional survey, conducted by the USDHHS, that assesses food intake, height, weight, blood pressure, vitamin and mineral levels, and a number of other health parameters in a statistically selected group of Americans
<b>NHOPI</b>	Any EFNEP participant between 1999 and 2006 who self-reported being of Micronesian, Native Hawaiian, or Samoan ethnicity
<b>NEERS5</b>	Nutrition Education Evaluation and Reporting System version 5.0
<b>NSLP</b>	National School Lunch Program
<b>Other</b>	Any EFNEP participant between 1999 and 2006 who self-reported being of African American, American Indian, or Hispanic ethnicity, or being black
<b>PA</b>	Paraprofessional program aide; peer educator that facilitates EFNEP nutrition education efforts
<b>Paraprofessional</b>	an individual, working in human services, who may or may not have a formal academic degree in the field in which they are working
<b>Pacific Islander</b>	Any person living within the border of the United States with roots or cultural ties to countries within the Pacific Islands
<b>SBP</b>	School Breakfast Program
<b>SCT</b>	Social Cognitive Theory
<b>SE Asian</b>	Any EFNEP participant between 1999 and 2006 who self-reported being of Cambodian, Filipino, Hmong, Laotian, or Vietnamese ethnicity
<b>Self-efficacy</b>	an individual's situational perception of their ability to succeed or fail at a given task

<b>SES</b>	<b>Socioeconomic status; a composite measure that normally encompasses economic status (measured by income), social status (measured by education attainment), and work status (measured by occupation)</b>
<b>SRS</b>	<b>State sub-level of the NEERS5</b>
<b>TTM</b>	<b>Transtheoretical Model</b>
<b>USDA</b>	<b>U.S. Department of Agriculture</b>
<b>USDHHS</b>	<b>U.S. Department of Health and Human Services</b>
<b>WIC</b>	<b>Supplemental Program for Women, Infants, and Children</b>

## **CHAPTER 1**

### **INTRODUCTION**

Poor diet has been shown to be associated with the major causes of morbidity and mortality among people in the United States. Lifelong consumption patterns of various nutrients have been linked to the development and progression of certain chronic conditions and diseases (1). Thus, developing and maintaining good dietary habits is essential for long-term health and well-being. In 1980, the U.S. Departments of Agriculture and Health and Human Services developed a set of national recommendations known as the *Dietary Guidelines for Americans*. The guidelines were developed to assist Americans in relating scientific nutrition information to practical food choices and related behaviors. The sixth and most recent edition of the *Dietary Guidelines*, published in 2005, consists of nutrition recommendations that promote health and reduce the risk for chronic disease (1). Currently, many Americans, especially those of lower income and socioeconomic status (SES), do not meet the recommendations specified in the *Dietary Guidelines* (1-5). In response, efforts are made through nutrition education and outreach to inform individuals about the relationship between diet and health. The assumption is that individuals can and will make better nutrition- and food-related choices through the implementation of these programs.

Established in 1969, the Expanded Food and Nutrition Education Program (EFNEP) provides nutrition education to low-income individuals. EFNEP's goal is to improve the well-being and health of participants and their families through

improved dietary practices and behaviors (6). Using a hands-on, learn by doing approach, local paraprofessionals teach homemakers about the fundamentals and importance of basic nutrition, food safety and preparation, and family resource management. In 2006, EFNEP reached 150,270 adults and 409,389 youths directly, while impacting more than half a million family members indirectly nationwide (7). Nationally, more than 70% of EFNEP participants are minorities, with the majority being Hispanic American or African American (7). Hawai'i EFNEP differs from the National level with regard to the breakdown of its ethnic minority groups, in that 70% of EFNEP participants are of Native Hawaiian, Pacific Islander, and Asian ethnicities.

Nutrition education programs such as EFNEP utilize millions of U.S. tax dollars every year. Therefore, evaluating the effectiveness of these programs at improving the nutrition-related behavior of participants is essential for justifying continued federal funding. Such evaluations can be challenging because the effectiveness of nutrition education interventions depends on many factors, and few gold standards exist for evaluating nutrition-related behaviors (8,9).

While there is a large amount of information available regarding the effectiveness of nutrition education programs among the larger minority groups in the U.S. (e.g., African and Hispanic Americans), only a very small amount of data pertaining to Asian, Native Hawaiian, and other Pacific Islander Americans is currently presented. Additionally, a lack of data sets large enough to make interethnic distinctions possible in multivariate analyses has resulted in these populations being analyzed as either one (Asian Americans and Pacific

Islanders) or two (Asian Americans or Native Hawaiian/Other Pacific Islanders) large aggregated groups. This may have masked the high degree of diversity in socioeconomic, immigrant, and health status that exists between ethnic and cultural subgroups of Asian, Native Hawaiian, and Pacific Islander Americans.

Hawai'i is an ideal location for investigating these ethnic groups in epidemiological research, because they constitute a large proportion of the State's population. Furthermore, Hawai'i EFNEP provides an opportunity to examine the effectiveness of nutrition education among less aggregated ethnic groups within these broader categories.

### **Research Goal and Objectives**

The goal of this study was to evaluate the ability of the Hawai'i EFNEP and the EFNEP paraprofessionals to facilitate behavior change among program participants.

The objectives of this research were to: (1) learn which ethnic groups, if any, differed significantly in behavior change after completing the Hawai'i EFNEP series, and (2) determine if paraprofessional instruction had any significant effect on participant behavior change, based on the pre- and post- EFNEP behavior checklist questions.

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **Diet, Health, and Nutrition Education**

Nutrition and diet play a significant role in the major causes of morbidity and mortality in the United States. Diseases and conditions that have been linked to nutrition and diet include cancer, cardiovascular disease (CVD), type 2 diabetes, osteoporosis, overweight and obesity. High intake of total fat and fats high in saturated and/or *trans* configuration fatty acids is associated with increased risk of excess weight, altered blood cholesterol levels and CVD (10-14). Conversely, replacing fats high in saturated fatty acids with fats high in poly- and monounsaturated fatty acids leads to a reduction in chronic disease risk (15-17). In salt-sensitive individuals, high sodium intake is associated with a greater risk for hypertension (HTN) and CVD (18-22).

Consuming five or more servings of fruits and vegetables a day is correlated with a decreased risk for CVD, diabetes, and selected types of cancer (23-31). Having a greater proportion of daily grain servings from whole grain sources, rather than refined, is associated with a reduced risk for certain chronic diseases (32-36). Higher intake of low-fat and/or fat-free milk and dairy products is associated with a decreased risk for certain cancers, osteoporosis, HTN, and CVD, as well as increased weight loss in overweight and obese individuals (37-43).



Since 1980, the U.S. Department of Agriculture (USDA) and the U.S. Department of Health and Human Services (USDHHS) have published dietary recommendations, including the Food Guide Pyramid (FGP), MyPyramid.gov and the *Dietary Guidelines for Americans* to help people translate science-based nutrition knowledge into practical food choices and behaviors (1). The *Dietary Guidelines for Americans* are intended for use by the general public, policymakers, healthcare providers, nutritionists and nutrition educators. In 1992, the FGP was developed and released by the USDA to help individuals implement the *Dietary Guidelines*. Recently published editions of the *Dietary Guidelines for Americans* (1995 - 2005) provide dietary and physical activity recommendations that promote health and reduction of chronic disease risk (1). MyPyramid.gov was developed by the USDA to help individuals implement the 2005 *Dietary Guidelines*.

Although the larger question still remains as to whether or not individuals should follow or need to adhere to the dietary recommendations put forth at the federal level, current national consumption patterns indicate that most Americans do not achieve the recommended intakes prescribed by MyPyramid and the *Dietary Guidelines* (3,5,44-53). These trends are most pronounced among individuals of lower SES (3,4,48,54-56). High costs of food and lack of access to supermarkets have both been cited as barriers to healthful eating among these populations (4,55,57,58). These types of barriers might be expected given that a greater proportion of low-income individuals live in urban and rural areas, where food prices are often higher than the national average and supermarkets are a

scarcity (57,59,60). In the state of Hawai'i, shipping and transportation cause non-local food costs to be 152% of the national average (61). With regard to supermarkets are a scarcity in urban and rural areas and gaining access to Therefore, efforts in nutrition education could be made to help at-risk populations of lower SES overcome the barriers that affect their nutrition- and food-related choices.

### **The Expanded Food and Nutrition Education Program (EFNEP)**

EFNEP began in 1969 in response to the growing numbers of American families afflicted by hunger and malnutrition and to serve members of low-income communities more effectively (9,62). The Program was initiated by the USDA with an appropriation of \$10 million in amendments of Section 32 of an Act to Amend the Agricultural Adjustment Act, and for other purposes, August 1935, Chapter 641, 74<sup>th</sup> Congress 1<sup>st</sup> Sess., 49 Stat. 750 744. EFNEP was implemented through Cooperative Extension Services via Land-Grant Universities across the Nation. In 1970, after the Program was seen to be successful, Congress increased funding to \$30 million under the Smith-Lever Act. Seven years later, Congress passed an additional piece of legislation allowing for the employment and training of professional and paraprofessional aides to engage in facilitating the nutrition education of EFNEP participants. That piece of legislation was eventually amended further to encourage the hiring of program aides from within the local population being served. Most recently,

**Congress authorized \$67 million for fiscal year 2009. Hawai'i's EFNEP annual budget is \$265,000.**

**Currently, EFNEP is the largest federally funded, community-based, nutrition education program in the U.S. EFNEP operates in all 50 states, American Samoa, Guam, the Federated States of Micronesia, the Northern Marianas, Puerto Rico, and the Virgin Islands. Each EFNEP team responds to the specific needs of its local limited income groups (6). The primary focus of the program is to assist low-income families in acquiring the knowledge, skills, attitudes, and behaviors necessary for making improved food-related choices. In doing so, EFNEP enhances its participants' ability to contribute to their own personal development, as well as to the improved well-being of participants and family members.**

**EFNEP participants fall into one of two categories: youth or adult. In 2006, EFNEP nationally served more than 409,000 youths and 150,000 adults (6). In 2006 in Hawai'i, EFNEP served 208 youths and approximately 5000 adults (P.A. Tschida, personal communication, 2007). As the learning styles and abilities of children, adolescents, and adults differ, the delivery of EFNEP varies with respect to the audience. As the results of this research pertain exclusively to the adult audience, only the adult program data and analysis results will be discussed throughout the remainder of the paper.**

## **Theoretical Framework of EFNEP Nutrition Education**

One of EFNEP's main objectives is to assist limited resource audiences in making positive changes in nutrition- and food-related behaviors. This can be a challenge though, because dietary and nutritional behavior is dependent on a myriad of psychological, social, and environmental factors (8,9). Research indicates that behavior-focused nutrition education is more effective when it addresses these factors and the effect they have on mediating human behavior (9,63). Therefore, in order to be successful in promoting behavior change, EFNEP coordinators and nutrition educators need to understand and address those factors that influence their program participants' nutrition- and food-related behaviors. However, human behavior and its modification are complex and poorly understood, even by behavioral science experts (64).

In the study of psychology and sociology, expectancy-value models or theories have been developed to explain how and why human behavior and behavior change occurs. These models are centered on the notion that people are likely to change their behavior if they believe that change will ultimately result in certain desired outcomes. These behavior change theories are applied in nutrition education to predict program outcomes and provide direction and justification for lesson material and methodology development (65-80). Specific behavioral change theories that underlie EFNEP nutrition education include: the Social Cognitive Theory, the Transtheoretical Model, and the Health Belief Model (9).

## The Social Cognitive Theory

**Social Cognitive Theory (SCT) suggests that learning can result from the observation of others within a social context. The model assumes that learning is a dynamic and interrelated process where experiences, social interactions, outside influences, and self-efficacy (self-efficacy refers to an individual's situational perception of their ability to succeed or fail at a given task) all have the ability to affect expected outcomes (81). SCT also addresses and emphasizes the interactive nature of social, environmental and psychological factors in mediating human behavior and its modification (9,82).**

**SCT is founded on four principles: 1) individuals can learn by observing behavior and/or the expected outcomes of that behavior in others (also referred to as models), 2) an observable change is not necessary for learning to occur, 3) reinforcement is valuable but may act less directly on the learning process, and 4) cognitive processes are necessary for learning. SCT also considers self-efficacy an important determinant of behavior and behavior change (81,83).**

**Research has shown SCT to be effective at predicting nutrition-related behaviors and developing interventions to promote behavior change (72,73,84-89). Reynolds, *et al.*, (74) utilized SCT to explain and predict fruit and vegetable consumption in elementary school children. SCT was also found to be an effective means of exploring what factors influence nutrition-related behavior change in Native American youth (72). EFNEP's approach to nutrition education is founded in SCT. Program participants learn through social interaction with**

their peers and nutrition educators, both of whom serve as models for improved behavior (P.A. Tschida, personal communication, 2007).

### The Transtheoretical Model

The Transtheoretical Model (TTM), formerly known as the Stages of Change model, provides an integrated framework for understanding health-related behavior change (90,91). The model is based on four constructs thought to mediate behavior change (90) : 1) stages of change, 2) decisional balance, 3) situational self-efficacy, and 4) processes of change. The stages of change represent the various psychological states through which an individual goes when trying to modify behavior. Decisional balance reflects the individual's consideration of the benefits and costs to behavior change (92). As described earlier, self-efficacy is an individual's perception of his/her ability to produce a desired change. Processes of change refers to the overt and covert activities and experiences that individuals use to alter behavior (93).

According to the TTM, behavior change occurs along a temporal dimension, through a series of 5 stages<sup>1</sup> (Figure 2.1): 1) precontemplation, 2) contemplation, 3) preparation, 4) action, and 5) maintenance. These stages are used to integrate cognitive and behavioral processes with processes of change and provide insight into when particular shifts in attitudes, intentions, and behaviors occur (91,94). At each stage, individuals require varying types of

<sup>1</sup> The TTM has been stated to have 5 and/or 6 stages of change. For the purpose of this paper, Prochaska's 5 stage model will be the one of reference.

motivation and information, due to the individual's varying attitudes, intentions, and behaviors. Additionally, the model posits that decisional balance, self-efficacy and processes of change are differentially effective in each stage of change (95).

EFNEP draws on the TTM in lesson material and methodology development in order to address the educational needs of participants in different stages of change. Research supports the use of the TTM in nutrition education because it has been shown to be effective at predicting change in nutrition-related behaviors (66-71,96-103). The Partners in Prevention-Nutrition program utilized a stages of change approach, based on the TTM, to tailor nutrition education materials to the needs of participants at various stages in the behavior change process (66). Di Noia, *et al.*, (68) found the TTM to be appropriate for designing interventions to increase fruit and vegetable consumption among African-American adolescents. The TTM has also been applied and shown to be valid in diabetes management (69).

### The Health Belief Model

The Health Belief Model (HBM) is another theoretical framework for examining the complex relationship between the various social, environmental, and psychological factors that shape health beliefs and health-related behaviors (9,80,104,105). In the HBM, perception is the foundation of behavior. The model emphasizes that an individual is more likely to change health-related behaviors associated with the development of a condition or disease if they perceive

themselves to be threatened by that condition or disease, if they perceive the behavior change to be feasible and efficacious, and/or if they believe they have the ability to implement the new behavior successfully (9,83,89,106-108). Cues to action are also important determinants of behavior and behavior change in the HBM. Examples of cues to action include mass media and public health messages, social stigmas, and existing personal knowledge.

EFNEP applies the HBM in the development of materials and lesson plans, because many of the nutrition- and food-related behaviors promoted by EFNEP are associated with health and risk for chronic conditions and disease. Research supports the use of the HBM in nutrition education interventions as a theoretical framework for bringing about desired nutrition- and food-related behavior outcomes (9,76-79,109-111). Hanson and Benedict (77) found the HBM to be useful in the examination of the food-handling behaviors of older adults. In promoting healthful eating behaviors, Abood, *et al.*, (78) applied the HBM in an 8-week worksite nutrition education intervention. The study found the intervention to be effective at producing the desired outcomes.

### **Theoretical Foundation for the Use of Paraprofessionals in EFNEP**

EFNEP employs and trains paraprofessional program aides (PA) to deliver nutrition education. A paraprofessional is defined as an individual working in human services, who may or may not have a formal academic degree in the field in which they are working. The use of PAs in EFNEP was inspired by a pilot study conducted in Alabama in the 1960's (112). The Alabama study utilized PAs



to teach nutrition education to low-income homemakers and proved to be highly effective at improving the nutrition- and food-related behaviors of program participants.

