

A RANDOMIZED CONTROLLED TRIAL OF THE HCHF INTERVENTION: A
COMMUNITY-BASED EDUCATION PROGRAM FOR LOW-INCOME
PARENTS

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ABSTRACT

Background: Given the increasing prevalence of childhood obesity, especially among low-income populations, and the importance of parenting in promoting children's eating behaviors and physical activity, this study aimed to evaluate the effectiveness of Healthy Children, Healthy Families (HCHF) intervention.

Methods: This two-year randomized controlled trial used a cross-over design. Parents/caregivers (n=391) of children aged 3-5 years old were recruited and randomized to either immediate education (IE) or delayed education (DE). Participants received eight weekly education workshops and completed surveys at each time points. Only demographic characteristics were analyzed in this study, and the four comparisons (IE vs. DE, year 1 vs. year 2, T1 vs. T4, and English vs. Spanish speaking sites) were conducted.

Results: Two hundred and seventy-five parents/caregivers completed surveys at the end of the study. Participants were primarily female, and about two thirds were Hispanic. The majority of them were unemployed, below 185% of poverty, and had low level of education. No important demographic differences were observed between IE and DE groups. Comparison between English and Spanish speaking sites showed significant differences in many variables, including race, ethnicity, household income, poverty level, and education. The other two comparisons (year 1 vs. year 2, T1 vs. T4) only showed a difference in race and household income, respectively.

Conclusion: Differences in behavioral outcomes between IE and DE groups will be able to determine the impacts of the education intervention on HCHF participants.

Demographic differences between English and Spanish speaking sites might influence the effectiveness of HCHF and therefore, should be used as covariates to control for confounding in future analyses.

BIOGRAPHICAL SKETCH

Shiya Huang was born in Guangzhou, China. She finished high school in Minnesota in 2012 and later received her Bachelor of Science Degree in General Biology from the University of California San Diego in 2016. She is currently completing her Master's program in the Division of Nutritional Sciences at Cornell University with Dr. Jamie Dollahite.

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INTRODUCTION

Childhood obesity has become increasingly prevalent in the United States, especially among audiences at high risk of obesity, such as families with limited resources (1–3). Development and extension of effective interventions in low-income populations are needed. Given evidence suggesting the importance of parental influence on children’s eating behaviors, physical activity, and consequently on weight status (4–11), effective interventions should engage parents as a critical component to prevent childhood obesity. Nonetheless, few childhood obesity prevention interventions reach parents intensively enough to address parenting practices.

The Expanded Food and Nutrition Education Program (EFNEP) is a federally funded program implemented by the Land-Grant University system in all states in the US (12). EFNEP began in 1969 and reaches over a half million low-income families with young children each year. It focuses on increasing nutrition knowledge and improving diet and physical activity among parents and caregivers, and consequently the health of children by offering nutrition education (12–14).

Supplemental Nutrition Assistance Program - Education (SNAP-Ed) is also a federally funded program that operates primarily through land-grant universities starting in 1988. The goal of SNAP-Ed is to help and teach people eligible for SNAP how to make healthy food and lifestyle choices by providing evidence-based nutrition education and obesity prevention interventions (15).

The Land-Grant University system offers a great opportunity to expand the reach of nutrition education to low-income audiences and promote health-related behaviors focusing on obesity prevention through EFNEP and SNAP-Ed. Nevertheless, issues exist in current obesity prevention interventions in these programs.

Issues in Existing Interventions/Programs

EFNEP has been successfully reaching limited-resource families to improve family diets by working with parents and caregivers to impact the food choices, and thereby the health of children. However, only one randomized controlled trial has been carried out in EFNEP that focused on improving parenting practices related to children's behaviors (16). In addition to traditional EFNEP classes, the intervention included short videos about food and eating activities at home in each session and weekly discussion encouraging goal setting and problem solving (16). The results showed a reduction in parent BMI that was not maintained over time.

Improvements in participants' psychosocial variables, such as feeding practices and self-efficacy, were not significantly different in control and intervention groups. Furthermore, the ability to use videos in EFNEP sessions in New York State has been found to be unreliable due to the variability of space and conditions where EFNEP groups meet.

On the other hand, SNAP-Ed has developed a toolkit that helps identify evidence-based obesity prevention programs that can be used in SNAP-Ed (17). This toolkit is also used by EFNEP to identify evidence-based interventions that can be adopted in that program. However, in the latest

version of the toolkit, very few childhood obesity prevention or nutrition education interventions focus on parents (18). Only three out of the eight interventions focus on parenting and feeding practices; the other five only engage parents in lessons or activities as part of the nutrition education but none includes parenting practices.

Rationale for the Research

Among interventions currently available that focus on parenting practices, the one that has strong evidence on improving health-related behaviors that influence children's weight status is not targeting low-income populations, while the others either are ineffective in improving parenting behaviors or have limited evidence. In order to promote healthful behavioral changes for both parents and their children, an effective intervention aiming to prevent childhood obesity should recognize the limited resources of low-income families; and incorporate parenting practices that influence motivation and success into parent education. Therefore, *Healthy Children, Healthy Families: Parents Making a Difference! (HCHF)* was developed, addressing key health-related behaviors that affect children's weight status, with an emphasis on those that can be influenced by parental practices.

HCHF is an innovative intervention that combines parenting practices and nutrition education, providing the knowledge and skills parents need to positively impact children's behaviors. This curriculum has been shown to be feasible and appropriate for low-income parents, caregivers, and program educators (19). Although program evaluation provides practice-based evidence of *HCHF*'s effectiveness by comparing pre- and post-education outcomes (20), it does not meet the

criteria of research-tested evidence. As a result, *HCHF* is only used in EFNEP in a few states. Only with research-tested evidence can HCHF be included in the SNAP-Ed Toolkit and fully adopted across all SNAP-Ed and EFNEP programs nationally. In order to address gaps in the literature and in available interventions, the goal of this research was to evaluate parent-focused nutrition education by rigorously testing the effectiveness of the *HCHF* intervention so that it can be distributed through EFNEP and SNAP-Ed.

REVIEW OF LITERATURE

Childhood Obesity

Obesity is associated with a variety of chronic diseases, such as cardiovascular disease, type 2 diabetes, and certain types of cancer (21–25). Children who are overweight or obese have a high risk of being overweight or obese in adulthood (26–28). The prevalence of obesity among children in the United States has increased markedly in recent decades (29,30). In spite of extensive public health focus on obesity prevention, the prevalence of childhood obesity remains high. Approximately one in five children are affected by obesity today. A significantly upward trend was reported for overweight (body mass index (BMI) \geq 85th percentile), obesity (BMI \geq 95th percentile) and severe obesity (BMI \geq 120% of the 95th percentile) among children from 1999 through 2016. The prevalence of overweight, obesity and severe obesity among children aged 2-19 years were 28.8%, 14.6%, and 4.9% in 1999 and 35.1%, 18.5%, and 7.9% in 2016 (30,31). Some studies reported a small decline in obesity prevalence among children aged 2-5 years and leveling off of the prevalence of obesity among children between 2005 and 2014 (32,33). However, the prevalence of obesity among children across all ages has been increasing since 2014 and remained high in 2016, with a prevalence of 18.5% (30,31,34).