Since the 1960's, research has continued to support the use of paraprofessionals in delivering a variety of education, health, and social services (113-123). In a review of 42 studies that compared the effectiveness of paraprofessionals and professionals in delivering various social services, paraprofessionals were found to achieve outcomes that were equal to or significantly better than those attained by professionals (122).

The PAs hired by EFNEP are usually indigenous, or local, to the population served, with some being graduates of the Program themselves. Findings in the literature support the increased effectiveness of paraprofessionals in human and social service programs when they are indigenous to the population served (9,119-121,124,125). This argument is grounded on the premise that certain qualities and life experiences of indigenous paraprofessionals enhance the relationship and credibility with the program audience (121,125-127). Indigenous paraprofessionals are thought to share similar social, psychological, environmental, and ethnic traits, as well as attitudes, values and beliefs, with the individuals they serve (126,127). Local paraprofessionals are also believed to understand the health beliefs and barriers to health care services of the population served better than non-local paraprofessionals (120,121).

**EFNEP PAs receive specific, directed training regarding the delivery of the EFNEP lesson series. They work semi-autonomously to provide direct services to participants, and receive a salary and possibly other benefits, such as health care, to compensate for any work performed. PAs also receive direction and supervision from professional colleagues, such as nutrition educators and specialists (9). In order to provide intensive nutrition education lessons to participants, EFNEP PAs must be knowledgeable in the fundamentals of basic nutrition, food safety, and family finance and resource management. They must also have an understanding of the determinants of eating behaviors, educational and behavioral change theories, and the design and delivery of nutrition education (9).**

**Hawai'i EFNEP currently employs 14 PAs who work on the islands of Hawai'i, Maui, and O`ahu. In addition to teaching the group nutrition education lessons, PAs are responsible for recruiting participants, keeping records of participant information, and establishing partnerships with other community-based programs and institutions (128). They must, at minimum, have the equivalent of a high school diploma, a valid driver's license, auto insurance, and daily use of a car; they must reside in one of the areas served by the Hawai'i EFNEP; they must be able to communicate effectively in English, demonstrate appropriate food handling and preparation skills, and perform basic mathematical calculations and record keeping.**

## **EFNEP Adult Lesson Series**

EFNEP nutrition education is delivered through a series of lessons that pertain to topics in basic nutrition, food safety and preparation, and family resource management. In Hawai'i, the EFNEP lessons are grouped and delivered as packages (APPENDIX A), with the majority of participants completing lessons from more than one package. Certain subjects, such as the Food Guide Pyramid (FGP)<sup>2</sup>, are covered in every package, while other subject areas are unique to single package. During each lesson, participants are provided with informational handouts and brief presentations that pertain to the day's topic (APPENDIX B). These materials are then accompanied by an activity or cooking demonstration, intended to reinforce the topics covered in the day's lesson (APPENDIX C).

EFNEP lessons are conducted in a variety of settings. PAs conduct lessons in their own home, in that of a participant, at community centers, at churches, or in housing complexes. Lessons are also conducted in collaboration with other community-based programs. In Hawai'i, EFNEP collaborates with a number of partnering agencies, including Parents and Children Together (PACT), the Salvation Army, the Parent-Community Networking Centers (PCNC), and various homeless shelters, to provide a meeting space for group lessons. Ideally, the partner agencies also assist in recruitment efforts. At times, these

<sup>2</sup> The FGP materials were replaced by MyPyramid materials the year after the study was completed.

agencies also provide assistance with materials, supplies, and equipment for cooking demonstrations (P.A. Tschida, personal communication, 2007).

Upon completion of the EFNEP lesson series, program participants should have increased and/or improved knowledge regarding the fundamentals of human nutrition, as well as of food production, preparation, storage, safety, and sanitation practices. Furthermore, Program graduates should have an improved ability to select and buy food that satisfies nutritional needs, and a greater ability to manage food budgets and related resources. According to the behavior change theories described above, these general outcomes may encourage ENFEP participants to modify and improve their nutrition- and food-related behaviors. Such changes in nutrition- and food-related behaviors may result in improved dietary quality of the participant and her/his family. This, in turn, would ultimately reduce the participants' risk for developing chronic conditions and diseases that have been linked to diet and nutrition.

### **Evaluating the Effectiveness of Community Nutrition Education Programs**

Evaluation of community nutrition education programs such as EFNEP is necessary for determining their effectiveness and justifying repeated federal funding. Unfortunately, evaluation of these programs poses considerable methodological challenges, because human behavior is extremely complex and there are few gold standards for evaluating nutrition behavior change (8,9). Furthermore, the majority of evaluative measures used to assess diet and nutrition education rely on subjects' self-reported information. Evaluations that

rely on self-reported behavior are all subject to bias because people are more likely to over-report desirable behaviors and under-report undesirable behaviors (129). Therefore, it is difficult to separate true behavior change from participants reporting what is perceived as socially desirable (129,130).

A perfect evaluation tool would be valid, reliable, and responsive, or sensitive, to change among the intended target population (131). Validity refers to the extent to which a tool measures what it is intended to measure (132). Validity of an instrument is usually determined by comparing the results of that instrument to a gold standard, or to another instrument that has been previously validated by a gold standard. Reliability refers to the extent to which an instrument consistently produces the same results over repeated applications under the same conditions (132). Reliability is usually established using internal consistency reliability analyses or test-retest reliability (8). Responsiveness or sensitivity to change refers to the ability of an instrument to detect the magnitude of differences in behavior over time (8).

Length, respondent burden, and cost are also of concern when developing, adapting or selecting an evaluative tool. In order to maximize efficiency in each of these areas, assessment instruments should be clear and concise, as well as quick to administer and analyze (131,133,134). Additionally, such a tool should be easy for limited-literacy populations to complete (134).

Currently, a wide variety of measures are used to assess the effectiveness of nutrition education programs. Therefore, researchers in nutrition education need to decide which evaluative approach is best for their particular program (8).

With regard to the Hawai'i EFNEP, an ideal assessment instrument would target a variety of food- and nutrition-related behaviors in the areas of dietary quality, food safety, and food security (131). Such a tool would also be valid, reliable, and responsive to change among a multiethnic, low-income population.

### **Assessment Instruments and Methods Used for Evaluating Behavior Change among EFNEP Participants**

Several indicators and assessment tools are used to evaluate EFNEP's effectiveness in producing positive gains and long term retention in the nutrition knowledge, food behaviors, and dietary practices of participants (9,62,114,125,135-142). Program completion, or graduation, provides an indication of program success, while also being essential to the measurement and evaluation of other desired indicators. This can be problematic, however, when reasons for attrition are related to participants' developmental gains, such as improved occupation, education or housing situations.

Another tool used by EFNEP to determine program effectiveness is the Evaluation and Reporting System (ERS4). The ERS4 is a multilevel computerized evaluation system from the Cooperative State Research, Education, and Extension Services (CSREES) that was originally developed to measure the positive impacts of EFNEP (143). Information on adult participant demographics, pregnancy and/or breastfeeding status, dietary intake (measured by a 24-hour dietary recall), and nutrition-related behaviors (measured by a 10-item food behavior checklist) are self-reported by participants and collected by

the PAs upon entry into (pre-) and exit from (post-) the Program, and subsequently entered into the ERS4 (143). The pre- and post- data can then be compared to determine the impact the EFNEP lesson series has on participants' nutrition- and food-related behaviors.

In 2006, the ERS was expanded and renamed the Nutrition Education Evaluation and Reporting System (NEERS5). Like the ERS4, the NEERS5 still collects self-reported information on participant demographics, pregnancy and breastfeeding status, dietary intake, and nutrition-related behaviors. New additions to NEERS5 include county (CRS) and state (SRS) sub-levels, as well as two independent systems for collecting adult and youth participant information (144).

### **EFNEP Outcome Evaluations**

Overall, outcome evaluations have shown the EFNEP lesson series to be effective at improving the nutrition- and food-related behaviors of participants and their families. Research indicates that EFNEP participants make significant knowledge gains in basic nutrition, food safety, and family resource management (125,138,139,142,145). These gains lead to significant improvements in nutrition- and food-related behaviors and diet quality (139,146). Several studies have shown that EFNEP participants are more food secure (125,138,139,142,147), and consume a greater number of servings of fruits and vegetables (139,148,149), after completing the EFNEP lesson series. Such changes in nutrition- and food-related behaviors may ultimately lead to the

improved health and well-being of participants and their families. As Arnold and Sobal (139) reported, “almost all participants reported that their families were healthier after they graduated from EFNEP, stating their families had more energy and less illness.”

### **EFNEP Participants**

In general, the majority of EFNEP participants are ethnic minorities, although the exact percentages vary from state to state. Nationally in 2006, the ethnic breakdown of participants was 33% Hispanic American, 30% Caucasian American, 26% African American, 3% Asian or Pacific Islander American, and 2% Native American or Alaskan Native American (6). For comparison, 72% of Hawai'i EFNEP participants in 2006 were of Asian, Native Hawaiian and Pacific Islander ancestry; half of all Hawai'i participants were Native Hawaiian. The same year, in Oregon, Caucasian Americans (47%) constituted the largest percentage of participants, while Asian and Pacific Islander Americans (1%) were the smallest (150). In Nevada, most participants were Hispanic Americans (49%), followed by Caucasian Americans (35%), African Americans (13%), Asian and Pacific Islander Americans (3%), and Native Americans and Native Alaskan Americans (1%) (151).



## **Evaluating EFNEP Effectiveness among Asian, Native Hawaiian, and Pacific Islander Americans**

Unlike other ethnic minority groups in the U.S., Asian, Native Hawaiian, and Pacific Islander Americans have been disregarded in many major public health debates due to the long held perception of these individuals being members of “model” minority groups. This belief is tied to the results of national surveys, such as the U.S. Census and National Health and Nutrition Examination Survey (NHANES) that depict these populations as having no significant disparities or needs (152). Currently, a shortcoming of such surveys is the limited number of contacted and sampled individuals of Asian, Native Hawaiian, and Pacific Islander ethnicity. This inadequate sampling has resulted in individuals of these ethnic backgrounds being aggregated into two groups (Asian Americans and Native Hawaiians/Other Pacific Islanders), one undifferentiated group (Asian Americans and Pacific Islanders), or included within the “other” category. In truth, the ethnic subgroups encompassed by the terms Asian, Native Hawaiian, and Pacific Islander are extremely different from one another with regard to SES, disparities, needs, and health beliefs (152-182).

The state of Hawai‘i provides a unique opportunity to gain insight into these differences, being home to a highly diverse, multiethnic population that consists of a large proportion of Asian Americans, Native Hawaiians, and other Pacific Islanders. In 2006, Asians constituted 40% of the State’s population, while Caucasians represented 28.6% of the state. Nine percent (9%) of the population were Native Hawaiians and/or other Pacific Islanders, and over 19%

self-identified as being more than one ethnicity. This is compared to only 0.2% Native Hawaiian and/or other Pacific Islander and 1.6% mixed ethnicity for the general U.S population.

As individuals of Asian, Native Hawaiian and Pacific Islander ancestry constitute a large proportion of Hawai'i's population, these individuals can be adequately sampled in epidemiological research, allowing for interethnic distinctions to be made. Furthermore, EFNEP is well-situated within the state of Hawai'i to evaluate the effectiveness of nutrition education among Asian, Native Hawaiian, and Pacific Islander Americans.

### **Goal of the Research**

The goal of this study was to evaluate the ability of the Hawai'i EFNEP and the EFNEP PAs to improve the nutrition- and food-related behaviors of program participants. The hypothesis was that the Hawai'i EFNEP will be effective at promoting positive behavior change, based on previous research and national impact data that both show that participation in EFNEP results in improved nutrition and food practices.

### **Objectives of the Research**

The objectives of this research were to: (1) ascertain which ethnic groups, if any, differed significantly in behavior change after completing the Hawai'i EFNEP series, and (2) determine if PA instruction had any significant effects on participant behavior change, based on the pre- and post-EFNEP behavior

checklist responses. The hypothesis was that ethnicity would have no effect on behavior change because the methods and tools employed by the Hawai'i EFNEP program were developed for use by a multiethnic population. It was also hypothesized that no differences would be evident with PA instruction, due to the standardization of materials and mode of instruction (small group), as well as to the fact that each of the PAs being members of their participants' community.

## **CHAPTER 3**

### **METHODOLOGY**

#### **Introduction**

Evaluative investigations of federally-funded nutrition education programs are essential for demonstrating program effectiveness, for determining the degree to which the target populations are being served, and for providing constructive criticism for program improvement. Although the materials and methods currently used in Hawai'i's EFNEP lesson series have been developed for use by a multiethnic population, the effectiveness of the program to produce significant behavior change among participants has never been systematically evaluated. The present study was initiated in response to this need for evaluation. The research was approved by the University Institutional Review Board Committee on Human Subjects in November 2007 (APPENDIX D).

#### **Data Collection**

Data used in this study were drawn from the EFNEP ERS4 and NEERS5/CRS5 for Federal Fiscal Years 1999 – 2006 in the form of a Microsoft Access database file for each fiscal year. The data were then pooled into a single dataset for 1999-2006, the earliest and latest dates for which the information necessary for this analysis was available. All information used in this project had been previously collected by PAs. Due to low literacy skills in English, or use of a different language in the home, many participants had

difficulty reading and completing program forms. PAs routinely offered assistance and read items on the evaluation tool to participants in order to facilitate form completion and ensure accuracy.

Individual PAs were identified by their EFNEP staff ID codes used when reporting participants' information. In order to maintain confidentiality, PAs were given a new code that differed from the assigned EFNEP code.

### **Participant Eligibility**

Individuals who had participated in the Hawai'i EFNEP between 1999 and 2006 and completed both a pre- and post- EFNEP Family Record Form #1 were eligible for inclusion in the study.

### **Evaluation of Participant Behavior Change**

Participant behavior change was evaluated using a standard EFNEP Food Behavior Checklist (FBC) (APPENDIX E). The EFNEP FBC consists of 10 statements that refer to various nutrition- and food-related behaviors. The behaviors are grouped into three subject areas: 1) Food and Money Basics, 2) Food Safety and 3) Food Practices. Participants indicate how often they engage in a given behavior or practice using Likert scale response categories (e.g., Always, Sometimes, and Never).

A major advantage of the FBC is that it can be self-administered by participants or administered quickly by PAs. Additionally, the FBC, being easy to use, tends to produce a high rate of responsiveness among participants.

However, behavior checklists can be difficult to validate and results are not easy to interpret (131,133,183,184). Furthermore, the EFNEP FBC is susceptible to bias, as the checklist relies on participants' self-reported behavior and it is difficult to know if participants who report the desirable behaviors targeted by the EFNEP lesson series have actually changed their behavior.

The EFNEP FBC was developed by a national expert panel in such a way as to ensure content validity (185). The EFNEP FBC has also been shown to have acceptable construct and face validity<sup>3</sup> (143). Internal consistency of the FBC was also tested using Cronbach's  $\alpha^4$ , which yielded a good level of reliability ( $\alpha = 0.80$ ) (147). The items included on the FBC were then evaluated for cultural sensitivity among low-income Caucasian, African, and Hispanic Americans (185). The FBC has not, however, been measured for cultural sensitivity among Americans of Asian, Native Hawaiian or Pacific Islander heritage.

Hawai'i EFNEP participants' food behaviors were assessed upon program entry (pre) and then re-evaluated upon program completion (post). Possible responses on the Hawai'i EFNEP FBC include: *do not do*, *seldom*, *some of the time*, *most of the time*, or *almost always*. Numeric scores from 1 to 5 are assigned to the responses, with 1 corresponding to *do not do*, and 5 to *almost always*. The participants also had the option to not respond to any or all questions, which was coded as 0. For seven of the items (*I shop with a grocery*

<sup>3</sup> Construct validity refers to the ability of a tool to measure or to correlate with a theorized psychological construct. Face validity refers to the extent to which a tool appears it is measuring what the tool is intended to measure.

<sup>4</sup> Cronbach's  $\alpha$  is a measure of internal consistency, or reliability of a psychometric instrument. As Cronbach's  $\alpha$  coefficient increases, the correlation between factors strengthens.

*list, I compare prices to save money, I plan what we eat for meals and snacks, I use the Food Guide Pyramid to prepare my family's meals, I prepare my family's meals without adding salt, I read food labels to know the fat content, and My children eat in the morning within 2 hours of waking up),* engaging in the behavior more often was considered to be an improvement. For the remaining three items (*I leave cooked foods out of the refrigerator for more than 2 hours, I thaw frozen meat in the sink or on the kitchen counter, and I run out of food before the end of the month*), engaging in the behavior less often was considered to be an improvement.

### **Criteria for Ethnic Subgroups**

Before 2007, EFNEP participants were asked to self-identify as being a member of one of forty-one different ethnic groups – 5 major ethnic groups, each with numerous sub-groups. Only 21 of those ethnic groups were present in this data set (Table 3.2). In order to allow for interethnic distinctions to be made using multivariate analysis, these 21 ethnic groups were re-classified into 6 groups – Caucasian, Asian, South East (SE) Asian, Native Hawaiian and other Pacific Islander (NHOPI), Mixed and Other. This decision was based on the observation of similar sociodemographic and health trends, and population rates in the state of Hawai'i (152-182,186). Contrary to most findings in the literature, Filipino Americans in Hawai'i tend to be of lower SES and poor health (170). For that reason, Filipinos were included in the SE Asian ethnic subgroup for this analysis.

**Table 3.1. Classification of national EFNEP race groups into ethnic groups for statistical analysis**

<b>Caucasian</b>	<b>Asian</b>	<b>SE Asian</b>
Caucasian Portuguese Middle Eastern	Chinese Eastern Indian Japanese Korean	Cambodian Filipino Hmong Laotian Vietnamese
<b>NHOPI</b>	<b>Mixed</b>	<b>Other</b>
Hawaiian Micronesian Samoan	Asian or Pacific Islander Mixed, not Hawaiian	Black African American American Indian Hispanic

### **Statistical Analysis**

Data were analyzed with SAS version 9.1 and SPSS version 16.0 for Windows (187). The major outcome variables for this study were changes in food- and nutrition-related behaviors as assessed by the EFNEP FBC. A paired t-test was used to detect differences between participants' pre- and post-responses (132). An independent t-test analysis was done to determine if there were differences in behavior change between participants living on O`ahu and those living on outer islands (includes Hawai`i, Maui). For all tests, significance was defined at a *p*-value of 0.05.

For three of the FBC behaviors, improvement was indicated by participants engaging in the behavior less frequently (*I leave cooked foods out of the refrigerator for more than 2 hours, I thaw frozen meats on the sink or on the kitchen counter, I run out of food before the end of the month*). Due to the nature of the response coding (0 = Don't do, 5 = Almost always), improvement



for these behaviors would result in a negative mean change in participants' response scores between pre- and post- assessment.

If significant differences between pre- and post- assessment were detected in the paired t-tests, confounding factors were controlled for using logistic regression analysis, with significance defined as a  $p$  value  $< 0.05$  (132). In the exact proportional odds model (188), "dummy" codes were created for categorical levels of the variables *Ethnicity, Staff ID, Participation in Other Federal Assistance Programs, Town Size, Number of Family Members, and Age*, omitting the reference level for each variable<sup>5</sup>. Risk estimates and 95% confidence intervals were determined using the method of maximum likelihood (132). Participant behavior change, defined as the difference between pre- and post- scores on the FBC items, was the outcome measure of interest. Logistic regression analyses were used to determine significant differences in behavior change between ethnic subgroups and the individual paraprofessionals (132). Univariate logistic regression analysis was performed on each FBC item to determine which variables described above had an effect on participant behavior change. Multivariate logistic regression analysis was then performed to gain a better understanding of the association between participant behavior changes. The variables *Ethnicity, Gender, Staff ID, Participation in Other Federal Assistance Programs, Town Size, Number of Family Members, and Age* were all

<sup>5</sup> The reference levels included: *Ethnicity = Caucasian, Staff ID = P1, Participation in other Federal Assistance Programs = No, Townsize = Farm, Number of Family Members =  $\leq 2$  people, and Age =  $\leq 25$  years of age. Caucasians were used at the group of reference for ethnicity because national surveys have indicated that minority ethnic groups do not fare as well as Caucasians for the majority of health and SES indicators (190).*

simultaneously analyzed in the multivariate model. Participation in other assistance programs, while not being significant in any of the univariate models, was included in the multivariate models. This was due to previous studies indicating that participation in other assistance programs had an effect on behavior change (137,189).

## **CHAPTER 4**

### **RESULTS**

Of the 4,487 individuals who participated in the Hawai'i EFNEP between 1999 and 2006, 1844 were excluded due to lack of adequate follow-up data (i.e., missing post assessment). An additional 139 individuals were excluded from the sample due to discrepancies in staff ID coding. This left an eligible study population of 2,504 EFNEP participants.

#### **Participant Demographics**

Table 4.1 gives the demographic characteristics of study participants. Almost half of the 2,504 subjects were NHOPI (47%), while only 6% were Asian. The majority of participants were younger than 36 years of age (64%). Females outnumbered males approximately 5 to 1. The island of O`ahu was home to the greatest proportion of participants (59%), followed by Hawai'i (35%), then Maui (5.8%); 59% of participants lived in areas with populations of 10,000 – 50,000 people. The majority of families had 3 to 4 members (37%). Eighty-five percent (85%) of households also participated in other federal assistance programs, including: the Food Stamp Program (FSP), the Head Start Program (HSP), the Commodity Supplemental Food Program (CSFP), the Supplemental Program for Women, Infants and Children (WIC), the School Breakfast Program (SBP) and the National School Lunch Program (NSLP).

**Table 4.1. Sociodemographic characteristics of eligible EFNEP participants, 1999-2006.**

	Total		Caucasian		Asian		SE Asian		NHOPI		Mixed		Other	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
	2504	100	451	18	144	5.8	354	14	1182	47	186	7.4	187	7.5
<b>Age</b>														
≤ 25	742	30	106	24	45	31	114	32	379	32	47	25	51	27
26 - 35	858	34	153	34	40	28	114	32	409	35	67	36	75	40
36 - 45	536	21	110	24	29	20	71	20	243	21	43	23	40	21
≥ 46	266	11	62	14	28	19	41	12	108	9.1	13	7.0	14	7.5
Not Reported	102	4.1	20	4.4	2	1.4	14	4.0	43	3.6	16	8.6	7	3.7
<b>Gender</b>														
Male	404	16	96	21	25	17	40	11.3	194	16	15	8.1	34	18
Female	2100	84	355	79	119	83	314	89	988	84	171	92	153	82
<b>County of Residence</b>														
Hawai'i	881	35	206	46	44	31	78	22	445	38	39	21	69	37
Maui	146	5.8	24	5.3	6	4.2	24	6.8	65	5.5	18	9.7	9	4.8
O'ahu (Honolulu)	1473	59	220	49	94	65	252	71	669	57	129	69	109	58
Not Reported	4	0.16	1	0.2	0	0.0	0	0.0	3	0.25	0	0.0	0	0.0
<b>Town Size</b>														
Farm	37	1.5	9	2.0	2	1.4	3	0.8	18	1.5	2	1.1	3	1.6
Towns under 10k and rural non-farm	593	24	123	27	26	18	65	18	294	25	36	19	49	26
Towns/Cities 10k-50k and their suburbs	1486	59	262	58	92	64	229	65	708	60	89	48	106	57
Suburbs of cities over 50k	49	2.0	12	2.7	4	2.8	7	2.0	14	1.2	8	4.3	4	2.1
Central cities over 50k	339	14	45	10	20	14	50	14	148	13	51	27	25	13
<b>Total number of people in household</b>														
≤ 2	348	14	98	22	19	13	36	10	138	12	22	12	35	19
3 to 4	927	37	165	37	60	42	122	34	435	37	76	41	69	37
5 to 6	736	29	110	24	40	28	126	36	344	29	55	30	61	33
≥ 7	493	20	78	17	25	17	70	20	265	22	33	18	22	12
<b>Participation in other assistance programs</b>														
Yes	2137	85	381	84	100	69	283	80	1043	88	162	87	168	90
No	367	15	70	16	44	31	71	20	139	12	24	13	19	10

## **Behavior Change among Hawai'i EFNEP Participants**

Paired t-tests were used to assess the differences between Hawai'i EFNEP participants' pre- and post- EFNEP FBC responses. The results of the paired t-test analyses are presented as the mean scores for, and the difference between, the pre- and post- FBC responses. Possible responses on the EFNEP FBC included *Do not do*, *Seldom*, *Sometimes*, *Most of the time*, and *Almost always*, with each response corresponding to a numeric score ranging from 1 (*Do not do*) to 5 (*Almost always*). Table 4.2 presents results of comparisons of the mean pre- and post- FBC response scores by Hawai'i EFNEP participants, and changes in response scores between pre- and post-assessment.

Participants changed their behavior and made significant improvements for all ten nutrition-related practices measured by the FBC between pre- and post-assessment. Increases in participants' scores between pre- and post-assessment were seen on the 7 items where an increase was desirable, and decreases in participants' scores between pre- and post- assessment were seen on the 3 items where a decrease would be desirable.

The number of participants who provided a response for each FBC item varied, as participants do have the option of not responding to any of the items on the FBC. The relatively small number of responses for the FBC item referring to added salt intake can be attributed to the fact that this statement was removed from the checklist for several years.

**Table 4.2. Hawai'i EFNEP participant behavior change as measured by the EFNEP Food Behavior Checklist**

Items on Food Behavior Checklist	n	Mean $\pm$ S.D.		
		Pre	Post	Change
<b>Food and Money Basics</b>				
I shop with a grocery list	2449	3.4 $\pm$ 1.2	3.8 $\pm$ 1.1	0.38 $\pm$ 1.2 †
I compare prices to save money	2450	4.0 $\pm$ 1.0	4.1 $\pm$ 0.93	0.14 $\pm$ 1.0 †
<b>Food Safety</b>				
I leave cooked foods out of the refrigerator for more than 2 hours	2455	2.4 $\pm$ 1.2	2.2 $\pm$ 1.2	-0.27 $\pm$ 1.3 †
I thaw frozen meat in the sink or on the kitchen counter	2432	3.2 $\pm$ 1.3	2.6 $\pm$ 1.3	-0.65 $\pm$ 1.4 †
<b>Food Practices</b>				
I plan what we eat for meals and snacks	1945	3.2 $\pm$ 1.1	3.5 $\pm$ 1.0	0.38 $\pm$ 1.1 †
I run out of food before the end of the month	2409	2.4 $\pm$ 1.1	2.2 $\pm$ 1.0	-0.18 $\pm$ 1.1 †
I use the Food Guide Pyramid to plan my family's meals	1946	2.0 $\pm$ 1.2	2.8 $\pm$ 1.2	0.79 $\pm$ 1.3 †
I prepare my family's meals without adding salt	699	2.5 $\pm$ 1.4	3.2 $\pm$ 1.3	0.64 $\pm$ 1.3 †
I read food labels to know the fat content	1945	2.8 $\pm$ 1.3	3.3 $\pm$ 1.3	0.51 $\pm$ 1.3 †
My children eat in the morning within 2 hours of waking up	2243	3.6 $\pm$ 1.3	3.8 $\pm$ 1.2	0.19 $\pm$ 1.2 †

† Significant difference between pre- and post- tests at p-value < 0.001

### **Differences in Behavior Change among Hawai'i EFNEP Participants**

The results of the logistic regression analyses are presented as the Relative Improvement Score, RIS (95% Confidence Interval). The RIS is a relative risk type of measure. Similar to the odds ratio, the RIS is a measure of the association between risk factors and an outcome of interest. As reported in this paper, the RIS is the association between participant characteristics and practice of the nutrition- and food-related behaviors assessed by the FBC (Table 3.3). An RIS greater than 1.0 indicates being more likely to improve in a given

behavior compared to the reference, while an RIS of less than 1.0 indicates being less likely to improve in a given behavior compared to the reference (188). Therefore, in the hypothetical example below (Table 3.3), Asian individuals would be 3 times more likely to improve than Caucasians, and females would only be 25% as likely to improve as men.

**Table 4.3. Hypothetical model for interpreting the relative improvement score (RIS)**

	RIS	(95% CI)
<b>Ethnicity</b>		
Caucasian	1.0	(Reference)
Asian	3.0	(2.5 - 3.5)
<b>Gender</b>		
Male	1.0	(Reference)
Female	0.25	(0.05 - 0.55)

For three of the FBC behaviors, improvement was indicated by participants engaging in the behavior less frequently (*I leave cooked foods out of the refrigerator for more than 2 hours, I thaw frozen meats on the sink or on the kitchen counter, I run out of food before the end of the month*). Due to the nature of the response coding (0 = Don't do, 5 = Almost always), improvement for these behaviors would result in a negative change in participants' response scores between pre- and post- assessment. Therefore, the RISs determined by the SAS analysis for these three behaviors were inverted to maintain consistency in the results.

The following results were found for the subject areas and nutrition- and food-related behaviors covered by the EFNEP lessons and measured by the FBC:

### Food and Money Basics

#### *I shop with a grocery list*

There were significant differences in participant behavior change by gender and PA instruction for the “I shop with a grocery list” checklist item (Table 4.3). In the univariate analysis, females were less likely than males to improve and shop with a grocery list more frequently; this effect did not persist in the adjusted model. Compared to the reference, instruction from three of the PAs (P3, P6, and P7) was statistically associated with participants being less likely to improve on shopping with a grocery list. After adjusting for confounding variables, instruction from the same three PAs remained significantly different, with the RIS either remaining constant or slightly decreasing.



**Table 4.4. Relative improvement scores for the FBC item "I shop with a grocery list."**

	Univariate		Multivariable <sup>a</sup>	
	RIS	(95% CI)	RIS	(95% CI)
<b>Ethnicity</b>				
Caucasian	1.0	Reference	1.0	Reference
Asian	0.91	(0.69 - 1.2)	0.93	(0.70 - 1.2)
SE Asian	1.1	(0.87 - 1.3)	1.1	(0.92 - 1.4)
NHOPI	1.1	(0.91 - 1.2)	1.1	(0.92 - 1.3)
Mixed	0.93	(0.72 - 1.2)	1.0	(0.77 - 1.3)
Other	0.94	(0.73 - 1.2)	0.93	(0.72 - 1.2)
<b>Gender</b>				
Male	1.0	Reference	1.0	Reference
Female	0.82*	(0.71 - 0.96)	0.87	(0.73 - 1.0)
<b>Age</b>				
≤ 25	1.0	Reference	1.0	Reference
26 - 35	0.95	(0.82 - 1.1)	0.95	(0.82 - 1.1)
36 - 45	0.96	(0.82 - 1.1)	0.95	(0.80 - 1.1)
≥ 46	0.98	(0.79 - 1.2)	1.0	(0.81 - 1.2)
Not reported	0.80	(0.58 - 1.1)	0.85	(0.61 - 1.2)
<b>Staff ID</b>				
P1	1.0	Reference	1.0	Reference
P2	0.89	(0.67 - 1.2)	0.88	(0.65 - 1.2)
P3	0.71*	(0.52 - 0.97)	0.68*	(0.49 - 0.96)
P4	0.80	(0.60 - 1.1)	0.77	(0.57 - 1.0)
P5	0.82	(0.68 - 1.0)	0.82	(0.66 - 1.0)
P6	0.77°	(0.65 - 0.91)	0.77°	(0.64 - 0.92)
P7	0.66†	(0.56 - 0.78)	0.61†	(0.50 - 0.74)
P8	0.67	(0.43 - 1.0)	0.66	(0.42 - 1.0)
P9	0.81	(0.51 - 1.3)	0.81	(0.50 - 1.3)
P10	0.89	(0.53 - 1.5)	0.82	(0.48 - 1.4)
P11	0.70	(0.35 - 1.4)	0.68	(0.34 - 1.4)
<b>Participated in other programs<sup>b</sup></b>				
No	1.0	Reference	1.0	Reference
Yes	0.99	(0.84 - 1.2)	0.97	(0.82 - 1.1)
<b>Town Size</b>				
Farm	1.0	Reference	1.0	Reference
Towns <10k and rural non-farm	1.1	(0.67 - 1.8)	1.1	(0.69 - 1.9)
Towns/Cities 10k to 50k	1.0	(0.63 - 1.7)	1.1	(0.65 - 1.8)
Suburbs of cities over 50k	1.0	(0.53 - 1.9)	1.0	(0.55 - 2.0)
Central cities over 50k	1.0	(0.58 - 1.6)	1.3	(0.75 - 2.2)
<b>Number of household members</b>				
≤ 2	1.0	Reference	1.0	Reference
3 to 4	1.1	(0.94 - 1.3)	1.1	(0.95 - 1.4)
5 to 6	1.1	(0.92 - 1.4)	1.2	(0.95 - 1.4)
≥ 7	1.0	(0.84 - 1.3)	0.99	(0.80 - 1.2)

\* P-value < 0.05

° P-value < 0.01

† P-value < 0.001

<sup>a</sup> All variables listed in the table were included in the multivariate analysis

<sup>b</sup> Federal assistance programs, including: Head Start, WIC, FSP, NSLP, SBP, and CSFP

*I compare prices to save money*

The RISs for the “I compare prices to save money” item are listed in Table 4.4. In the unadjusted model, individuals in the Other ethnic group, with an RIS of 1.3 (0.96 – 1.7), were statistically different from Caucasians, being 30% more likely to compare prices before purchasing food. In the multivariate model, SE Asian and Other ethnic groups were significantly different from Caucasians, both being 40% more likely than Caucasians to compare prices before buying. Participant behavior change in this Food and Money practice also differed by PA instruction. In the univariate model, instruction from all of the PAs was associated with improvement in participants comparing prices to save money compared to the reference PA. However, only five PAs (P3, P5, P6, P7 and P10) were statistically significant. In the multivariate model, instruction from P4 was significant as well.