Causes of Obesity

Overweight and obesity is caused by an imbalance between energy intake and expenditure. The most common causes of a positive energy balance are increased caloric intake and inadequate physical activity (35,36). From 1989 through 2014, high-calorie, low-nutrient foods such as

french fries, most snacks, desserts, and sweetened drinks, predominated the top sources of calories in children's diets. Additionally, children's intakes of fats and sugars exceeded the recommended limits (37,38). Meanwhile, increasing use of television and other screen media as well as sedentary behaviors at home and in home-based child care settings result in the reduction in physical activity in children (39,40). The poor dietary pattern and decreased physical activity are important contributors to the childhood obesity epidemic.

Food Choices

The current obesogenic food environment in the United States has resulted in undesirable dietary behaviors, such as the overconsumption of high-fat and high-sugar foods and beverages, the increase in portion sizes along with the underconsumption of fruits, vegetables, and whole grains (35,36). This results in many US children consuming an excess of calories.

Intake of Sugar-Sweetened Beverages

Limiting sugar consumption is advised by health experts and guidelines, but nearly half of children in the US are consuming excessive amounts of sugars, especially added sugars (41). The primary source of added sugars and calories in the American diets is sugar-sweetened beverages (37,41–43). Data from the NHANES 2009-2014 showed that sugar-sweetened beverages and fruit drinks were the top sources of added sugars for children (37,41). Beverages accounted for approximately one third of the consumption of added sugars among preschoolers, and the proportion of sugar-sweetened beverages consumed increased as children aged (37). High consumption of added sugars can lead to excessive energy intake and an increasing risk of

obesity (37,41). Nonetheless, 63% of preschool-aged children consumed free sugars (added sugars combined with naturally occurring sugars from 100% fruit juice) at or above the recommended limits (36–38,44). Bailey et al. (41) reported that the percentage of total energy contributed by added sugars was approximately 14% among children aged 2-8 years, exceeding the recommended limit of 10%. These findings are especially alarming since the associations between sugar consumption and the risk of obesity appears to be more pronounced in beverages rather than foods (45). Moreover, evidence indicated a positive relationship between juice intake at 1 year of age and consumption of juice and sugar-sweetened beverages as well as adiposity later in childhood (37,44), suggesting the possibility that early intervention of eating behaviors may prevent the development of obesity. Thus, reducing the intake of sweetened beverages was included in the *HCHF* curriculum as one of the key behaviors to help children avoid unhealthy weight gain.

Intake of Fruits and Vegetables

The Dietary Guidelines for Americans suggest that incorporating higher intakes of fruits and vegetables into the diet is associated with reduced risk of many chronic diseases (46). Although there is no evidence that low consumption of fruits and vegetables lead to obesity, it is important to promote fruit and vegetable intake. Nonetheless, Americans, especially low-income populations, are doing a poor job of meeting fruit and vegetable recommendations. In particular, fruit and vegetable intakes among the majority of US children and adolescents were still low in 2010 (47–49) despite evidence of an increase in fruit intake among children between 2003 and 2010 (47,50). Evidence also shows that children living in families with low income level or low

educational status are at higher risk of low consumption of fruits and vegetables (51,52). The Centers for Disease Control and Prevention (CDC) reports indicated that 93% of children did not meet recommended levels of vegetable intake, and 60% of children did not meet recommended levels of fruit intake using NHANES data from 2003 to 2010 (47,53). Among total vegetables consumed by US children, white potatoes (especially in the form of french fries) accounted for 30%, being the leading contributor of vegetables. The proportion of french fries to total vegetable consumption was even higher among low-income children. Frequent consumption of french fries, which are high in fats and salts, might be associated with negative health outcomes, including obesity, hypertension, heart disease, and diabetes (54). In the case of fruit consumption, the leading contributor of fruits, 100% fruit juice, accounted for more than 40% of total fruit intake among children aged 2-5 (47,51). Frequent consumption of 100% fruit juice can lead to excessive energy intake because sugars from 100% fruit juice are biochemically similar to added sugars in sugar-sweetened beverages (37). These findings demonstrated that a lot of children are having a poor dietary pattern with high-sugar and high-fat foods as their major sources of fruits and vegetables. Therefore, increasing the intake of a variety of vegetables that are sources of important nutrients and fruits that have relatively low sugar content, especially whole fruits, is emphasized in the *HCHF* curriculum. Despite limited evidence, available studies suggest that dietary patterns in childhood have the potential to track into adolescence and adulthood (55–58), which highlights the importance of promoting fruit and vegetable consumption among children at an early age.

Physical Activity

In addition to poor eating behaviors, inadequate physical activity is another contributor to the positive energy balance that leads to overweight and obesity. Evidence has shown that physical activity levels among preschool-aged children were very low and they spent a large proportion of time being sedentary (59–62). Pate et al. (63) reported that children in 24 preschools performed moderate-to-vigorous physical activities during only 3% of the time and were completely stationary during 56% of the time. High levels of screen use, including television and computer, have been observed in several studies in young children, especially those attending child care centers or early learning facilities (59,64,65). Low levels of physical activity and excessive screen time are associated with increased BMI and unhealthy dietary behaviors, such as increased consumption of energy-dense nutrient-poor foods (66,67). On the contrary, increased physical activity is associated with improved weight status in preschoolers (68). Since the first years of life are a crucial period for the development of activity patterns, promoting physical activity along with reducing sedentary behavior among children during the preschool years is an important step to prevent childhood obesity. Furthermore, children's participation in physical activity and sedentary behaviors is likely to be influenced by that of their parents. Children appear to be more physically active when their parents are physically active and also involved in the children's activities with them (69–71). Moore et al. (69) observed that children of active parents were about 6 times as likely to be active, compared to children whose parents were inactive. A recent study by Brouwer et al. (70) also showed a positive association between the intensity of physical activity in parents and that in children. On the other hand, children whose parents engaged in high levels of TV viewing had an increased risk of watching more than 4

hours of TV daily (72). Hence, educating and engaging parents to help children achieve and maintain a healthful weight status during the preschool years is emphasized in the *HCHF* curriculum.

Parenting Practices and Obesity Prevention

In order to prevent childhood obesity, effective intervention approaches are needed to address a range of behaviors that could improve dietary patterns and physical activity level among children. Eating behaviors and physical activity developed early during the childhood track into adulthood, suggesting that the first few years of life may be critical for the development of healthy behaviors in children (7,9,11,73,74). Parents have a direct impact on children's dietary intake and physical activity. As their caregivers, role models, and educators, parents play a powerful role in providing children's food environments, influencing their food preferences, and promoting their healthy behaviors (4,6,8,11,75–77). Accordingly, improving parental knowledge and behaviors in relation to children's eating and physical activity can lead to weight improvements in children (78,79).

Parenting styles, feeding styles, and feeding practices are related to children's food and activity choices, and thus weight status. General parenting is based on two dimensions: demandingness and responsiveness. Demandingness is the extent to which parents control their children's behavior, and responsiveness is the extent to which parents are sensitive to their children's emotional needs. The four common parenting styles include authoritative (high demandingness and high responsiveness), authoritarian (high demandingness and low responsiveness),

permissive/indulgent (low demandingness and high responsiveness), and neglectful/uninvolved (low demandingness and low responsiveness) (4,5,10,11,76). Feeding styles can be viewed as a part of parenting styles situated in the context of feeding. Parental feeding practices are how parents behave specifically to influence their children's eating, which may be influenced by parenting styles and feeding styles (5,8,11). It is crucial to understand how parenting practices are related to children's health-related behaviors in order to prevent childhood obesity.