**Table 4.5. Relative improvement scores for the FBC item "I compare prices to save money."**

	Univariate		Multivariable <sup>a</sup>	
	RIS	(95% CI)	RIS	(95% CI)
<b>Ethnicity</b>				
Caucasian	1.0	Reference	1.0	Reference
Asian	1.3	(0.95 - 1.7)	1.4*	(1.0 - 1.8)
SE Asian	1.0	(0.82 - 1.3)	1.1	(0.89 - 1.4)
NHOPI	1.1	(0.95 - 1.3)	1.2	(0.98 - 1.4)
Mixed	1.1	(0.86 - 1.5)	1.3	(0.95 - 1.7)
Other	1.3*	(1.0 - 1.7)	1.4*	(1.0 - 1.8)
<b>Gender</b>				
Male	1.0	Reference	1.0	Reference
Female	0.85*	(0.72 - 1.0)	0.95	(0.80 - 1.1)
<b>Age</b>				
≤ 25	1.0	Reference	1.0	Reference
26 - 35	0.95	(0.81 - 1.1)	0.95	(0.81 - 1.1)
36 - 45	0.94	(0.79 - 1.1)	0.91	(0.76 - 1.1)
≥ 46	0.91	(0.73 - 1.1)	0.90	(0.72 - 1.1)
Not reported	0.81	(0.57 - 1.1)	0.85	(0.60 - 1.2)
<b>Staff ID</b>				
P1	1.0	Reference	1.0	Reference
P2	0.94	(0.70 - 1.3)	0.94	(0.68 - 1.3)
P3	0.67*	(0.48 - 0.93)	0.67*	(0.47 - 0.96)
P4	0.75	(0.55 - 1.0)	0.71*	(0.51 - 0.98)
P5	0.60†	(0.49 - 0.74)	0.61†	(0.49 - 0.77)
P6	0.66†	(0.55 - 0.79)	0.67†	(0.55 - 0.81)
P7	0.63†	(0.53 - 0.75)	0.59†	(0.47 - 0.72)
P8	0.64	(0.41 - 1.0)	0.64	(0.40 - 1.0)
P9	0.87	(0.53 - 1.4)	0.87	(0.53 - 1.4)
P10	0.55*	(0.31 - 0.97)	0.55*	(0.30 - 0.98)
P11	0.62	(0.30 - 1.2)	0.62	(0.30 - 1.3)
<b>Participated in other programs<sup>b</sup></b>				
No	1.0	Reference	1.0	Reference
Yes	0.92	(0.78 - 1.1)	0.87	(0.73 - 1.0)
<b>Town Size</b>				
Farm	1.0	Reference	1.0	Reference
Towns <10k and rural non-farm	1.0	(0.61 - 1.7)	1.2	(0.69 - 2.0)
Towns/Cities 10k to 50k	0.99	(0.60 - 1.6)	1.1	(0.66 - 1.9)
Suburbs of cities over 50k	0.7	(0.36 - 1.4)	0.91	(0.46 - 1.8)
Central cities over 50k	0.95	(0.56 - 1.6)	1.3	(0.76 - 2.3)
<b>Number of household members</b>				
≤ 2	1.0	Reference	1.0	Reference
3 to 4	0.9	(0.74 - 1.1)	0.91	(0.74 - 1.1)
5 to 6	0.91	(0.74 - 1.1)	0.91	(0.74 - 1.1)
≥ 7	1.1	(0.86 - 1.3)	1.0	(0.80 - 1.2)

\* P-value < 0.05

° P-value < 0.01

† P-value < 0.001

<sup>a</sup> All variables listed in the table were included in the multivariate analysis

<sup>b</sup> Federal assistance programs, including: Head Start, WIC, FSP, NSLP, SBP, and CSFP

## Food Safety

### *I leave cooked foods out of the refrigerator for more than 2 hours*

Improvement on this behavior indicated participants engaged in the practice less often. Therefore, for this FBC practice, a RIS of less than one indicates that participant behavior change was in a less desirable direction; i.e., participants were not as likely as the reference group to thaw frozen meats in a safe manner upon completion of the lesson series. PA instruction and Town size had a significant effect on participant improvement on the FBC item "I leave cooked foods out of the refrigerator for more than 2 hours" (Table 4.5). In the multivariate model, improvement on this behavior was statistically less probable for those participants instructed by P5, P6, P7, P8, and P10, compared to those instructed by P1. Participants living in central cities were about half as likely to improve on this food safety practice compared to those participants living on rural farms.

**Table 4.6. Relative Improvement scores for the FBC Item "I leave cooked foods out of the refrigerator for more than 2 hours."**

	Univariate		Multivariable <sup>a</sup>	
	RIS <sup>c</sup>	(95% CI)	RIS <sup>c</sup>	(95% CI)
<b>Ethnicity</b>				
Caucasian	1.0	Reference	1.0	Reference
Asian	1.1	(0.80 - 1.4)	1.1	(0.83 - 1.4)
SE Asian	1.0	(0.81 - 1.2)	1.0	(0.84 - 1.3)
NHOPI	0.86	(0.74 - 1.0)	0.90	(0.76 - 1.1)
Mixed	1.1	(0.83 - 1.4)	1.1	(0.88 - 1.5)
Other	1.0	(0.79 - 1.3)	1.0	(0.80 - 1.3)
<b>Gender</b>				
Male	1.0	Reference	1.0	Reference
Female	1.0	(0.86 - 1.2)	1.1	(0.90 - 1.3)
<b>Age</b>				
≤ 25	1.0	Reference	1.0	Reference
26 - 35	1.0	(0.87 - 1.2)	1.0	(0.86 - 1.1)
36 - 45	1.0	(0.87 - 1.2)	1.0	(0.85 - 1.2)
≥ 46	1.0	(0.84 - 1.3)	1.0	(0.84 - 1.3)
Not reported	1.3	(0.93 - 1.7)	1.3	(0.97 - 1.8)
<b>Staff ID</b>				
P1	1.0	Reference	1.0	Reference
P2	0.92	(0.69 - 1.2)	0.86	(0.63 - 1.2)
P3	1.0	(0.75 - 1.4)	0.94	(0.68 - 1.3)
P4	0.94	(0.70 - 1.2)	0.94	(0.69 - 1.3)
P5	0.79*	(0.65 - 0.96)	0.75°	(0.61 - 0.93)
P6	0.75°	(0.63 - 0.90)	0.73†	(0.61 - 0.87)
P7	0.67†	(0.57 - 0.79)	0.68†	(0.56 - 0.83)
P8	0.64*	(0.42 - 0.97)	0.62*	(0.41 - 0.96)
P9	0.67	(0.42 - 1.1)	0.66	(0.42 - 1.1)
P10	0.54*	(0.33 - 0.89)	0.52°	(0.31 - 0.87)
P11	0.54	(0.29 - 1.0)	0.54	(0.29 - 1.0)
<b>Participated in other programs<sup>b</sup></b>				
No	1.0	Reference	1.0	Reference
Yes	0.88	(0.75 - 1.0)	0.88	(0.75 - 1.0)
<b>Town Size</b>				
Farm	1.0	Reference	1.0	Reference
Towns <10k and rural non-farm	0.66	(0.40 - 1.1)	0.66	(0.40 - 1.1)
Towns/Cities 10k to 50k	0.63	(0.39 - 1.0)	0.64	(0.39 - 1.1)
Suburbs of cities over 50k	0.59	(0.32 - 1.1)	0.60	(0.31 - 1.1)
Central cities over 50k	0.50°	(0.30 - 0.83)	0.56*	(0.33 - 0.96)
<b>Number of household members</b>				
≤ 2	1.0	Reference	1.0	Reference
3 to 4	0.98	(0.82 - 1.2)	1.0	(0.87 - 1.3)
5 to 6	1.0	(0.87 - 1.3)	1.1	(0.89 - 1.3)
≥ 7	1.0	(0.83 - 1.2)	1.0	(0.83 - 1.3)

\* P-value < 0.05

° P-value < 0.01

† P-value < 0.001

<sup>a</sup> All variables listed in the table were included in the multivariate analysis

<sup>b</sup> Federal assistance programs, including: Head Start, WIC, FSP, NSLP, SBP, and CSFP

<sup>c</sup> Improvement for this item was indicated by participants engaging in the behavior less frequently. Due to the nature of the response coding, the RISs determined by the SAS analysis had to be inverted in order to reflect the actual direction of improvement.

*I thaw frozen meat in the sink or on the kitchen counter*

Participant behavior change for the FBC item “I thaw frozen meat in the sink or on the kitchen counter” significantly differed by ethnicity, PA instruction, and size of family household (Table 4.6). Improvement on this behavior was also indicated by participants engaging in the practice less often. Therefore, a RIS of less than one indicates that participant behavior change was in a less desirable direction; i.e., participants were not as likely as the reference group to thaw frozen meats in a safe manner upon completion of the lesson series.

Participants of Mixed ethnicity were about 70% as likely as Caucasians to improve on meat thawing practices compared after completion of the EFNEP series. Additionally, participants were less likely to improve on thawing frozen meats in a safe manner if they received instruction from one of six PAs (P5, P6, P7, P8, P9, and P11) when compared to the reference (P1). Participants with more than two household family members were more likely to improve their methods of thawing frozen foods compared to the reference.

**Table 4.7. Relative improvement scores for the FBC item "I thaw frozen meats in the sink or on the kitchen counter."**

	Univariate		Multivariable <sup>a</sup>	
	RIS <sup>c</sup>	(95% CI)	RIS <sup>c</sup>	(95% CI)
<b>Ethnicity</b>				
Caucasian	1.0	Reference	1.0	Reference
Asian	0.90	(0.69 - 1.2)	0.93	(0.71 - 1.2)
SE Asian	0.87	(0.71 - 1.1)	0.92	(0.76 - 1.1)
NHOPI	0.92	(0.78 - 1.1)	0.93	(0.80 - 1.1)
Mixed	0.68 <sup>o</sup>	(0.53 - 0.87)	0.71 <sup>o</sup>	(0.55 - 0.91)
Other	0.92	(0.73 - 1.2)	0.95	(0.75 - 1.2)
<b>Gender</b>				
Male	1.0	Reference	1.0	Reference
Female	1.0	(0.88 - 1.2)	1.2	(0.99 - 1.4)
<b>Age</b>				
≤ 25	1.0	Reference	1.0	Reference
26 - 35	0.97	(0.84 - 1.1)	0.94	(0.82 - 1.1)
36 - 45	1.0	(0.87 - 1.2)	1.0	(0.85 - 1.2)
≥ 46	1.1	(0.91 - 1.3)	1.1	(0.93 - 1.4)
Not reported	0.81	(0.60 - 1.1)	0.88	(0.65 - 1.2)
<b>Staff ID</b>				
P1	1.0	Reference	1.0	Reference
P2	0.79	(0.59 - 1.0)	0.85	(0.63 - 1.1)
P3	1.1	(0.79 - 1.4)	1.0	(0.74 - 1.4)
P4	0.79	(0.60 - 1.0)	0.86	(0.64 - 1.1)
P5	0.65†	(0.54 - 0.79)	0.65†	(0.53 - 0.80)
P6	0.75†	(0.64 - 0.89)	0.75 <sup>o</sup>	(0.63 - 0.89)
P7	0.63†	(0.54 - 0.74)	0.65†	(0.54 - 0.79)
P8	0.61 <sup>*</sup>	(0.41 - 0.92)	0.60 <sup>*</sup>	(0.40 - 0.91)
P9	0.63 <sup>*</sup>	(0.40 - 0.98)	0.60 <sup>*</sup>	(0.38 - 0.95)
P10	0.68	(0.41 - 1.1)	0.70	(0.43 - 1.2)
P11	0.50 <sup>*</sup>	(0.27 - 0.93)	0.47 <sup>*</sup>	(0.25 - 0.89)
<b>Participated in other programs<sup>b</sup></b>				
No	1.0	Reference	1.0	Reference
Yes	1.0	(0.87 - 1.2)	1.0	(0.87 - 1.2)
<b>Town Size</b>				
Farm	1.0	Reference	1.0	Reference
Towns <10k and rural non-farm	1.5	(0.96 - 2.4)	1.5	(0.96 - 2.5)
Towns/Cities 10k to 50k	1.4	(0.91 - 2.3)	1.5	(0.94 - 2.4)
Suburbs of cities over 50k	1.4	(0.75 - 2.4)	1.5	(0.82 - 2.8)
Central cities over 50k	1.1	(0.71 - 1.8)	1.4	(0.85 - 2.3)
<b>Number of household members</b>				
≤ 2	1.0	Reference	1.0	Reference
3 to 4	1.2	(0.99 - 1.4)	1.2 <sup>*</sup>	(1.0 - 1.4)
5 to 6	1.2	(0.99 - 1.4)	1.2	(1.0 - 1.4)
≥ 7	1.4 <sup>o</sup>	(1.1 - 1.7)	1.3 <sup>o</sup>	(1.1 - 1.6)

\* P-value < 0.05

<sup>o</sup> P-value < 0.01

† P-value < 0.001

<sup>a</sup> All variables listed in the table were included in the multivariate analysis

<sup>b</sup> Federal assistance programs, including: Head Start, WIC, FSP, NSLP, SBP, and CSFP

<sup>c</sup> Improvement for this item was indicated by participants engaging in the behavior less frequently. Due to the nature of the response coding, the RISs determined by the SAS analysis had to be inverted in order to reflect the actual direction of improvement.

## Food Practices

### *I plan what we eat for meals and snacks*

Table 4.7 gives the RISs for the “I plan what we eat for meals and snacks” FBC item. Mixed ethnicity was significantly different from the reference in the univariate model, with participants of this group not improving their scores on planning family meals and snacks as much as Caucasians after completing the EFNEP lesson series. In the multivariate model, the RIS for participants of Mixed ethnicity (0.80) was still lower than that for Caucasians (1.0), but no longer significant. Compared to P1, instruction from all other PAs resulted in participants being less likely to improve on planning meals and snacks ahead of time, with the results being statistically significant for five of the PAs (P5, P6, P7, P8, and P9) in both models.