Extensive research has examined the relationship between parenting styles and child outcomes. Studies investigating the association between parenting and child weight-related outcomes have shown that authoritative parenting is protective against obesity and produces the most positive child outcomes compared to other parenting styles (11,75). This positivity might be associated with the fact that authoritative parents are warm and nurturing and set appropriate demands using supportive behaviors, whereas authoritarian parents tend to be restrictive, unresponsive to children's needs, and control children's eating through parent-centric rules regardless of their preferences (10,11). Children whose parents employed authoritative styles exhibited increased physical activity, healthier eating behaviors, and lower BMIs (11,75). Furthermore, Podlesak et al. (80) found positive correlations between authoritative parenting style and non-picky eating behaviors in children. Hence, parents' responsiveness to children's eating behaviors, in addition to their demandingness, is a critical component that seems to allow for the achievement of the best quality of children's diets (76). Although permissive parents exhibit high responsiveness, the lack of guidance and control over children's eating is likely to negatively influence their eating patterns, and consequently their BMIs (10). In contrast to authoritative parenting,

authoritarian and permissive parenting styles were associated with picky eating behaviors and negative feeding practices (80). In summary, these findings indicate that an authoritative parenting style may lead to positive feeding strategies that promote the development of healthy dietary patterns among children.

Similar observations were found with regard to feeding styles. Authoritative feeding style was associated with a more positive home food environment and healthier eating patterns (11,61,73). Studies also reported associations between authoritative feeding style and better dietary quality, higher consumption of fruits and vegetables as well as lower consumption of sugar-sweetened beverages in children (9,11,76). In addition, some studies conducted in the US, Europe, Australia, and Hong Kong found that children had healthier eating behaviors when parents monitored and guided children's eating by showing encouragement and responsiveness, which resembles an authoritative feeding style (8,81), suggesting that this particular feeding style might produce beneficial dietary outcomes among children in various countries.

On the other hand, children in families exhibiting authoritarian, permissive/indulgent, and neglectful/uninvolved feeding styles were shown to have less healthy eating behaviors and negative health outcomes (5,76). Two systematic reviews have shown that feeding styles characterized by low parental responsiveness were linked to higher child BMI (7,9). In particular, authoritarian feeding styles were associated with unhealthy dietary intake and an increased risk of becoming overweight (5,76). A systematic review of 31 studies on responsive feeding in high-income countries suggests an association between restrictive and pressuring

feeding practices and unhealthy eating behaviors and child weight status. Moreover, indulgent feeding was positively related to children's BMIs and adiposity and negatively related to children's fruit and vegetable intake (7).

Some inconsistencies were found in the literature on the effects of different parental feeding styles, especially on the comparison of authoritative and authoritarian styles. Hoerr and colleagues (82) examined the influence of context-specific parental feeding styles on children's food intake. In contrast with the results of most studies, the findings showed that authoritarian feeding style was associated with better eating behaviors and more effective among low-income children and in families from diverse cultural backgrounds. Authoritarian feeding style was found most commonly in low-income African American and Hispanic parents whose children had lower BMI z-scores (7,10). In a study that specifically examined parenting and feeding practices among low-income minority populations, Hispanic parents were more likely than African American parents to be indulgent/permissive, whereas African American parents were more likely than Hispanic parents to be uninvolved/neglectful (10). These findings suggest the influence of culture and poverty on feeding styles and practices.

Despite these inconsistencies, the majority of evidence from studies conducted in various countries supported the association between authoritative parental approaches and children's healthy eating behaviors and potential obesity-preventive effects. Hence, incorporating authoritative parenting practices in interventions may be an effective way to prevent childhood obesity, and these types of parenting practices were presented in the *HCHF* curriculum.

Existing Interventions in SNAP-Ed Toolkit

As a program that supports nutrition education and obesity prevention interventions, SNAP-Ed delivers educational interventions to low-income populations broadly (15). The SNAP-Ed Toolkit includes obesity prevention interventions for SNAP-Ed implementing agencies in all states and was developed with the goal of helping people eligible for SNAP make healthful nutrition and physical activity choices on a limited budget (17). It includes interventions and an evaluation framework, providing both SNAP-Ed and EFNEP with a useful way to find evidence-based interventions that can be used in programming. However, after searching for interventions targeting eating behaviors and physical activity in the 2016 SNAP-Ed Toolkit, only eight were found that are related to parents or caregivers. Only three of these interventions included feeding practices: one is a pilot study so there is only emerging evidence, another has only practice-based rather than research-tested evidence, and the last one is not developed for low-income audiences.

- *Color Me Healthy* is a research-tested intervention that focuses on increasing fruit and vegetable intake and physical activity in children. The intervention includes lessons for children and take-home materials for parents/caregivers to reinforce messages learned by children in the classroom (83). Parenting practices do not appear to be included.
- *Eat Well Play Hard in Child Care Settings* is a practice-tested intervention that focuses on promoting healthy food and activity choices in preschoolers and their parents/caregivers. Six lessons are available to both children and caregivers (84).

Although the intervention engages parents and children in a series of healthy activities, it

does not focus on parenting practices per se. The evaluation report indicates low parent participation, with only 31% attending at least one class (85).

- *Healthy Kindergarten Initiative* is a practice-tested intervention that focuses on educating children and parents/caregivers about improving food choices using local food (86). It provides opportunities for parents and children to engage in various activities but does not include parenting practices.
- *Mind, Exercise, Nutrition, Do it (MEND)* is a research-tested program that focuses on improving healthy behavior change in children and their families. Three program options are available for children of different ages (87). The 10-week curriculum supports active parental engagement, role modeling, and setting goals and rewards. Outcome evaluation reported that children in the intervention had significant decreases in waist circumference and BMI z-scores, compared to the control group (88). However, the program is not designed for low-income families due to the high cost of required learning materials (87).
- *Obesity Prevention Plus Parenting Support (OPPS)* is a pilot study that focused on improving nutrition and physical activity in American Indian mothers and their children. Lessons were delivered to low-income families in their homes (89). Participants in the obesity prevention plus parenting support condition that focused exclusively on improving parenting skills showed less restrictive child feeding behaviors over time than participants in the parenting support condition (90). This intervention seems to include parenting practices that are related to mealtime behaviors only.

- *PE-Nut* is a practice-tested program that targets students at school. It focuses on improving nutrition and physical activity by using a series of 30 lessons (91). Materials include take-home activities and parental engagement but do not seem to include parenting practices.
- *Text2BHealthy* is a research-tested, text message-based intervention that focuses on the promotion of healthy food choices and physical activity in elementary school children by sending text messages to their parents (92). Text messages aim to connect parents with the school and reinforce nutrition education for children, and do not appear to include supportive parenting practices.
- *Ways to Enhance Children's Activity and Nutrition (We Can!)* is a practice-tested national education program that focuses on promoting healthy weight among children by providing a variety of online resources to parents/caregivers and communities (93). Education materials support role modeling and parental engagements. A 2007 progress report showed improvements in parents' knowledge, attitudes, and behaviors related to healthy eating and physical activity (94).

Given the scarcity of interventions that aimed to improve eating behaviors and physical activity among low-income children by emphasizing the importance of parenting practices, the *HCHF* curriculum was therefore developed to address gaps in programming.

Introduction of the HCHF Curriculum

Healthy Children, Healthy Families: Parents Making a Difference! (HCHF), the curriculum in the present study, was created for a childhood obesity prevention program for low-income families, Collaboration for Health, Activity and Nutrition in Children's Environments (CHANCE) that was developed within EFNEP (19). Based on the weight of evidence on the importance of parenting to healthy eating and physical activity in children, developers of *HCHF* integrated parenting practices that are consistent with authoritative approaches into the curriculum.