**Table 4.8. Relative improvement scores for the FBC item "I plan what we eat for meals and snacks."**

	Univariate		Multivariable <sup>a</sup>	
	RIS	(95% CI)	RIS	(95% CI)
<b>Ethnicity</b>				
Caucasian	1.0	Reference	1.0	Reference
Asian	1.1	(0.85 - 1.5)	1.2	(0.93 - 1.6)
SE Asian	1.0	(0.82 - 1.2)	1.1	(0.89 - 1.3)
NHOPI	1.1	(0.90 - 1.2)	1.1	(0.93 - 1.3)
Mixed	0.74*	(0.57 - 0.97)	0.80	(0.61 - 1.0)
Other	1.1	(0.86 - 1.4)	1.1	(0.86 - 1.4)
<b>Gender</b>				
Male	1.0	Reference	1.0	Reference
Female	0.91	(0.78 - 1.1)	1.0	(0.86 - 1.2)
<b>Age</b>				
≤ 25	1.0	Reference	1.0	Reference
26 - 35	1.0	(0.90 - 1.2)	1.1	(0.92 - 1.2)
36 - 45	0.97	(0.83 - 1.1)	1.0	(0.84 - 1.2)
≥ 46	0.87	(0.71 - 1.1)	0.89	(0.72 - 1.1)
Not reported	0.97	(0.71 - 1.3)	1.1	(0.77 - 1.4)
<b>Staff ID</b>				
P1	1.0	Reference	1.0	Reference
P2	0.84	(0.63 - 1.1)	0.87	(0.64 - 1.2)
P3	0.75	(0.56 - 1.0)	0.78	(0.56 - 1.1)
P4	0.82	(0.62 - 1.1)	0.84	(0.62 - 1.1)
P5	0.79*	(0.65 - 0.96)	0.80*	(0.65 - 0.98)
P6	0.72†	(0.60 - 0.85)	0.74†	(0.61 - 0.88)
P7	0.60†	(0.51 - 0.72)	0.63†	(0.52 - 0.77)
P8	0.54°	(0.35 - 0.84)	0.53°	(0.34 - 0.84)
P9	0.52°	(0.32 - 0.84)	0.53*	(0.33 - 0.87)
P10	0.70	(0.41 - 1.2)	0.73	(0.42 - 1.3)
P11	0.61	(0.31 - 1.2)	0.59	(0.30 - 1.2)
<b>Participated in other programs<sup>b</sup></b>				
No	1.0	Reference	1.0	Reference
Yes	1.2	(0.98 - 1.4)	1.1	(0.93 - 1.3)
<b>Town Size</b>				
Farm	1.0	Reference	1.0	Reference
Towns <10k and rural non-farm	1.1	(0.67 - 1.8)	1.2	(0.71 - 1.9)
Towns/Cities 10k to 50k	1.1	(0.67 - 1.7)	1.2	(0.71 - 1.9)
Suburbs of cities over 50k	0.92	(0.50 - 1.7)	1.1	(0.57 - 2.1)
Central cities over 50k	0.84	(0.51 - 1.4)	1.1	(0.65 - 1.9)
<b>Number of household members</b>				
≤ 2	1.0	Reference	1.0	Reference
3 to 4	0.94	(0.78 - 1.1)	0.93	(0.77 - 1.1)
5 to 6	0.85	(0.70 - 1.0)	0.83	(0.68 - 1.0)
≥ 7	1.0	(0.84 - 1.2)	0.94	(0.76 - 1.2)

\* P-value < 0.05

° P-value < 0.01

† P-value < 0.001

<sup>a</sup> All variables listed in the table were included in the multivariate analysis

<sup>b</sup> Federal assistance programs, including: Head Start, WIC, FSP, NSLP, SBP, and CSFP

*I run out of food before the end of the month*

Significant differences in participant behavior change were detected on the FBC item “I run out of food before the end of the month” (Table 4.8). Similar to the food safety practices, improvement on this behavior indicated participants engaged in the practice less often. Therefore, for this FBC practice, a RIS of less than one indicates that participant behavior change was in a less desirable direction; i.e., participants were not as likely as the reference group to improve their families’ food security upon completion of the lesson series. In both models, participants of Mixed ethnicity were significantly less likely than Caucasians to improve their food security. In the univariate model, participants 26-35 years of age were 1.2 times more likely to improve their food security compared to participants under the age of 26. In the multivariate model, all participants 26 years of age and older, as well as those who did not report their age, were significantly more likely than Caucasians to improve on this food security practice upon completion of the EFNEP lesson series. Interestingly, participants who did not report their age had the greatest RIS, being 1.4 times more likely to not run out of food before the end of the month compared to participants 25 years of age and younger. Improvements in participant food security did not significantly vary with PA instruction after adjusting for confounding factors.

**Table 4.9. Relative improvement scores for the FBC item "I run out of food before the end of the month."**

	Univariate		Multivariable <sup>a</sup>	
	RIS <sup>c</sup>	(95% CI)	RIS <sup>c</sup>	(95% CI)
<b>Ethnicity</b>				
Caucasian	1.0	Reference	1.0	Reference
Asian	0.85	(0.63 - 1.1)	0.89	(0.66 - 1.2)
SE Asian	0.83	(0.67 - 1.0)	0.87	(0.70 - 1.1)
NHOPI	0.94	(0.80 - 1.1)	0.97	(0.82 - 1.1)
Mixed	0.74*	(0.57 - 0.96)	0.74*	(0.57 - 0.97)
Other	1.1	(0.86 - 1.5)	1.1	(0.84 - 1.4)
<b>Gender</b>				
Male	1.0	Reference	1.0	Reference
Female	1.1	(0.91 - 1.3)	1.1	(0.95 - 1.3)
<b>Age</b>				
≤ 25	1.0	Reference	1.0	Reference
26 - 35	1.2*	(1.0 - 1.4)	1.2*	(1.0 - 1.4)
36 - 45	1.2	(1.0 - 1.4)	1.2*	(1.0 - 1.5)
≥ 46	1.2	(0.98 - 1.5)	1.3*	(1.0 - 1.6)
Not reported	1.3	(0.92 - 1.8)	1.4*	(1.0 - 2.0)
<b>Staff ID</b>				
P1	1.0	Reference	1.0	Reference
P2	0.87	(0.64 - 1.2)	0.86	(0.62 - 1.2)
P3	1.1	(0.77 - 1.5)	1.1	(0.74 - 1.5)
P4	1.0	(0.78 - 1.4)	1.1	(0.81 - 1.5)
P5	0.86	(0.69 - 1.1)	0.86	(0.69 - 1.1)
P6	1.1	(0.95 - 1.4)	1.1	(0.92 - 1.3)
P7	0.82*	(0.69 - 0.98)	0.91	(0.74 - 1.1)
P8	0.72	(0.46 - 1.1)	0.68	(0.43 - 1.1)
P9	1.0	(0.61 - 1.6)	1.0	(0.61 - 1.7)
P10	0.83	(0.49 - 1.4)	0.82	(0.47 - 1.4)
P11	0.64	(0.31 - 1.3)	0.65	(0.31 - 1.3)
<b>Participated in other programs<sup>b</sup></b>				
No	1.0	Reference	1.0	Reference
Yes	1.1	(0.94 - 1.3)	1.2	(0.97 - 1.4)
<b>Town Size</b>				
Farm	1.0	Reference	1.0	Reference
Towns <10k and rural non-farm	0.83	(0.49 - 1.4)	0.97	(0.49 - 1.4)
Towns/Cities 10k to 50k	0.86	(0.52 - 1.4)	0.87	(0.51 - 1.5)
Suburbs of cities over 50k	0.82	(0.43 - 1.6)	0.81	(0.41 - 1.6)
Central cities over 50k	0.66	(0.40 - 1.1)	0.67	(0.38 - 1.2)
<b>Number of household members</b>				
≤ 2	1.0	Reference	1.0	Reference
3 to 4	1.0	(0.83 - 1.2)	1.0	(0.84 - 1.3)
5 to 6	0.94	(0.76 - 1.1)	0.90	(0.74 - 1.1)
≥ 7	0.92	(0.75 - 1.1)	0.89	(0.71 - 1.1)

\* P-value < 0.05

° P-value < 0.01

† P-value < 0.001

<sup>a</sup> All variables listed in the table were included in the multivariate analysis

<sup>b</sup> Federal assistance programs, including: Head Start, WIC, FSP, NSLP, SBP, and CSFP

<sup>c</sup> Improvement for this item was indicated by participants engaging in the behavior less frequently. Due to the nature of the response coding, the RISs determined by the SAS analysis had to be inverted in order to reflect the actual direction of improvement.

*I use the Food Guide Pyramid to prepare my family's meals*

Significant differences in participant behavior change were also found on the FBC item "I use the Food Guide Pyramid (FGP) to prepare my family's meals" (Table 4.9). In the univariate model, SE Asian ethnicity and Mixed ethnicity were significantly less likely than Caucasians to improve on using the FGP to plan family meals after the EFNEP classes; these effects did not persist in the multivariate model. Females were statistically less likely than males to improve on FGP use in meal planning in the univariate model. Participants who received instruction from P4, P5, P6, P7, P8, P9, P10, and P11 were all statistically less likely to improve on using the FGP to plan meals upon completion of the lesson series. P4 was no longer significant after adjusting for confounding factors. Alternatively, age was associated with an increased probability of improving on this food practice. In the multivariate model, participants 36–45 years of age were significantly more likely than the reference to improve in their use of the FGP in family meal planning as a result of the EFNEP lesson series.

**Table 4.10. Relative improvement scores for the FBC item "I use the Food Guide Pyramid to plan my family's meals."**

	Univariate		Multivariable <sup>a</sup>	
	RIS	(95% CI)	RIS	(95% CI)
<b>Ethnicity</b>				
Caucasian	1.0	Reference	1.0	Reference
Asian	0.81	(0.60 - 1.1)	0.97	(0.71 - 1.3)
SE Asian	0.80*	(0.64 - 1.0)	0.94	(0.75 - 1.2)
NHOPI	0.89	(0.75 - 1.1)	1.0	(0.84 - 1.2)
Mixed	0.62†	(0.47 - 0.82)	0.76	(0.57 - 1.0)
Other	1.1	(0.83 - 1.4)	1.1	(0.86 - 1.5)
<b>Gender</b>				
Male	1.0	Reference	1.0	Reference
Female	0.85*	(0.72 - 0.99)	1.1	(0.89 - 1.3)
<b>Age</b>				
≤ 25	1.0	Reference	1.0	Reference
26 - 35	1.2*	(1.0 - 1.4)	1.2	(0.99 - 1.4)
36 - 45	1.3°	(1.1 - 1.5)	1.3*	(1.1 - 1.5)
≥ 46	1.2	(0.93 - 1.4)	1.2	(0.94 - 1.5)
Not reported	0.87	(0.63 - 1.2)	0.99	(0.72 - 1.4)
<b>Staff ID</b>				
P1	1.0	Reference	1.0	Reference
P2	0.93	(0.66 - 1.3)	0.90	(0.62 - 1.3)
P3	0.73	(0.51 - 1.0)	0.73	(0.49 - 1.1)
P4	0.89*	(0.49 - 0.96)	0.72	(0.51 - 1.0)
P5	0.64†	(0.52 - 0.79)	0.65†	(0.52 - 0.81)
P6	0.64†	(0.53 - 0.76)	0.64†	(0.53 - 0.78)
P7	0.37†	(0.31 - 0.45)	0.43†	(0.34 - 0.53)
P8	0.35†	(0.23 - 0.55)	0.35†	(0.23 - 0.55)
P9	0.44†	(0.28 - 0.70)	0.42†	(0.26 - 0.67)
P10	0.42†	(0.25 - 0.70)	0.44°	(0.26 - 0.75)
P11	0.30†	(0.15 - 0.59)	0.33°	(0.16 - 0.65)
<b>Participated in other programs<sup>b</sup></b>				
No	1.0	Reference	1.0	Reference
Yes	1.1	(0.89 - 1.3)	0.96	(0.80 - 1.2)
<b>Town Size</b>				
Farm	1.0	Reference	1.0	Reference
Towns <10k and rural non-farm	1.3	(0.78 - 2.2)	1.4	(0.83 - 2.4)
Towns/Cities 10k to 50k	1.2	(0.71 - 2.0)	1.3	(0.79 - 2.3)
Suburbs of cities over 50k	1.1	(0.50 - 2.3)	1.4	(0.64 - 3.1)
Central cities over 50k	0.67	(0.39 - 1.1)	1.1	(0.61 - 2.0)
<b>Number of household members</b>				
≤ 2	1.0	Reference	1.0	Reference
3 to 4	0.83	(0.68 - 1.0)	0.89	(0.73 - 1.1)
5 to 6	0.88	(0.72 - 1.1)	0.89	(0.72 - 1.1)
≥ 7	1.1	(0.88 - 1.3)	0.97	(0.77 - 1.2)

\* P-value < 0.05

° P-value < 0.01

† P-value < 0.001

<sup>a</sup> All variables listed in the table were included in the multivariate analysis

<sup>b</sup> Federal assistance programs, including: Head Start, WIC, FSP, NSLP, SBP, and CSFP

*I prepare my family's meals without adding salt.*

The results of the logistic regression analysis revealed that three of the PAs did not have any participants respond to the FBC item "I prepare my family's meals without adding salt." This fact was discussed at a recent EFNEP meeting (Personal communication, P.A. Tschida, 2008), and the results of the logistic regression analysis have the potential to compromise PA confidentiality. Therefore, the results for the FBC "I prepare my family's meals without adding salt" are not presented.

*I read food labels to know the fat content*

Significant differences in participant behavior change were observed for the FBC item "I read food labels to know the fat content" (Table 4.10). In the multivariate model, participants of SE Asian ethnicity were 75% as likely as Caucasians to increase their use of food labels after completion of the EFNEP lesson series. PA instruction also had a significant effect on participants' improvement for this food practice. For example, participants who received instruction from P4 were 63% less likely than those who received instruction from P1 to improve their use of food labels as a result of the EFNEP lesson series. Although being female and having more than seven family members were both significant in the univariate model, these effects did not persist after adjusting for confounding factors.

**Table 4.11. Relative improvement scores for the FBC item "I read the food label to know the fat content."**

	Univariate		Multivariable <sup>a</sup>	
	RIS	(95% CI)	RIS	(95% CI)
<b>Ethnicity</b>				
Caucasian	1.0	Reference	1.0	Reference
Asian	0.94	(0.71 - 1.3)	1.0	(0.76 - 1.4)
SE Asian	0.68†	(0.55 - 0.85)	0.75*	(0.59 - 0.94)
NHOPI	0.89	(0.75 - 1.1)	0.90	(0.77 - 1.1)
Mixed	0.63°	(0.47 - 0.84)	0.75	(0.55 - 1.0)
Other	0.84	(0.64 - 1.1)	0.85	(0.65 - 1.1)
<b>Gender</b>				
Male	1.0	Reference	1.0	Reference
Female	0.73†	(0.62 - 0.85)	0.90	(0.76 - 1.1)
<b>Age</b>				
≤ 25	1.0	Reference	1.0	Reference
26 - 35	1.0	(0.88 - 1.2)	1.0	(0.87 - 1.2)
36 - 45	1.1	(0.94 - 1.3)	1.1	(0.88 - 1.3)
≥ 46	1.0	(0.80 - 1.2)	0.95	(0.76 - 1.2)
Not reported	0.79	(0.57 - 1.1)	0.87	(0.62 - 1.2)
<b>Staff ID</b>				
P1	1.0	Reference	1.0	Reference
P2	0.51†	(0.36 - 0.72)	0.47†	(0.32 - 0.69)
P3	0.72	(0.50 - 1.0)	0.71	(0.49 - 1.0)
P4	0.32†	(0.23 - 0.46)	0.37†	(0.26 - 0.54)
P5	0.50†	(0.40 - 0.62)	0.53†	(0.43 - 0.67)
P6	0.56†	(0.46 - 0.67)	0.60†	(0.49 - 0.72)
P7	0.48†	(0.40 - 0.57)	0.52†	(0.42 - 0.64)
P8	0.38†	(0.24 - 0.58)	0.39†	(0.25 - 0.61)
P9	0.58*	(0.37 - 0.91)	0.62*	(0.39 - 0.98)
P10	0.61	(0.37 - 1.0)	0.60	(0.36 - 1.0)
P11	0.35°	(0.18 - 0.68)	0.38°	(0.20 - 0.75)
<b>Participated in other programs<sup>b</sup></b>				
No	1.0	Reference	1.0	Reference
Yes	1.0	(0.87 - 1.2)	0.97	(0.81 - 1.2)
<b>Town Size</b>				
Farm	1.0	Reference	1.0	Reference
Towns <10k and rural non-farm	1.2	(0.73 - 2.1)	1.4	(0.79 - 2.4)
Towns/Cities 10k to 50k	1.2	(0.69 - 2.0)	1.2	(0.69 - 2.0)
Suburbs of cities over 50k	1	(0.49 - 2.3)	1.3	(0.59 - 2.9)
Central cities over 50k	0.89	(0.52 - 1.5)	1.2	(0.69 - 2.2)
<b>Number of household members</b>				
≤ 2	1.0	Reference	1.0	Reference
3 to 4	1.0	(0.86 - 1.3)	1.0	(0.84 - 1.3)
5 to 6	0.99	(0.81 - 1.2)	0.98	(0.79 - 1.2)
≥ 7	1.4°	(1.1 - 1.7)	1.2	(0.95 - 1.5)

\* P-value < 0.05

° P-value < 0.01

† P-value < 0.001

<sup>a</sup> All variables listed in the table were included in the multivariate analysis

<sup>b</sup> Federal assistance programs, including: Head Start, WIC, FSP, NSLP, SBP, and CSFP

***My children eat in the morning within 2 hours of waking up***

Ethnicity did not affect participant improvement on the FBC item “My children eat in the morning within 2 hours of waking up” (Table 4.12). Females were less likely than males to have their children eat in the morning, but the difference was only significant in the univariate model. Interestingly, participants who did not report their age were significantly different from the reference, being 44% less likely to improve on having their children eat within 2 hours of waking up in the morning after controlling for confounding factors. Additionally, participant improvement for this Food Practice varied with PA instruction, with RISs ranging from 0.37 – 1.5. The differences, however, were only significant for five of the PAs (P2, P5, P6, P7, and P10).



**Table 4.12. Relative Improvement scores for the FBC item "My children eat in the morning within 2 hours of waking up."**

	Univariate		Multivariable <sup>a</sup>	
	RIS	(95% CI)	RIS	(95% CI)
<b>Ethnicity</b>				
Caucasian	1.0	Reference	1.0	Reference
Asian	0.93	(0.69 - 1.3)	0.96	(0.70 - 1.3)
SE Asian	1.1	(0.86 - 1.3)	1.1	(0.89 - 1.4)
NHOPI	1.1	(0.91 - 1.3)	1.1	(0.92 - 1.3)
Mixed	0.90	(0.68 - 1.2)	1.0	(0.75 - 1.3)
Other	1.0	(0.79 - 1.4)	1.1	(0.81 - 1.4)
<b>Gender</b>				
Male	1.0	Reference	1.0	Reference
Female	0.83*	(0.70 - 0.98)	0.88	(0.74 - 1.1)
<b>Age</b>				
≤ 25	1.0	Reference	1.0	Reference
26 - 35	1.0	(0.87 - 1.2)	1	(0.87 - 1.2)
36 - 45	1.1	(0.91 - 1.3)	1.1	(0.89 - 1.3)
≥ 46	1.0	(0.79 - 1.3)	0.99	(0.78 - 1.3)
Not reported	0.62°	(0.43 - 0.89)	0.66*	(0.46 - 0.95)
<b>Staff ID</b>				
P1	1.0	Reference	1.0	Reference
P2	0.74	(0.54 - 1.0)	0.76	(0.54 - 1.1)
P3	0.63°	(0.45 - 0.89)	0.61°	(0.42 - 0.89)
P4	0.91	(0.67 - 1.2)	0.96	(0.69 - 1.3)
P5	0.77*	(0.62 - 0.96)	0.79*	(0.63 - 1.0)
P6	0.75°	(0.62 - 0.90)	0.76°	(0.63 - 0.93)
P7	0.69†	(0.57 - 0.82)	0.71°	(0.57 - 0.88)
P8	0.69	(0.42 - 1.1)	0.69	(0.42 - 1.1)
P9	1.0	(0.62 - 1.6)	0.99	(0.61 - 1.6)
P10	0.36°	(0.19 - 0.69)	0.37°	(0.19 - 0.70)
P11	1.5	(0.75 - 2.9)	1.5	(0.74 - 2.9)
<b>Participated in other programs<sup>b</sup></b>				
No	1.0	Reference	1.0	Reference
Yes	0.91	(0.75 - 1.1)	0.88	(0.73 - 1.1)
<b>Town Size</b>				
Farm	1.0	Reference	1.0	Reference
Towns <10k and rural non-farm	1.5	(0.85 - 2.6)	1.4	(0.81 - 2.5)
Towns/Cities 10k to 50k	1.5	(0.87 - 2.6)	1.3	(0.75 - 2.3)
Suburbs of cities over 50k	1.5	(0.77 - 3.0)	1.5	(0.72 - 3.0)
Central cities over 50k	1.4	(0.77 - 2.4)	1.4	(0.77 - 2.5)
<b>Number of household members</b>				
≤ 2	1.0	Reference	1.0	Reference
3 to 4	1.1	(0.88 - 1.4)	1.1	(0.88 - 1.4)
5 to 6	0.94	(0.76 - 1.2)	0.93	(0.75 - 1.2)
≥ 7	1.2	(0.93 - 1.5)	1.1	(0.86 - 1.4)

\* P-value < 0.05

° P-value < 0.01

† P-value < 0.001

<sup>a</sup> All variables listed in the table were included in the multivariate analysis

<sup>b</sup> Federal assistance programs, including: Head Start, WIC, FSP, NSLP, SBP, and CSFP

**Table 4.13. Differences in the mean pre-intervention FBC response of participants by island of residence.**

<b>Food Behavior Checklist Item</b>	<b>Mean ± S.D.</b>		
	<b>O`ahu n = 1473</b>	<b>Outer Island<sup>a</sup> n = 1027</b>	
<b>Food and Money Basics</b>			
I shop with a grocery list	3.3 ± 1.2	3.5 ± 1.2	°
I compare prices to save money	4.0 ± 1.0	3.9 ± 1.0	°
<b>Food Safety</b>			
I leave cooked foods out of the refrigerator for more than 2 hours	2.4 ± 1.2	2.5 ± 1.2	
I thaw frozen meat in the sink or on the kitchen counter	3.2 ± 1.3	3.3 ± 1.2	†
<b>Food Practices</b>			
I plan what we eat for meals and snacks	3.2 ± 1.1	3.1 ± 1.2	
I run out of food before the end of the month	2.4 ± 1.1	2.4 ± 1.0	
I use the Food Guide Pyramid to plan my family's meals	2.1 ± 1.2	1.9 ± 1.1	†
I prepare my family's meals without adding salt	2.6 ± 1.4	2.3 ± 1.4	°
I read food labels to know the fat content	2.9 ± 1.4	2.6 ± 1.3	°
My children eat within two hours of waking up in the morning	3.6 ± 1.3	3.5 ± 1.3	

<sup>a</sup> Includes the islands of Hawai'i and Maui

° Significantly different with a p-value < 0.01

† Significantly different with a p-value < 0.001

Significant differences were also detected for participants' post-intervention FBC response scores by island of residence for eight of the FBC items (Table 4.13). The only FBC items where participants' responses did not differ significantly by island of residence were "I run out of food before the end of the month" and "I prepare my family's meals without adding salt." On each of the items found to be significant, participants living on one of the outer islands had post-assessment scores that were better than those living on O`ahu.

## **Effects of PA Island of Residence on Participant Behavior Change**

After controlling for confounding factors, participant behavior change resulting from the EFNEP lesson series differed significantly with PA instruction on all but one of the nine FBC items (see above). Information on PA characteristics (e.g., age, ethnicity, years working as an EFNEP PA, amount/type of EFNEP training received) was not available. Therefore, mean changes in participants' pre- and post- FBC responses were further evaluated based on island of residence. The participants' island of residence corresponds to their PAs' island of residence because Hawai'i EFNEP PAs live and work on the same islands. In order to maintain PA confidentiality, island of residence was evaluated as a dichotomous variable – living on O`ahu versus not living on O`ahu.

Significant differences in participants' pre-intervention FBC responses by island of residence were observed for six of the FBC items (Table 4.12). The results are reported as the mean difference between pre- and post- FBC responses. Participants living on O`ahu improved slightly better between pre- and post- assessment than those not living on O`ahu on five of the six FBC items found to be significant.

**Table 4.14. Differences in mean post-assessment FBC response of participants by Island of residence.**

<b>Food Behavior Checklist Item</b>	<b>Mean ± S.D.</b>		
	<b>O`ahu n = 1473</b>	<b>Outer Island<sup>a</sup> n = 1027</b>	
<b>Food and Money Basics</b>			
I shop with a grocery list	3.6 ± 1.1	4.0 ± 1.1	†
I compare prices to save money	4.0 ± 0.96	4.2 ± 0.89	*
<b>Food Safety</b>			
I leave cooked foods out of the refrigerator for more than 2 hours	2.3 ± 1.2	2.0 ± 1.1	†
I thaw frozen meat in the sink or on the kitchen counter	2.7 ± 1.3	2.4 ± 1.3	†
<b>Food Practices</b>			
I plan what we eat for meals and snacks	3.5 ± 1.0	3.6 ± 1.0	†
I run out of food before the end of the month	2.3 ± 1.1	2.2 ± 1.0	
I use the Food Guide Pyramid to plan my family's meals	2.8 ± 1.2	3.0 ± 1.3	†
I prepare my family's meals without adding salt	3.2 ± 1.3	3.2 ± 1.3	
I read food labels to know the fat content	3.2 ± 1.3	3.4 ± 1.3	°
My children eat within two hours of waking up in the morning	3.7 ± 1.2	3.8 ± 1.2	*

<sup>a</sup> Includes the islands of Hawai'i and Maui

\* Significantly different with a p-value < 0.05.

° Significantly different with a p-value < 0.01

† Significantly different with a p-value < 0.001

With regard to the difference between pre- and post-assessment, participants living on one of the outer islands improved slightly but significantly more than those participants living on O`ahu for nine FBC items (Table 4.13).

**Table 4.15. Mean differences between pre- and post- FBC responses of participants by island of residence.**

<b>Food Behavior Checklist Item</b>	<b>Mean ± S.D.</b>		
	<b>O'ahu n = 1473</b>	<b>Outer Island<sup>a</sup> n = 1027</b>	
<b>Food and Money Basics</b>			
I shop with a grocery list	0.30 ± 1.3	0.51 ± 1.2	†
I compare prices to save money	0.05 ± 1.2	0.30 ± 1.2	†
<b>Food Safety</b>			
I leave cooked foods out of the refrigerator for more than 2 hours	-0.14 ± 1.3	-0.44 ± 1.3	†
I thaw frozen meat in the sink or on the kitchen counter	-0.48 ± 1.5	-0.87 ± 1.5	†
<b>Food Practices</b>			
I plan what we eat for meals and snacks	0.29 ± 1.2	0.50 ± 1.2	†
I run out of food before the end of the month	-0.15 ± 1.2	-0.19 ± 1.2	
I use the Food Guide Pyramid to plan my family's meals	0.50 ± 1.2	0.82 ± 1.3	†
I prepare my family's meals without adding salt	0.16 ± 0.78	0.21 ± 0.80	
I read food labels to know the fat content	0.30 ± 1.2	0.56 ± 1.3	†
My children eat within two hours of waking up in the morning	0.12 ± 1.4	0.33 ± 1.4	†

<sup>a</sup> Includes the islands of Hawai'i and Maui

† Significantly different with a p-value < 0.001

Mean difference between pre- and post- FBC responses by island of residence for the FBC items "I run out of food before the end of the month" did not differ significantly by island of residence. This finding was expected because there were no significant differences with PA instruction for that FBC item in the previous analysis.

## **CHAPTER 5**

### **DISCUSSION**

The results of this study provide evidence that the nutrition education provided by the Hawai'i EFNEP is effective in bringing about desirable changes in nutrition- and food-related behaviors among limited-resource audiences. The Hawai'i EFNEP participants included in this study made moderate but significant improvements between pre- and post- assessment on all of the nutrition- and food-related behaviors measured by the EFNEP FBC. This finding is consistent with previous research investigating EFNEP effectiveness, as well as with trends seen in national EFNEP impact data (7,113,125,136-139,142,145-149,189-201).

The results of this study also indicate that the theoretical frameworks used in developing and implementing EFNEP nutrition education are effective at promoting desirable changes in nutrition- and food-related behavior among low-income populations. Therefore, Social Cognitive Theory, as well as the Transtheoretical and Health Belief Models of human behavior change might be useful in developing other nutrition education interventions targeted at low-income populations.

The first objective of this study was to determine if ethnicity had any significant effects on EFNEP participant's behavior change. Ethnicity was found to have an effect on participants' improvement on four FBC items. Participants of Mixed ethnicity differed from Caucasians in improvement on the FBC items "I thaw frozen meats in the sink or on the kitchen counter" and "I run out of food

before the end of the month.” SE Asians differed from Caucasians in improvement on the FBC item “I read food labels to know the fat content.” Participants in the Asian and Other ethnic groups differed from Caucasians in behavior change for the FBC item “I compare prices to save money.” Therefore, the null hypothesis that ethnicity has no effect on EFNEP participant behavior change was rejected. This evidence increases our confidence in the alternative hypothesis that ethnicity does have an effect on EFNEP participant behavior change.

SE Asians were not as likely as Caucasians to improve on the FBC item “I read food labels to know the fat content” after adjusting for confounding factors. In this study, SE Asian refers to anyone who reported being of Cambodian, Filipino, Hmong, Laotian, or Vietnamese ethnicity. Previous research indicates that individuals of these ethnic groups have difficulty reading foods labels (202). Furthermore, according to U.S. Census data, a large percentage of SE Asian individuals living in the U.S. do not have a strong command of the English language (158). Thus, reading food labels may frustrate these individuals rather than provide informative assistance. This might explain why these individuals are significantly less likely to improve on this behavior.

After adjusting for confounding factors, participants in the Other and Asian ethnic groups were more likely than Caucasians to improve on the FBC item “I compare prices to save money.” This was the sole FBC item where the minority groups performed better than Caucasians. In this study, the Other ethnic group consisted of those EFNEP participants who self-reported being Black, African

American, Hispanic, and Native American, as these groups constitute a small proportion of Hawai'i's population. No generalizations can be made regarding the effect of ethnicity on the behavior change of the participants included in the Other group because the group is so diverse. However, some inferences can be made as to why participants of Asian ethnicity were more likely to improve in comparing prices to save money. The Asian group included individuals of Chinese, Japanese, and Korean ethnicity. These ethnic groups tend to have, on average, a higher level of educational attainment when compared with the general U.S. population (158). Having a higher educational attainment may provide these individuals with an advantage related to mathematical ability necessary for cost analysis. This may explain why Asians were more likely than Caucasians to improve on comparing prices before buying foods after completing the EFNEP lesson series.

The second objective of this study was to determine if participant behavior change differed significant with regard to PA instruction. After adjusting for confounding factors, highly significant differences in participant behavior change by PA instruction were observed on all but one of the FBC items ("I run out of food before the end of the month"). Therefore, the null hypothesis that behavior change among participants would not differ with PA instruction was also rejected. This gives credence to the alternative hypothesis that behavior change among participants differs by PA.

To understand better why participant behavior change varied with PA instruction, it would have been useful to evaluate participant behavior change on



the basis of characteristics shared by the PAs. However, most of the variables which might have provided insight into why participant behavior change differed with PA instruction, such as PA's ethnicity, age, length of time working with EFNEP, and amount of training received, could not be assessed, as this information was not available. Therefore, island of residence of the participants was examined to see if behavior change was different on the most populated island (O`ahu) versus the other two islands (Hawai`i and Maui).

On eight FBC items, the improvements made by residents of Hawai`i and Maui were statistically greater than those for residents of O`ahu. This might have resulted from differences in the participants' baseline characteristics. However, the actual differences in participants' pre-assessment FBC responses by island of residence, although significant, were relatively trivial. Therefore, it is unlikely that the greater improvement seen by participants on outer islands could be attributed to lower pre-assessment FBC scores. Thus, PAs teaching on the islands of Hawai`i and Maui might have been more effective at facilitating behavior change among their participants. However, participants living on the outer islands might also have been more amenable to learning than those living on O`ahu.

In addition to ethnicity and paraprofessional instruction, several other factors had a significant effect on participant behavior change after adjustment for confounding factors. Some inferences can be made as to why certain factors may have had a significant effect on participant behavior change.

Participants living in central cities were less likely than those living on farms to improve on the FBC item “I leave cooked foods out of the refrigerator for more than 2 hours.” Many local families in Hawai`i regularly take part in *ohana*, or family, events, where food plays a central role. For those families living in central cities, these events are commonly held in community and beach parks, where the large number of family members can be easily accommodated. Therefore, the food served at these events may be left sitting out for more than two hours because such *ohana* events usually go on throughout the day, and refrigeration of food is not an option.

Participants 26 years of age and older were statistically more likely to improve on the FBC item “I run out of the food before the end of the month” than participants 25 years of age and younger. Older EFNEP participants might have access to better employment and higher salaries than younger participants, resulting in a larger food budget. This might contribute to the effects seen on the food security checklist item.

### **Strengths**

This study has several strengths. To the knowledge of the author, this study was the first to address the effectiveness of EFNEP nutrition education in promoting positive behavior change among low-income individuals in the state of Hawai`i. Furthermore, this project contributes to the growth and continued success of Hawai`i EFNEP, by being the first study to evaluate program effectiveness systematically. Nutrition educators must be cognizant of the effects

of ethnicity when working with highly diverse, multiethnic populations. The findings reported in this study are not only relevant to nutrition educators working in Hawai`i, but also to those working nationally and internationally.