The curriculum focuses on key modifiable behaviors that influence child weight by addressing six "Paths to Success," which include drinking water or milk instead of sweetened drinks, eating more vegetables and fruits, limiting high-fat and high-sugar foods, playing actively, limiting TV and computer time, and having sensible servings. It also involves parenting practices that promote healthy eating and physical activity at home. These four "Keys to Success" include showing (role modeling), supporting (helping children feel good about themselves), guiding (offering choices within limits), and shaping the home environment. *HCHF* is delivered by paraprofessional educators through eight weekly sessions (Table 1).

HCHF was extensively tested with iterative revisions (19). Process evaluation with staff and participant input were used to refine and guide the implementation of the program. Results from the practice-based evidence suggest that *HCHF* is a highly effective approach in integrating parenting and nutrition education for limited-resource audiences (20). Nonetheless, a randomized

controlled trial was needed to confirm the effectiveness of *HCHF* and provide research-tested evidence that would allow the curriculum to be adopted more broadly.

Table 1. Healthy Lifestyle and Parenting Content of HCHF Curriculum

Nutrition and Physical Activity	Week	Parenting Practice(s) Introduced*	Week
Taking healthy steps: goal-setting for behavior change	1	How parents can make a difference Firm & responsive (authoritative) parenting	1
Drinking water and low-fat milk instead of sweetened drinks - reducing “empty calories” - “go”, “slow” and “no” beverages - understanding labels	2	<i>Guiding: Offer choices within limits</i> - divide responsibility for eating and activity (parent provides healthy options, child chooses) - say what child <i>can</i> do, not what can’t do - make decisions together with child	2, 4, 7
Eating more vegetables and fruits - ways to increase consumption	3	<i>Showing: Teach by Example</i> - eat smart, play actively with your children	3
Playing actively - need for parents and children to increase physical activity - fun ways for families to be active together	4	<i>Supporting: Help children feel good about themselves</i> - positive feedback for desired behaviors - acknowledge and respect children’s feelings (even when need to limit their behavior)	1, 3
Eating fewer energy-dense foods - quick healthy meals & snacks at home; healthy choices for eating out	5	<i>Shaping: Make healthy choices easier</i> - change the home environment (e.g. availability and access to healthy food and activity options for children) - create family routines that help build healthy habits, including family meals - find solutions with other adults to support healthy changes at home and in other environments (e.g. Head Start, child care)	2, 5, 6
Limiting TV and computer time - reducing sedentary behavior - impact of media on children	6		
Sensible servings - smaller serving sizes - respond to internal satiety cues	7		
Review & healthy celebration	8	<i>Shaping</i> environments outside the home (e.g. schools, daycares, neighborhoods)	8

* Parenting practices are reinforced by applying to nutrition and activity situations in later sessions.

HCHF Design

The *HCHF* curriculum was designed based on two theories: Social Cognitive Theory (SCT) and Self-Determination Theory (SDT). According to SCT, individual behaviors are shaped by the social context, and learning involves the interaction of personal factors, environment, and behavior. Besides the acquisition of knowledge and skills, the development of self-efficacy is also an important component to behavior change in SCT (95). SDT, the second theoretical basis of *HCHF*, purports that maintenance of behavior change over time is largely influenced by motivation, which is closely related to one's autonomy and competence to change (96). In order to support participants' self-determined behaviors and confidence, *HCHF* encourages them to try new behaviors and make progress on the key behavioral objectives. By using a learner-centered dialogue approach that involves participants in discussions, hands-on activities, and role-plays during eight weekly sessions, *HCHF* allows them to learn and apply the behavioral objectives and skills (97). These workshops provide participants opportunities to practice skills and help them master the desired behaviors, thereby increasing their self-efficacy.

The socio-ecological model is also a part of *HCHF* (98). Although Figure 1 shown below is a simplified model, it illustrates how factors at different levels intersect. The multidimensional process exhibited in this simplified model allows parents to affect children's energy intake and expenditure; it can be used to better understand the *HCHF* curriculum. This conceptual model shows the interplay between the home and community environments outside the home and their influence on individual behaviors. More importantly, the model reveals the main pathways by

which parents influence children’s diet, physical activity, and weight by showing, supporting, and shaping environments. Thus, the socio-ecological approach used in the curriculum helps participants gain skills that promote healthful behaviors for themselves and their children and create environments that make healthy eating and physical activity more accessible (19).

Variables measured in the research are also included in the figure.

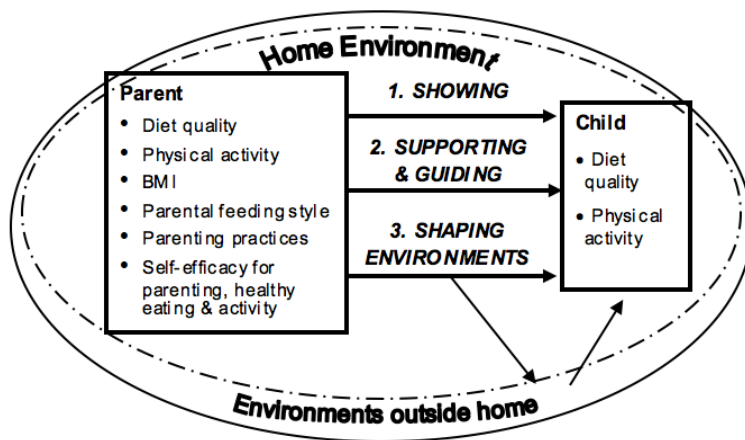


Figure 1. Simplified Model of Pathways of Parental Influence on Child Behaviors and Weight

The content of the *HCHF* parent education curriculum is described in Table 1. Each of the eight weekly sessions addresses one key nutrition and physical activity behavior and incorporates the application of parenting practices. In each 1.5-hour session, parents have the opportunity to taste a healthy recipe and participate in an active game they can play with their children at home (19).

METHODS

Objectives and Hypotheses

Objective 1. Assess the impacts of *HCHF* on how low-income parents enrolled in EFNEP use effective parenting practices to influence children's healthy eating and active play behavior, as compared to a delayed intervention control group.

Hypothesis 1.1. Parenting practices and self-efficacy will improve more in *HCHF* than in the control group.

Hypothesis 1.2. Parent diet quality and physical activity will improve more in *HCHF* than in the control group.

Hypothesis 1.3. Child diet quality and physical activity will improve more in *HCHF* than in the control group.

Objective 2. Investigate parents' retention of changes in parenting practices and their influence on child diet quality and physical activity when assessed up to 18 weeks after *HCHF* sessions have ended.

Hypothesis 2.1 Parenting practices and self-efficacy assessed immediate post-education will be retained.

Hypothesis 2.2 Parent diet quality and physical activity assessed immediate post-education will be retained.

Hypothesis 2.3. Child diet quality and physical activity assessed immediate post-education will be retained.

Settings and Participants

The study was conducted between January 2017 and December 2018 at Head Start programs in New York City (NYC), which are usual delivery sites for EFNEP. Participants were recruited by program staff. Low-income parents or caregivers were eligible to participate if they had young children 3-5 years old at the time of enrollment. Most participants had incomes below the Federal poverty level.