This study also has several statistical strengths. This is the first study to use the RIS in evaluating the effects of mediating factors such as ethnicity and PA instruction on EFNEP participant behavior change. The large sample size of participants increased the power of the statistical tests and reduced the probability of a Type II error. An additional statistical strength of this study is the large sample of Asian, Native Hawaiian, and Pacific Islander individuals, which allowed for the distinction of two Asian ethnic subgroups (Asian and SE Asian) and a separate group for NHOPI.

### **Limitations**

This study also has several limitations. First, the FBC was not measured against a second determinant of behavior change, such as actual dietary intake or a biochemical measure of nutrient intake. Although dietary intake data, in the form of a pre- and post- 24-hour dietary recall, was collected for each of the participants included in this study, the data was highly variable and unreliable. Thus, it was not suitable for inclusion in the analysis as a means of validating participants' FBC responses. Moreover, the FBC itself is susceptible to respondent biases, as individuals tend to over-report socially desirable behaviors and under-report socially undesirable behaviors. Finally, although the FBC has been tested for validity and reliability among Caucasian, African, and Hispanic

Americans, there have been no formal evaluations of the validity and reliability of the tool among Asian and NHOPI populations.

While the large sample size was considered a statistical strength, care must be taken in interpreting the findings. The use of such a large sample size might have resulted in differences that were statistically significant but too small to be meaningful.

Furthermore, the results of this study may not be applicable to the individual Asian and Pacific Islander ethnic groups that are included within the six ethnicity aggregates used in this study.

### **Implications for Future Research**

This investigation found that improvements in nutrition- and food-related behaviors were associated with participation in Hawai'i EFNEP. However the changes in behavior measured by the FBC were not validated against another determinant of behavior change. Therefore, investigating the reliability and validity of the EFNEP FBC with regard to how accurately it reflects actual behavior change among Asian, Native Hawaiian, and Pacific Islander Americans would be valuable. Additionally, establishing which aspects of the EFNEP series were most influential in bringing about improvements in participants' nutrition- and food related behaviors may also be useful in developing future lesson plans. Although improvements in participants' behaviors were apparent immediately after completing the EFNEP series, it is unknown if the changes endure over

time. Multiple follow-up assessments after graduation may provide insight into the persistence of the observed changes in nutrition- and food-related practices.

Additional research is needed to understand better why individuals of certain ethnic groups were less likely to make positive behavior changes compared to Caucasians after receiving the same Hawai'i EFNEP lesson series. Disaggregating the data into smaller subgroups or individual ethnicities may provide insight into the true effect of ethnicity on behavior change. Although the educational strategies utilized by the Hawai'i EFNEP were intended for use within a multiethnic population, some of the materials and methods may not have been as effective for all ethnic groups. Focus groups may be useful in determining if the materials and methods employed by the EFNEP staff were culturally appropriate for all participants. Moreover, translating the EFNEP family record forms and lesson materials into the participants' native languages may also enhance program delivery.

Further exploration is needed to understand why participant behavior change varied between individual PAs. Investigation into how the ethnicity of PA, and whether matching PA to EFNEP groups based on ethnicity, might affect behavior change outcomes would also be informative. Investigating the effect that PA experience, as measured by length of time as a PA and amount of training received, has on participant behavior change might also be of interest. Additionally, it would be interesting to know whether inaccurate staff perceptions of participant needs has an effect on program outcomes (117). Determining which personal and professional attributes of Hawai'i EFNEP PA's have the

greatest impact on participant behavior change could strengthen the program and allow for the refinement of EFNEP hiring and training criteria to serve program participants better (115,203).

## **Conclusion**

In conclusion, Hawai'i EFNEP has the ability to improve the nutrition- and food-related practices and behaviors among a highly diverse multiethnic population. While improvement varied among ethnic subgroups and by individual PA instruction, participants, on average, practiced positive nutrition- and food-related behavior more often following completion of the EFNEP lesson series. In order to minimize the inequalities between ethnic subgroups, EFNEP PAs and coordinators should attempt to identify barriers to positive behavior change in those areas where certain ethnic subgroups (e.g. SE Asians) were not as likely to improve. EFNEP PAs and coordinators should also continue to work together in refining delivery methods and lesson materials to meet their populations' needs best, in order to ensure lasting program success.

**APPENDIX A**  
**Hawai'i EFNEP Lesson Series Packages**

**CONSUMER NUTRITION LIFESKILLS  
COLLABORATIVE GROUP NUTRITION EDUCATION SERIES  
EFNEP**

---

**LESSON PACKAGES**

---

**Food and Money Basics (4 .... Required lessons)**

Food Guide Pyramid  
Safe Food Handling

Spending Less, Eating Better  
Mirrors  
Goal Setting  
Balancing Act

**Planning Meals and Food Shopping (4)**

Food Guide Pyramid  
Safe Food Handling

Meal Planning/Meal Appeal  
Spending Less, Eating Better

**Food Preparation and Methods (4)**

Food Guide Pyramid  
Safe Food Handling

Winning Ways in the Kitchen  
Kitchen Safety  
Microwave Cooking  
Food Keeper

**Food Choices (4)**

Food Guide Pyramid  
Safe Food Handling

Making Healthy Choices  
Vegetables & Fruits  
Herbs

Web site: <http://www.hawaii.edu/foodskills/>



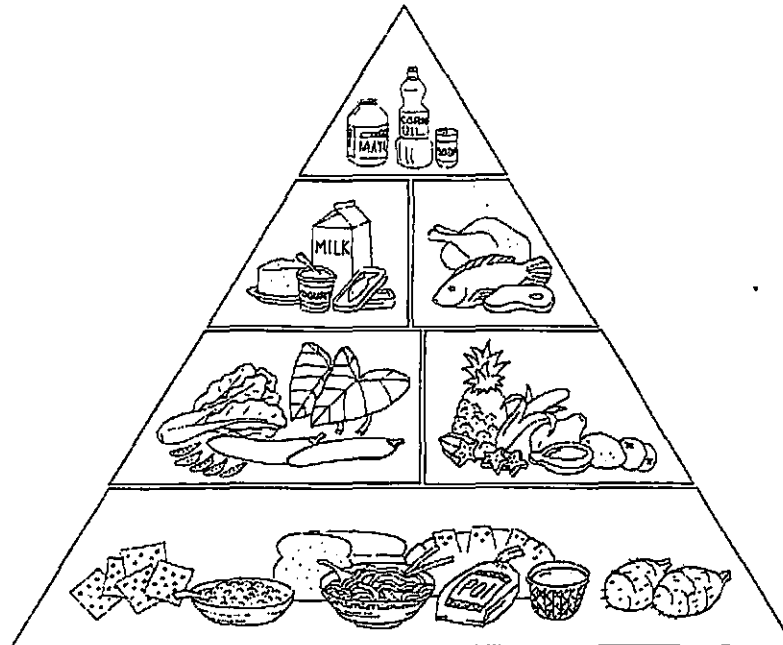
## **APPENDIX B**

### **Examples of Educational Materials Used in the Hawai'i EFNEP Lesson Series**



## A Food Guide Pyramid

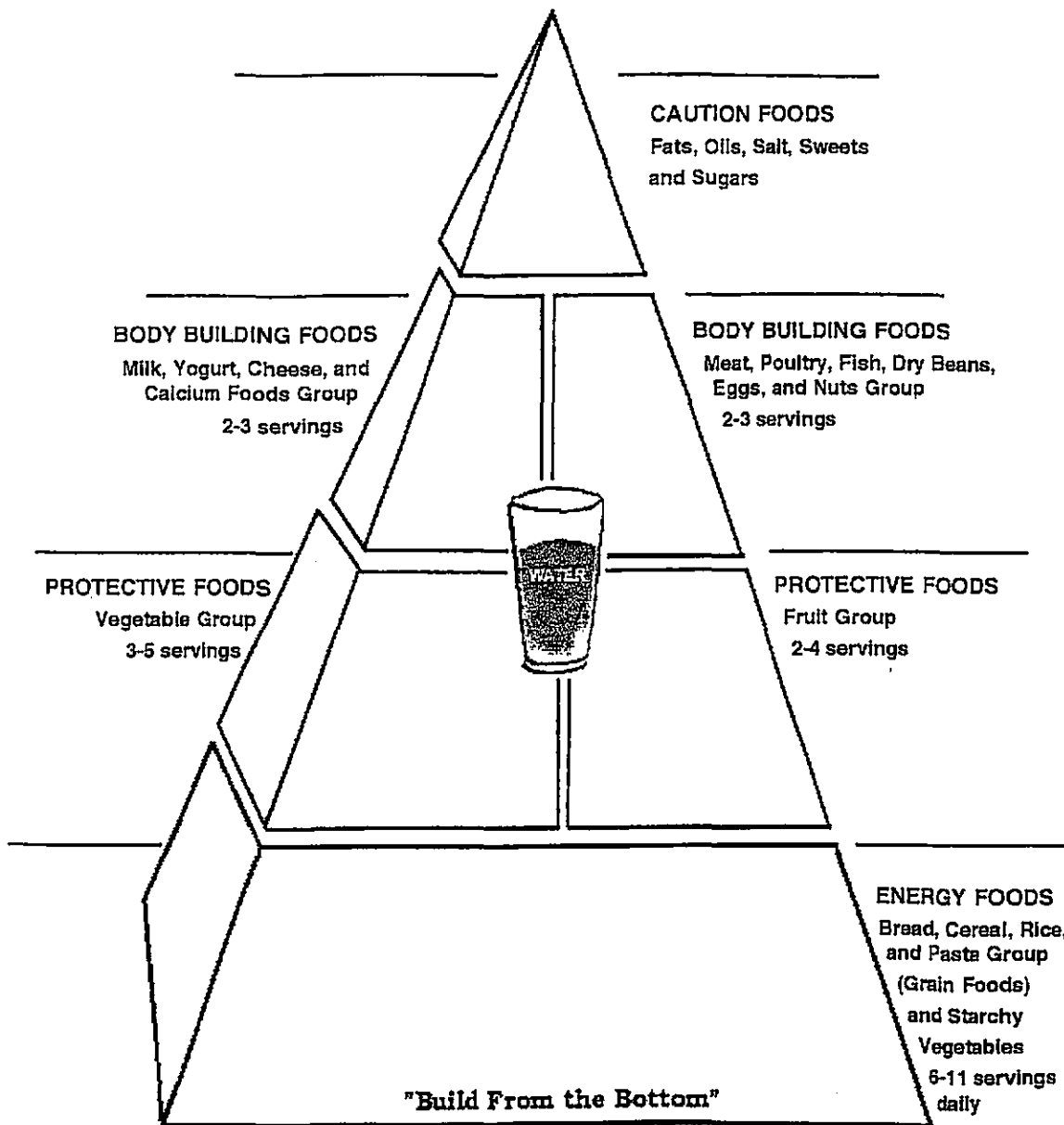
Foods for Wellness: Choices for Healthy Eating



“Build from the Bottom”

<b>Variety:</b>	Get the nutrients your body needs to be healthy by eating many different kinds of foods. Also, drink water, the liquid your body needs.
<b>Proportion:</b>	Stay healthy by eating more foods from the bottom two levels of the pyramid—grains, fruits, and vegetables—and fewer foods from the top level (fats, salt and sugars.)
<b>Moderation:</b>	Reduce your risk of chronic diseases by limiting the amounts of foods you eat that are high in fats, sugars, and salt.
<b>Whole Foods:</b>	Choose foods in their natural, unprocessed form when possible. For example, fresh apples are in the “whole” form nature gave us. Applesauce and apple juice are more processed. Flavored apple products may contain no real apples.

# Foods for Wellness: A Food Guide Pyramid Choices for Healthy Eating



**5 or more Today?  
Please list or draw**

vegetables	fruits
○ ○ ○	○ ○

**5 or more Yesterday?  
Please list or draw**

vegetables	fruits
○ ○ ○	○ ○

**5 or more Tomorrow!  
Please list or draw**

vegetables	fruits
○ ○ ○	○ ○

## CAUTION FOODS

Fats, oils, sweets, sugar, and salt

## BODY BUILDING FOODS

Meat, Poultry, Fish, Dry Beans, Eggs, and Nuts Group and Milk, Yogurt, Cheese and Calcium Foods Group

Fish	Beef	Beans	Sardines	Milk
Seafood	Pork	Lentils	Salmon	Cheese
Tuna	Chicken	Peanuts	Dried Fish	Yogurt
Eggs	Turkey	Tofu	Bones	Cottage cheese

## PROTECTIVE FOODS

Vegetable Group and Fruit Group

Acerola	Cauliflower	Green bean	Marungay	Pommelo	Tamarind
Apple	Celery	Green pepper	Okra	Pumpkin	Tangerine
Apricot	Chayote	Guava	Orange	Seaweed	Tomato
Banana	Cherimoya	Jicama	Papaya	Spinach	Turnips
Bean sprout	Choi sum	Kiwi	Peach	Squash	Watercress
Bittermelon	Cucumber	Kumquat	Peas	Tomato	Watermelon
Broccoli	Eggplant	Lettuce	Persimmon	Starfruit	Winged bean
Cabbage	Fresh herbs	Luau Leaf	Pineapple	Strawberry	Zucchini
Cantaloupe	Grapefruit	Lychee	Pomegranate	Sugar snap peas	
Carrot	Grape	Mango	Prickly pear	Surinam cherry	

## ENERGY FOODS

Bread, Cereal, Rice and Pasta Group and Starchy Vegetables

Bagels	Cornmeal	Macaroni	Soba	<i>Starchy Vegetables</i>
Barley	Crackers	Oats	Somen	Breadfruit
Breads	English muffins	Pita bread	Spaghetti	Green banana
Bulgur	Look fun	Rice	Tortillas	Poi
Buns	Long rice	Pancit	Udon	Potato
Cereals	Millet	Saimin	Whole grains	Sweet potato
				Taro

## WATER - A BASIC NUTRIENT

COOPERATIVE EXTENSION SERVICE UNIVERSITY OF HAWAII AT MANOA COLLEGE OF TROPICAL AGRICULTURE AND HUMAN RESOURCES 3050 MAILE WAY, HONOLULU, HAWAII 96822 The UH-CTAHR Cooperative Extension Service and the U.S. Department of Agriculture cooperate in presenting to the people of Hawaii programs and services without regard to race, sex, age, religion, color, national origin, ancestry, disability, marital status, arrest and court record, sexual orientation, or veteran status. The University is an equal opportunity, affirmative action institution.

## **APPENDIX C**

**Demonstration recipe packet given to EFNEP participants**

## DEMONSTRATION RECIPES

### Expanded Food and Nutrition Education Program

Attached is a shopping list for recipe suggestions for our consumer nutrition lifeskills series.

An EFNEP Program Assistant and a Host Agency representative need to collaboratively plan which recipes are to be presented and discuss responsibilities for food, supplies, and equipment needed for each demonstration.

We look forward to our working together. Thanks!

EFNEP Program Assistant: \_\_\_\_\_

Host Agency/Representative: \_\_\_\_\_

Number of Classes \_\_\_\_\_ Time \_\_\_\_\_ Place \_\_\_\_\_

	dates	Lessons	recipes
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			

Revised 02/04

**HOST AGENCY:** *paper plates, forks, napkins, cup*

**HOST AGENCY:** *paper plates, forks, napkins, cups*

**BEAN SALAD**

serves: 14 cups

4 (15 ounces) cans beans (pinto, kidney, green, garbanzo)  
 1 small round onion  
 1 carrot  
 1 clove garlic  
 ½ cup vinegar  
 1 teaspoon sugar  
 ½ teaspoon pepper

optional: 2 teaspoons oregano

**BEAN SALAD SPREAD**

serves: 8

2 (15 ounces) cans beans (pinto, kidney, lima, or Great Northern)  
 ½ small round onion  
 ½ cup green pepper or celery, or a mixture of both  
 1 ½ tablespoon lemon juice or vinegar  
 ¼ teaspoon salt  
 ¼ teaspoon powdered mustard

**Suggestions for dippers:** vegetables, tortillas, whole wheat crackers, or pita bread

**PROGRAM ASSISTANT:**

Cutting board  
 Knives  
 Large bowl  
 Measuring cups/spoons  
 Colander  
 Mixing spoon  
 Serving spoon  
 Vegetable peeler

**PROGRAM ASSISTANT:**

Cutting board  
 Knives  
 Large bowl  
 Measuring spoons  
 Potato masher  
 Mixing spoon

*HOST AGENCY: paper cups, napkins*

**BEEF TOMATO** serves: 6

1 clove garlic  
1 round onion  
2 stalks celery  
2 bell peppers  
2 tomatoes  
1 pound beef  
4 teaspoon cornstarch  
2 teaspoon sugar  
3 tablespoons soy sauce  
salt & pepper to taste

**PROGRAM ASSISTANT:**

Cutting board  
Knives  
2 bowls  
Skillet/wok  
Measuring cups/spoons  
Mixing spoons  
Serving spoons

*HOST AGENCY: paper plates, forks, napkins*

**BLENDER DRINKS** yield: 6 cups

1 (12 ounces) can juice concentrate  
**OR** 2 cups fresh fruit (mango, banana, strawberries,  
etc.)