Intervention sites were chosen to include half English-speaking and half Spanish-speaking participants. All 11 sites in the study were Head Start programs, two of which were *EarlyLearn NYC* Head Start. Head Start is a program that offers early childhood education and parent involvement services to low-income families (99). *EarlyLearn NYC* is a type of Head Start that is contracted with New York City to provide Child Care as well as Head Start services to families eligible for subsidized care (100).

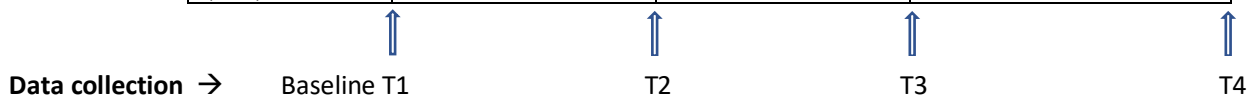
At each of four data collection points, participants received cash incentives with increasing amounts (\$20, 30, 40, 50) at each point. Graduation certificates were also given to participants upon their completion of the 8-week education program, as an additional incentive for many EFNEP participants. Participants must have attended at least six out of eight sessions to receive graduation certificates.

Study Design

This study was designed to be implemented over three 9-week periods as a two-group randomized controlled trial with cross-over design (Table 2). Participants at each site were randomly assigned to either immediate education (IE) or delayed education (DE). Assignment occurred after participants completed surveys at baseline by drawing cards from a hat. The intervention was a series of 8-week *HCHF* education workshops.

In order to diminish seasonal effects, each IE group was paired in time with a DE group from the same site. In period 1, the IE group received *HCHF* education, and the DE group received no education, serving as the control. In periods 2 and 3, the IE group received no intervention and was followed longitudinally to assess retention of behavior change over eighteen weeks after the completion of *HCHF* education. The DE group received *HCHF* education only in period 2 and was then followed longitudinally in period 3 to allow an assessment of retention of behavior change over 9 weeks.

Groups	Period 1 (9 wks)	Period 2 (9 wks)	Period 3 (9 wks)
Immediate Education (IE)	<i>HCHF</i>	18-week longitudinal follow-up	
Delayed Education (DE)	Control	<i>HCHF</i>	9-week longitudinal follow-up



Intervention

The intervention was an 8-week series of *HCHF* sessions, delivered by trained paraprofessional community nutrition educators who had experience delivering EFNEP and *HCHF*. The curriculum was designed to be appropriate and engaging for low-income families and available in both English and Spanish. Educators delivering the education were fluent in the language of a given group and familiar with the specified Head Start sites.

Data Collection

Data were collected from parents/caregivers at T1, T2, T3 and T4 (Table 2). To limit social desirability bias in the response provided by participants, data were collected by Cornell University Cooperative Extension (CUCE) NYC data collection staff instead of the educators who taught the class. Before administering the survey, a consent form was given to participants and read by the data CUCE data staff. Each question on the survey was read aloud by staff to ensure that participants understood the questions and allow time for the them to mark their answers. Several staff were available during data collection to assist and answer participants' questions. Food models of the serving sizes were also provided to help participants complete the relevant survey questions.

This study was approved by Cornell University's Institutional Review Board for Human Participants.

Study Instrument

Data were self-reported and collected at each time point. Demographics characteristics (i.e. age, gender, pregnancy status, nursing status, race, ethnicity, employment status, number of jobs, household income, poverty level, education, household status, number of children, and number of other adults) were assessed upon enrollment and the end of period 3 (T4). To determine the poverty level of participants' in the study, their annual household income was compared to specific poverty cutoffs based on the Federal Poverty Guidelines of 2017 and 2018 for their household size (total number of individuals living in a household). Because participants' household income was reported as income ranges in the survey, which cannot be compared to poverty cutoffs, the mean of the income ranges was used to allow for comparisons with poverty cutoffs.

Validated measures used for data collection included the 16-item *HCHF* Behavior Checklist, developed for use with *HCHF* (101). Complementary measures that assessed parental self-efficacy for obesity prevention behaviors, parenting practices, food behaviors in parents and children, and food security were combined to form the study instrument. The final instrument was available in both English and Spanish.

The study instrument was comprised of six sections, including sixty-eight items (See Appendix B). The 6 sections were organized in the following order: *HCHF* Behavior Checklist (16 items), Parental self-efficacy for obesity prevention related behaviors (4 items), Comprehensive Feeding Practices Questionnaire (24 items), Food Behavior Checklist (13 items), Child Food and

Beverage Intake Questionnaire (5 items), Food Security Survey Module (6 items). Food Security (section 6) was only assessed at T1 and T4 whereas other sections were included at each time point. The six sections of the study instrument and how each was validated are described below:

- The *HCHF Behavior Checklist* was developed to assess change in parents' and children's key behaviors addressed by *HCHF* using EFNEP's internal evaluation system (101). This brief instrument was comprised of 16 items based on *HCHF* objectives to ensure low respondent burden. Items covered parent and child intake of foods including vegetables, fruits, low-fat dairy, soda and energy-dense foods or sweets, physical activity, and parental feeding practices. The behavior checklist was reviewed and revised by an expert panel of nutrition and parenting professionals. Cognitive testing and field testing were performed to further refine the instrument, which was found to be feasible and acceptable to use in the program. The checklist had good test-retest reliability ($r = 0.83$) and convergent validity with more in-depth and validated measures of adult and child dietary intake, physical activity and parental modeling (101). However, the behavior checklist has not been validated against actual behaviors or biological markers. Additionally, most items in the checklist assessed discrete behaviors, rather than being a part of multi-item scales, because of the need for brevity and simplicity to keep respondent burden low within the program context (101). Therefore, complementary validated measures were included in the study instrument to ensure outcomes with the *HCHF Behavior Checklist* converge with more detailed, validated measures.

- *Parental self-efficacy for obesity prevention related behaviors* was assessed using an instrument that focused on parents' confidence for helping their children with behaviors related to physical activity, fruit and vegetable consumption, sugary drinks, and fruit juice. Items were selected and refined based on input from experts and parents. Exploratory and confirmatory factor analyses were performed to further revise the instrument. Construct validity was assessed by comparing the child's behavior reported by parents with the self-efficacy scales. Correlations were significant for all recommended behaviors ranging from 0.13 - 0.29, and the instrument was found to have good test-retest reliability ($r > 0.8$) and internal consistency ($\alpha > 0.8$) (102). The instrument consisted of 4 scales (16 items), of which 4 items were included in the *HCHF* study instrument. These were chosen to match HCHF and still keep the study instrument as brief as possible.
- The *Comprehensive Feeding Practices Questionnaire* is a measure of parental feeding practices of young children. Instrument development underwent a total of three studies. Items were created and validated based on review of literature and input from parents. Factor analyses were performed, suggesting that the items formed coherent scales. Internal consistency for most of the scales was moderate to high, ranging from 0.58 – 0.81. The resulting instrument contained 12 subscales, of which 6 (24 items) were used in the study instrument. In line with the objectives of *HCHF*, the 24 items covered a variety of parents' feeding behaviors: allowing the child to control eating, encouraging consumption of well-balanced and varied foods, using food as a reward for child

behavior, modeling of healthy eating, pressuring the child to consume more food at meals, and making healthy foods available in the home (103).