½ cup powdered milk

3 cups ice

optional: 1 (8 ounce) container vanilla yogurt  
(in place of powdered milk)

**PROGRAM ASSISTANT:**

Blender  
Measuring cup  
Mixing spoon  
2 Pitchers  
Cutting board (only if using fresh fruits)  
Knives (only if using fresh fruits)

3

*HOST AGENCY: paper plates, forks, napkins*

**CARROT and RAISIN SALAD** serves: 6

2 cups carrots  
¾ - 1 cup raisins  
1 tablespoon sugar  
1 teaspoon vinegar

**PROGRAM ASSISTANT:**

Grater  
Large bowl  
Vegetable peeler  
Measuring spoons  
Serving spoons

*HOST AGENCY: paper plates, forks, napkins*

**CHICKEN and BEANS** serves: 6

1 (15 ounces) can kidney beans  
1 clove garlic  
1 medium round onion  
2 ½ pounds chicken thighs  
1 (8 ounces) can tomato sauce  
¼ cup vinegar  
1 teaspoon sugar  
salt and pepper to taste

**PROGRAM ASSISTANT:**

Skillet/wok  
Mixing spoon  
Serving spoon  
Measuring cups/spoon  
Can opener  
Cutting board  
Knives  
Large mixing bowl

4



*HOST AGENCY: paper plates, forks, napkins*

**CHOW FUN** serves 8

1 cup green onion or ½ medium round onion  
¼ pound lean meat or poultry  
2 (12 ounces) packages refrigerated chow fun noodles  
2 (10 ounces) packages chop suey mix and/or bean sprouts  
2 thumb size pieces ginger  
1 teaspoon salt  
4 tablespoons soy sauce  
2 teaspoons sugar  
optional: sesame seeds  
Chinese parsley

**PROGRAM ASSISTANT:**

Knives  
2 small bowls  
Measuring cups/spoons  
Skillet/wok  
Mixing spoon  
Cutting board  
Tongs  
Vegetable peeler  
Colander

*HOST AGENCY: paper plates, forks, napkins*

**CREAMY VEGETABLE/FRUIT SALAD** serves: 6

3 cups fresh, frozen, or canned fruit  
OR  
3 cups fresh or frozen vegetables  
1 (8 ounces) container plain or flavored low-fat yogurt

**PROGRAM ASSISTANT:**

Large bowl  
Mixing spoon  
Knives  
Cutting boards  
Serving spoon  
Can opener

5

*HOST AGENCY: paper plates, forks, napkins*

**GON LO MEIN** serves: 4

½ (12 ounces) can luncheon meat  
2 (9 ounces) packages chop suey mix  
½ cup oyster sauce  
2 (10 ounces) packages refrigerated chow mein noodles

**PROGRAM ASSISTANT:**

Skillet/wok  
Cutting board  
Tongs  
Knives  
Mixing spoon  
Bowls  
Vegetable peeler  
Measuring spoons

*HOST AGENCY: paper plates, forks, napkins*

**LEAFY TOFU** serves: 6

1 (20 ounces) container tofu  
1-2 tablespoons oil  
2 large bunch spinach or any leafy green vegetables  
2 tablespoons soy sauce  
1 teaspoon toasted sesame seeds

**PROGRAM ASSISTANT:**

Skillet/wok  
Cutting board  
Knives  
Colander  
Bowls  
Mixing spoon

6

*HOST AGENCY: paper plates, forks, napkins*

**OYSTER CHICKEN with BROCCOLI** serves: 8

2 pounds fresh or frozen broccoli  
1 small round onion  
1 clove garlic  
1 thumb size piece ginger  
2 ½ pounds chicken thighs  
3 tablespoons oyster sauce  
salt and pepper to taste  
2 tablespoons cornstarch

**PROGRAM ASSISTANT:**

Skillet/wok  
Cutting board  
Knives  
Measuring cups/spoons  
Mixing spoon  
Colander  
Serving spoon

*HOST AGENCY: paper plates, forks, napkins*

**PEANUT BUTTER LOG** yield: 1-log

¼ cup peanut butter  
2 tablespoons pancake syrup  
½ cup powdered milk  
½ cup unsweetened cereal or graham cracker  
wax paper  
optional: 1 teaspoon vanilla extract  
¼ cup raisins

**PROGRAM ASSISTANT:**

Large bowl  
Butter knife  
Mixing spoon  
Cutting board  
Measuring cups/spoons

7

*HOST AGENCY: paper plates, forks, napkins*

**POTATOES** serves: 12

6 medium potatoes

**PROGRAM ASSISTANT:**

Rice cooker  
Steamer rack or foil  
Cutting board  
Knives  
Tongs

-----  
*HOST AGENCY: paper plates, napkins, spoons*

**SALSA** yield: approximately 4 cups

½ - ¾ pounds tomatoes or 1 (28 ounces) can whole tomato  
½ small round onion  
1 piece chili pepper  
1 teaspoon lemon or lime juice  
2 tablespoons Chinese parsley

**PROGRAM ASSISTANT:**

Can opener  
Cutting board  
Knives  
Medium bowl  
Measuring spoons  
Serving spoons

*HOST AGENCY: paper plates, forks, napkins*

**QUESADILLAS** serves: 10

1 tomato  
2 cups cheese  
1 (10 count) package small flour tortillas  
optional: taco sauce or salsa  
bell peppers  
round onion  
Beans: kidney, pinto, or refried

**PROGRAM ASSISTANT:**

Skillet/wok/electric griddle  
Spatula  
Spoons  
Can opener  
Knives  
Cutting Board  
Grater  
Mixing spoons

8

*HOST AGENCY: paper plates, forks, napkins*

**SKILLET LASAGNA** serves: 8

1 cup chicken, turkey, or tofu  
1 cup cheese  
1 (28 ounces) jar spaghetti sauce  
1 cup uncooked macaroni  
2 (10 ounces) boxes frozen spinach

**PROGRAM ASSISTANT:**

Skillet/wok  
Mixing spoon  
Serving spoon  
Measuring cups/spoons  
Jar opener  
Bowls  
Can opener  
Grater

*HOST AGENCY: paper plates, forks, napkins*

**TUNA SUNSHINE MIX** yield: approx. 1 ½ cup

1 (6 ounces) can tuna in water  
½ carrot  
¼ cup powdered milk  
¼ cup mayonnaise  
pepper to taste  
1 small box crackers  
optional: ¼ cup round onion  
¼ cup celery  
2 tablespoons relish

**PROGRAM ASSISTANT:**

Grater  
2 bowls  
Can opener  
Mixing spoon  
Measuring cups/spoons  
Vegetable peeler

*HOST AGENCY: paper plates, forks, napkins*

**SOMEN SALAD** serves: 6

1 (9 ounces) package somen noodles  
2-3 cups romaine lettuce  
¼ cup carrots  
1 (6.5 ounces) block fish cake  
salt and pepper to taste  
¼ cup sesame oil  
¼ cup soy sauce  
¼ cup sugar  
¼ cup vinegar  
1 teaspoon salt  
optional: 1 cup leftover meats, imitation crab, or  
char siu  
¼ cup green onions  
other vegetables as desired  
¼ cup sesame seeds

**PROGRAM ASSISTANT:**

Skillet/wok/rice pot  
Cutting board  
Knives  
Measuring cups/spoons  
Vegetable peeler  
Bowls – small and large  
Colander  
Pot holders  
Serving spoon

9

*HOST AGENCY: paper plates, forks, napkins*

**TUNA TOFU SALAD** serves: 8

1 head lettuce  
1 small bunch Chinese parsley  
1 medium round onion or ½ bunch green onions  
2 tomatoes  
1 (20 ounces) container firm tofu  
1 (6 ounces) can tuna in water  
½ cup soy sauce  
1 teaspoon sesame oil  
3 teaspoon sugar

optional: toasted sesame seeds

**PROGRAM ASSISTANT:**

4 bowls  
Large bowl or platter  
Knives  
Cutting board  
Measuring cups/spoons  
Jar with lid  
Tongs  
Can opener

*HOST AGENCY: paper plates, forks, napkins*

**VEGETABLE NAMUL** serves: 4

1 clove garlic  
1 medium carrot  
1 bunch watercress or 1 (10 ounces) package bean sprouts  
1 teaspoon sesame oil  
¼ teaspoon sugar  
3 tablespoons soy sauce  
optional: 1/8 teaspoon cayenne pepper or red pepper  
1 teaspoon sesame seeds

**PROGRAM ASSISTANT:**

Skillet/wok/rice cooker  
Measuring cups/spoons  
Mixing spoons  
Serving bowls  
Tongs

*HOST AGENCY: paper plates, forks, napkins*

**VEGETABLE STIR FRY** serves: 5

1 clove garlic  
1 thumb size piece ginger  
1 bunch ung choy, pak choy, kai choy, or watercress  
1 pound lean beef, pork, or chicken without skin  
1 tablespoon soy sauce  
1 teaspoon cornstarch  
½ teaspoon sugar

**PROGRAM ASSISTANT:**

Skillet/wok  
Cutting board  
Small bowls  
Tongs  
Measuring spoons  
Mixing spoons  
Serving spoon  
Knives  
Colander

**APPENDIX D**

**Institutional Review Board Approval Documentation**

# UNIVERSITY OF HAWAII

Committee on Human Studies

## MEMORANDUM

November 2, 2007

TO: Margaret Pulver  
Principal Investigator  
Human Nutrition, Food and Animal Sciences

FROM: William H. Dendle  
Executive Secretary



SUBJECT: CHS #15558- "Positive Behavior Change Among the Hawaii EFNEP Multiethnic Population"

Your project identified above was reviewed and has been determined to be exempt from Department of Health and Human Services (DHHS) regulations, 45 CFR Part 46. Specifically, the authority for this exemption is section 46.101(b)(2). Your certificate of exemption (Optional Form 310) is enclosed. This certificate is your record of CHS review of this study and will be effective as of the date shown on the certificate.

An exempt status signifies that you will not be required to submit renewal applications for full Committee review as long as that portion of your project involving human subjects remains unchanged. If, during the course of your project, you intend to make changes which may significantly affect the human subjects involved, you should contact this office for guidance prior to implementing these changes.

Any unanticipated problems related to your use of human subjects in this project must be promptly reported to the CHS through this office. This is required so that the CHS can institute or update protective measures for human subjects as may be necessary. In addition, under the University's Assurance with the U.S. Department of Health and Human Services, the University must report certain situations to the federal government. Examples of these reportable situations include deaths, injuries, adverse reactions or unforeseen risks to human subjects. These reports must be made regardless of the source funding or exempt status of your project.

University policy requires you to maintain as an essential part of your project records, any documents pertaining to the use of humans as subjects in your research. This includes any information or materials conveyed to, and received from, the subjects, as well as any executed consent forms, data and analysis results. These records must be maintained for at least three years after project completion or termination. If this is a funded project, you should be aware that these records are subject to inspection and review by authorized representatives of the University, State and Federal governments.

Please notify this office when your project is completed. We may ask that you provide information regarding your experiences with human subjects and with the CHS review process. Upon notification, we will close our files pertaining to your project. Any subsequent reactivation of the project will require a new CHS application.

Please do not hesitate to contact me if you have any questions or require assistance. I will be happy to assist you in any way I can.

Thank you for your cooperation and efforts throughout this review process. I wish you success in this endeavor.

Enclosure

**Protection of Human Subjects**  
**Assurance Identification/IRB Certification/Declaration of Exemption**  
**(Common Rule)**

*Policy:* Research activities involving human subjects may not be conducted or supported by the Departments and Agencies adopting the Common Rule (56FR28003, June 18, 1991) unless the activities are exempt from or approved in accordance with the Common Rule. See section 101(b) of the Common Rule for exemptions. Institutions submitting applications or proposals for support must submit certification of appropriate Institutional Review Board (IRB) review and approval to the Department or Agency in accordance with the Common Rule.

Institutions must have an assurance of compliance that applies to the research to be conducted and should submit certification of IRB review and approval with each application or proposal unless otherwise advised by the Department or Agency.

1. Request Type <input type="checkbox"/> ORIGINAL <input type="checkbox"/> CONTINUATION <input checked="" type="checkbox"/> EXEMPTION	2. Type of Mechanism <input type="checkbox"/> GRANT <input type="checkbox"/> CONTRACT <input type="checkbox"/> FELLOWSHIP <input type="checkbox"/> COOPERATIVE AGREEMENT <input type="checkbox"/> OTHER: _____	3. Name of Federal Department or Agency and, if known, Application or Proposal Identification No.
4. Title of Application or Activity "Positive Behavior Change Among the Hawaii EPNEP Multiethnic Population"		5. Name of Principal Investigator, Program Director, Fellow, or Other Margaret Puiver

6. Assurance Status of this Project (Respond to one of the following)

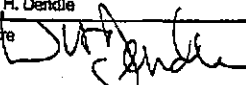
- This Assurance, on file with Department of Health and Human Services, covers this activity.  
 Assurance Identification No. F-3526, the expiration date September 23, 2008 IRB Registration No. IORG000169
- This Assurance, on file with (agency/dept) \_\_\_\_\_, covers this activity.  
 Assurance No. \_\_\_\_\_, the expiration date \_\_\_\_\_ IRB Registration/Identification No. \_\_\_\_\_ (if applicable)
- No assurance has been filed for this institution. This institution declares that it will provide an Assurance and Certification of IRB review and approval upon request.
- Exemption Status: Human subjects are involved, but this activity qualifies for exemption under Section 101(b), paragraph 2.

7. Certification of IRB Review (Respond to one of the following IF you have an Assurance on file)

- This activity has been reviewed and approved by the IRB in accordance with the Common Rule and any other governing regulations,  
 by:  Full IRB Review on (date of IRB meeting) \_\_\_\_\_ or  Expedited Review on (date) \_\_\_\_\_  
 If less than one year approval, provide expiration date \_\_\_\_\_
- This activity contains multiple projects, some of which have not been reviewed. The IRB has granted approval on condition that all projects covered by the Common Rule will be reviewed and approved before they are initiated and that appropriate further certification will be submitted.

8. Comments

CHS #15558

9. The official signing below certifies that the information provided above is correct and that, as required, future reviews will be performed until study closure and certification will be provided.		10. Name and Address of Institution University of Hawaii at Manoa 2444 Dole Street, Bachman Hall Honolulu, HI 96822
11. Phone No. (with area code) (808) 956-5007		
12. Fax No. (with area code) (808) 956-8683		
13. Email: dendle@hawaii.edu		
14. Name of Official William H. Dendle	15. Title Compliance Officer	
16. Signature 		17. Date November 2, 2007

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**APPENDIX E**

**Hawai'i EFNEP Food Behavior Checklist**



<b>1. FOOD AND MONEY BASICS</b>	<b>Don't do</b>	<b>Seldom</b>	<b>Some-times</b>	<b>Most of the time</b>	<b>Almost always</b>
A 4. I shop with a grocery list.					
B 2. I compare prices to save money.					

<b>2. FOOD SAFETY</b>	<b>Don't do</b>	<b>Seldom</b>	<b>Some-times</b>	<b>Most of the time</b>	<b>Almost always</b>
A 5. I leave cooked foods out of the refrigerator for more than 2 hours.					
B 6. I thaw frozen meat in the sink or on the kitchen counter.					

<b>3. FOOD PRACTICES</b>	<b>Don't do</b>	<b>Seldom</b>	<b>Some-times</b>	<b>Most of the time</b>	<b>Almost always</b>
A 1. I plan what we eat for meals and snacks.					
B 3. I run out of food before the end of the month.					
C 7. I use the Food Guide Pyramid to plan my family's meals.					
D 8. I prepare my family's meals without adding salt.					
D 9. I read food labels to know the fat content.					
E 10. My children eat in the morning within 2 hours of waking up					

## REFERENCES

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