- The *Food Behavior Checklist* is a 39-item instrument developed to assess food behaviors among low-literacy and low-income participants in EFNEP and SNAP-Ed. The instrument was validated using a biological measure (serum carotenoid levels) as a marker of fruit and vegetable intake. Correlations were significant between serum carotenoid levels and fruit and vegetable items and overall diet quality, ranging from 0.27 - 0.48. Convergent validity was assessed using multiple 24-hour dietary recalls, which also showed significant correlations, although many of the correlations were low (less than 0.3) (104). Two scales (13 items) that were most relevant to *HCHF* were used from the checklist. A 9-item scale measured fruit and vegetable behaviors, and a 4-item scale assessed overall diet quality, including the use of food labels and behaviors related to sugar-sweetened beverages.
- The *Child Food and Beverage Intake Questionnaire* is a brief 10-item instrument developed to assess parent-reported intake of fruits, vegetables, and sweetened foods and beverages among children 2 to 4 years old. Reliability was assessed by comparing the questionnaire results at 2 time points. Correlations ranged from 0.48 - 0.87, indicating good test-retest reliability. Three 24-hour recalls were used to assess validity of each item, which had moderate to strong correlations ranging from 0.15 - 0.59 (105). Five items from the questionnaire were used in the present study to assess children's consumption frequency per day of sweetened foods and beverages.

- The 6-item *USDA Food Security Survey Module* was developed by the National Center for Health Statistics to assess households' food security status. Although this short survey did not measure the most severe range of household food insecurity (106), it provided additional demographic information about whether participants' food security changed over time.

Statistical Analyses

Demographics

Participant demographic characteristics were analyzed descriptively using R (version 1.0.153, RStudio, Inc., Boston MA). T-tests for continuous variables and chi-square tests or Fisher's exact tests for categorical variables were performed to compare demographic differences between: (1) year 1 and year 2; (2) IE and DE groups; (3) English-speaking sites and Spanish-speaking sites; and (4) T1 and T4 time points. Significance level was set at $p < 0.05$.

Behavioral Outcomes

Data were analyzed using SAS (version 9.4, SAS Institute Inc., Cary, NC). Principal Component Analysis was conducted to identify constructs within the study instrument, allowing for analyses of these data. Internal consistency for each scale was measured with Cronbach's alpha. Analyses of behavior change and retention of behavior change used the mean scores (the sum of the response scores divided by the number of items) for each scale.

Behavior Change

Behavior change in *HCHF* participants from baseline (T1) to post-education (T2) was assessed to determine the impacts of *HCHF*. To assess whether the behavioral results for IE and DE groups in year 1 differed from those in year 2, values for IE groups in year 1 were compared to those in year 2 using t-tests, and values for DE groups in year 1 were compared to those in year 2 using t-tests. Most importantly, the change from baseline (T1) to post-education (T2) for the IE (intervention) groups was compared to the change from baseline to pre-education (T2) for the DE (control) groups in both years using paired t-tests, determining individual behavior change in *HCHF* participants.

Retention of Behavior Change

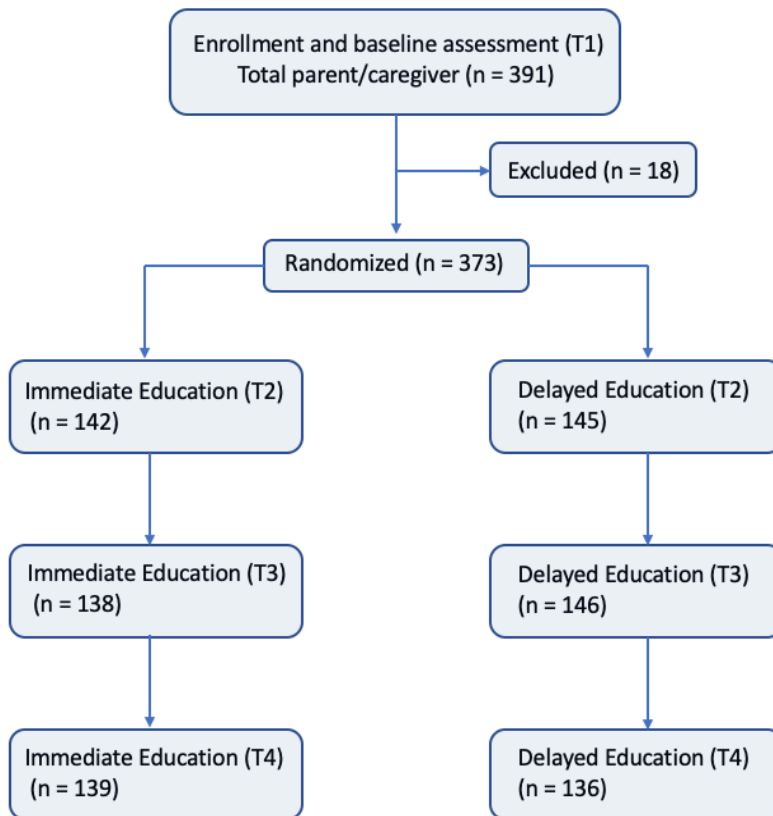
The retention of behavior change was assessed by comparing the T3 and T4 results to the T2 results for the IE groups and comparing the T4 results to the T3 results for the DE groups using paired t-tests. Behavior change from T2 to T3 for the IE groups was compared to behavior change from T3 to T4 for the DE groups to compare retention of behavior change in both groups. Moreover, post-education (T2) scores for the IE groups were compared to T3 scores for DE groups to determine the extent to which immediate post-education behaviors were similar.

Regression analyses were performed to determine the influence of covariates, such as the educators, the sites, and demographic characteristics, on the behavioral outcomes and control for confounding. Specifically, a Mixed Methods GLMSELECT procedure was conducted, which performs effect selection in the framework of general linear models and enables selection from a

large number of effects (107). The association between the number of lessons completed by participants and behavioral outcomes was also assessed to determine if a dose response relationship existed.

RESULTS

Throughout the 2-year program period, a total of 391 participants were recruited from 11 EFNEP sites and completed the baseline (T1) surveys (Figure 2). Eighteen participants were excluded from the study because their children were not in the age range of 3-5 years. At the end of period 3 (T4), 275 participants remained and completed the surveys. Eight of the 11 Head Starts were included in year 1 (2017) and 9 were included in year 2 (2018) because of insufficient number of participants in some of the sites in year 2.



*A total of 221 parents/caregivers participated in all 4 time points.

Figure 2. CONSORT flowchart of the *HCHF* intervention

Demographics

HCHF participants were aged 20-74 years, primarily female and approximately two thirds were Hispanic. The number of participants in Spanish-speaking sites was higher than that in English-speaking sites at T1 and T4 in both years (Tables A5-6). The majority of participants were either unemployed or part-time workers and had income levels below 185% of poverty. Fewer than half of the participants had more than a high school education (Table A1-2). Number of lessons completed by IE and DE participants is shown in Table 3.

Table 3. Number of lessons completed by *HCHF* participants

Participants, n	Number of lessons, n													
	0	1	2	3	4	4.5	5	5.5	5.75	6	6.25	7	8	Total
Immediate Education	15	13	9	7	12	1	19	0	1	43	1	40	34	195
Delayed Education	50	14	6	11	12	0	11	1	0	28	0	31	32	196
Total	65	27	15	18	24	1	30	1	1	71	1	71	66	391

*Number of lessons in a fraction means that those participants arrived late or left early so they had only a fraction of the lesson

Table A1. Baseline (T1) characteristics of *HCHF* participants by IE/DE group in 2017 and 2018

Characteristic, n (%)	Overall (n=373)	Immediate Education Group (n=185)	Delayed Education Group (n=188)	<i>P</i> value¹
Age of target child, yr (mean [SD])	3.57 ± 0.58	3.58 ± 0.56	3.55 ± 0.60	0.49*
Age of parent/caregiver, yr (mean [SD])	35.91 ± 9.65	36.64 ± 10.21	35.18 ± 9.03	0.14
Gender				1
Female	346 (92.8)	172 (93.0)	174 (92.6)	
Male	27 (7.2)	13 (7.0)	14 (7.4)	
Pregnancy status				0.11*
No	355 (95.2)	173 (93.5)	182 (96.8)	
Yes	14 (3.8)	8 (4.3)	6 (3.2)	
Not reported	4 (1.1)	4 (2.2)	0	
Nursing status				0.04*
No	325 (87.1)	162 (87.6)	163 (86.7)	
Yes	40 (10.7)	16 (8.6)	24 (12.8)	
Not reported	8 (2.1)	7 (3.8)	1 (0.5)	
Planning to nurse				0.31*
No	351 (94.1)	172 (93.0)	179 (95.2)	
Yes	16 (4.3)	8 (4.3)	8 (4.3)	
Not reported	6 (1.6)	5 (2.7)	1 (0.5)	
Race				0.51*
American Indian	2 (0.5)	2 (1.1)	0	
Asian/Pacific Islander	3 (0.8)	0	3 (1.6)	
Black	101 (27.1)	50 (27.0)	51 (27.1)	
Mixed Race	52 (13.9)	25 (13.5)	27 (14.4)	
Other	205 (55.0)	103 (55.7)	102 (54.3)	
White	10 (2.7)	5 (2.7)	5 (2.7)	
Ethnicity				0.61*
Hispanic	239 (64.1)	122 (65.9)	117 (62.2)	
Non-Hispanic	128 (34.3)	61 (33.0)	67 (35.6)	
Not reported	6 (1.6)	2 (1.1)	4 (2.1)	

Employment Status				0.58*
Unemployed	268 (71.8)	137 (74.1)	131 (69.7)	
Part time	67 (18.0)	30 (16.2)	37 (19.7)	
Full time	37 (9.9)	17 (9.2)	20 (10.6)	
Missing data	1 (0.3)	1 (0.5)	0	
Number of jobs				0.56*
0	268 (72.2)	137 (74.5)	131 (70.1)	
1	95 (25.6)	44 (23.9)	51 (27.3)	
>1	8 (2.2)	3 (1.6)	5 (2.7)	
Household income				0.98
<\$900/month	124 (33.2)	63 (34.1)	61 (32.4)	
\$901 - \$1400/month	112 (30.0)	55 (29.7)	57 (30.3)	
\$1401 - \$1900/month	55 (14.7)	29 (15.7)	26 (13.8)	
\$1901 - \$2400/month	28 (7.5)	13 (7.0)	15 (8.0)	
>\$2400/month	44 (11.8)	20 (10.8)	24 (12.8)	
Not reported	10 (2.7)	5 (2.7)	5 (2.7)	
Poverty level				0.47*
< FPL	300 (88.5)	154 (90.1)	146 (86.9)	
1 – 1.35 FPL	25 (7.4)	10 (5.8)	15 (8.9)	
1.35 – 1.85 FPL	10 (2.9)	4 (2.3)	6 (3.6)	
>1.85 FPL	4 (1.2)	3 (1.8)	1 (0.6)	
Education				0.91*
Less than high school education	128 (34.3)	62 (33.5)	66 (35.1)	
High school graduate/GED	100 (26.8)	51 (27.6)	49 (26.1)	
More than high school education	144 (38.6)	71 (38.4)	73 (38.8)	
Not reported	1 (0.3)	1 (0.5)	0	
Household status (families living with children <18 y)				0.59
No	13 (3.5)	5 (2.7)	8 (4.3)	
Yes	360 (96.5)	180 (97.3)	180 (95.7)	
Number of children				0.09
1	87 (24.2)	43 (23.9)	44 (24.4)	

2	135 (37.5)	61 (33.9)	74 (41.1)	
3	84 (23.3)	40 (22.2)	44 (24.4)	
4	29 (8.1)	18 (10.0)	11 (6.1)	
>4	25 (6.9)	18 (10.0)	7 (3.9)	
Household status (families living with other adults)				0.26
No	87 (23.3)	38 (20.5)	49 (26.1)	
Yes	286 (76.7)	147 (79.5)	139 (73.9)	
Number of other adults				0.1*
1	177 (62.5)	93 (63.7)	84 (61.3)	
2	53 (18.7)	21 (14.4)	32 (23.4)	
3	33 (11.7)	19 (13.0)	14 (10.2)	
4	9 (3.2)	4 (2.7)	5 (3.6)	
>4	11 (3.9)	9 (6.2)	2 (1.5)	

¹*P* values with an asterisk were calculated using the Fisher's exact tests; *p* values without an asterisk were calculated using t-tests and chi-squares for continuous and categorical variables, respectively.

Table A2. Characteristics of HCHF participants (T4) by IE/DE group in 2017 and 2018

Characteristic, n (%)	Overall (n=275)	Immediate Education Group (n=139)	Delayed Education Group (n=136)	<i>P</i> value ¹
Age of target child, yr (mean [SD])	4.09 ± 0.70	4.12 ± 0.70	4.06 ± 0.70	0.79*
Age of parent/caregiver, yr (mean [SD])	36.15 ± 8.79	36.53 ± 9.06	35.76 ± 8.52	0.47
Gender				0.96
Female	256 (93.1)	130 (93.5)	126 (92.6)	
Male	19 (6.9)	9 (6.5)	10 (7.4)	
Pregnancy status				0.5*
No	266 (96.7)	133 (95.7)	133 (97.8)	

Yes	9 (3.3)	6 (4.3)	3 (2.2)	
Nursing status				0.32
No	256 (93.1)	132 (95.0)	124 (91.2)	
Yes	19 (6.9)	7 (5.0)	12 (8.8)	
Planning to Nurse				0.33*
No	265 (96.4)	132 (95.0)	133 (97.8)	
Yes	10 (3.6)	7 (5.0)	3 (2.2)	
Race				0.77*
American Indian	2 (0.7)	2 (1.4)	0	
Asian/Pacific Islander	1 (0.4)	0	1 (0.7)	
Black	72 (26.2)	35 (25.2)	37 (27.2)	
Mixed Race	40 (14.5)	19 (13.7)	21 (15.4)	
Other	153 (55.6)	79 (56.8)	74 (54.4)	
White	7 (2.5)	4 (2.9)	3 (2.2)	
Ethnicity				0.15*
Hispanic	175 (63.6)	94 (67.6)	81 (59.6)	
Non-Hispanic	99 (36.0)	44 (31.7)	55 (40.4)	
Not reported	1 (0.4)	1 (0.7)	0	
Employment status				0.74*
Unemployed	184 (66.9)	94 (67.6)	90 (66.2)	
Part Time	58 (21.1)	31 (22.3)	27 (19.9)	
Full Time	30 (10.9)	13 (9.4)	17 (12.5)	
Not reported	3 (1.1)	1 (0.7)	2 (1.5)	
Number of jobs				0.39*
0	184 (67.2)	94 (68.1)	90 (66.2)	
1	78 (28.5)	36 (26.1)	42 (30.9)	
>1	12 (4.4)	8 (5.8)	4 (2.9)	
Household income				0.52
<\$900/month	89 (32.4)	42 (30.2)	47 (34.6)	
\$901 - \$1400/month	69 (25.1)	41 (29.5)	28 (20.6)	
\$1401 - \$1900/month	45 (16.4)	23 (16.5)	22 (16.2)	
\$1901 - \$2400/month	27 (9.8)	12 (8.6)	15 (11.0)	
>\$2400/month	45 (16.4)	21 (15.1)	24 (17.6)	
Poverty level				0.24*
<FPL	211 (81.2)	112 (84.2)	99 (78.0)	
1-1.35 FPL	27 (10.4)	10 (7.5)	17 (13.4)	

1.35-1.85 FPL	15 (5.8)	9 (6.8)	6 (4.7)	
>1.85 FPL	7 (2.7)	2 (1.5)	5 (3.9)	
Education				0.85
Less than high school education	95 (34.5)	48 (34.5)	47 (34.6)	
High school graduate/GED	77 (28.0)	37 (26.6)	40 (29.4)	
More than high school education	103 (37.5)	54 (38.8)	49 (36.0)	
Household status (families living with children <18 y)				1*
No	8 (2.9)	4 (2.9)	4 (2.9)	
Yes	267 (97.1)	135 (97.1)	132 (97.1)	
Number of children				0.41*
1	54 (20.1)	27 (20.0)	27 (20.3)	
2	112 (41.8)	53 (39.3)	59 (44.4)	
3	66 (24.6)	32 (23.7)	34 (25.6)	
4	24 (9.0)	14 (10.4)	10 (7.5)	
>4	12 (4.5)	9 (6.7)	3 (2.3)	
Household status (families living with other adults)				0.8
No	78 (28.4)	38 (27.3)	40 (29.4)	
Yes	197 (71.6)	101 (72.7)	96 (70.6)	
Number of other adults				0.6*
1	112 (56.9)	59 (58.4)	53 (55.2)	
2	49 (24.9)	24 (23.8)	25 (26.0)	
3	22 (11.2)	11 (10.9)	11 (11.5)	
4	9 (4.6)	3 (3.0)	6 (6.2)	
>4	5 (2.5)	4 (4.0)	1 (1.0)	

¹P values with an asterisk were calculated using the Fisher's exact tests; p values without an asterisk were calculated using t-tests and chi-squares for continuous and categorical variables, respectively.

Comparison between IE and DE groups

At baseline (T1), nursing status in the two years combined ($p=0.04$) and the number of other adults in year 1 ($p=0.01$) were significantly different between IE and DE groups. At T4, the only significant difference was in year 1 for planning to nurse ($p=0.046$). No other demographic differences were observed between IE and DE groups at baseline or T4 (Tables A1-2, See Tables A1.1-1.2, A2.1-2.2 in Appendix A for detailed information). Although small differences were reported between IE and DE groups, they are not likely to impact the study outcomes.

Comparison between 2017 and 2018

Compared to year 1, children of participants at T1 were significantly younger in year 2 ($p=0.03$). At T1 in year 2, more participants were living with children younger than 18 years ($p=0.048$) and other adults ($p=0.02$); the number of children living with the participants was also significantly different.

Comparisons of demographic characteristics at T4 between year 1 and year 2 showed a significant difference in race ($p=0.02$), with the proportion of Black participants being higher in year 1 (See Tables A3-4 in Appendix A).

Baseline differences between the two years are not likely to have an influence on study outcomes, but the difference in race at T4 between the two years might have a potential impact on the behavioral outcomes, and will need to be included as covariates in the regression analyses.

Comparison between English-Speaking and Spanish-Speaking Sites

More variations were observed in the comparisons of demographics between English-speaking and Spanish-speaking sites. As expected, race and ethnicity were significantly different in both years. At baseline, demographic differences also included household income, poverty level, education and household status (living with children <18 y) in the two years combined. At T4, in addition to the differences mentioned above, age of target child, gender, employment status, and number of jobs were significantly different in the two years combined (See Tables A5-6 in Appendix A).

At baseline, more than half of the participants in English-speaking sites at baseline were Black (62.6% in year 1, 57.9% in year 2), compared to none in Spanish-speaking sites; more participants were categorized into “other” race in Spanish-speaking sites ($p < 0.001$) because most Hispanic/Latino participants reported “other” race in the survey as their ethnicity. As expected, significantly more Hispanic participants were observed in Spanish-speaking sites ($p < 0.001$) in both years (See Tables A5.1-5.2 in Appendix A for detailed information).

In year 1 specifically, in addition to the differences mentioned above, household income, poverty level, education, and household status (living with other adults) were significantly different at baseline. Participants in Spanish-speaking sites had lower household incomes ($p = 0.003$) and more of them had incomes lower than the poverty level ($p = 0.046$). Further, a significantly higher proportion of participants in Spanish-speaking sites had less than high school education, whereas a higher proportion of participants in English-speaking sites had more than high school education

($p < 0.001$). More Spanish-speaking participants were living with other adults ($p = 0.006$). In year 2, significant differences were also observed in employment status, number of jobs, and education. Fewer participants in English-speaking sites were unemployed ($p = 0.04$) and had less than a high school education ($p < 0.001$); more participants in English-speaking sites had at least 1 job ($p = 0.03$).

At T4, demographic differences with respect to race, ethnicity, employment status, number of jobs, household income, poverty level, education, and household status (living with other adults) were similar to those at baseline. However, more female participants were observed in Spanish-speaking sites in year 1, and children of Spanish-speaking participants were significantly older in year 2 (See Tables A6.1-6.2 in Appendix A for detailed information).

In summary, the demographic differences between English-speaking and Spanish-speaking sites, especially those related to race/ethnicity and socioeconomic status (employment status, number of jobs, household income, poverty level, education) could potentially influence the behavioral outcomes and the effectiveness of *HCHF*. Therefore, these variables will be used as covariates in regression analyses.

Comparison between T1 and T4

The comparison of demographic characteristics between T1 and T4 participants in the two years showed significant differences in the age of the target child, nursing status, and household

income (See Table A7 in Appendix A). Children of participants were significantly older at T4 ($p < 0.001$), as expected. More participants at T4 had higher household incomes ($p = 0.02$).

The differences in child age and nursing status between baseline and T4 are not likely to affect the study outcomes. However, the difference in household income may suggest a difference in the duration of an individual's participation in the intervention (108,109). Participants with lower incomes might encounter more barriers (e.g. time, work, transportation, etc.) that affect their participation in the intervention and thereby the outcome results.

Future Analyses

Future analyses include assessing the impacts of *HCHF* on the IE groups as compared to the DE groups and the retention of behavior change for up to eighteen weeks after the education intervention for the IE group and nine weeks for the DE group. The demographic results will be taken into account in the regression analyses to determine if they are covariates that need to be controlled for.

Objective 1: Assess the impacts of *HCHF* on the IE groups compared to the DE groups

1. Behavioral results of IE in year 1 will be compared to year 2, and behavioral results of DE in year 1 will be compared to year 2 to determine if behaviors for both IE and DE groups are similar in the two years.
2. The impacts of *HCHF* will be assessed by comparing the behavior change from T1 to T2 for IE groups to that for DE groups in year 1 and year 2, respectively. It is expected that no

significant difference will be observed in the DE groups whereas the IE groups will demonstrate significant behavior changes.

Objective 2: Assess the retention of change in behavior for up to 18 weeks

1. T3 and T4 results will be compared to T2 results for the IE groups, and T4 results will be compared to T3 results for the DE groups to assess retention of behavior change in both IE and DE groups after the education intervention.
2. Retention of behavior change in both groups will be compared by comparing the behavior change from T2 to T3 for the IE groups to the behavior change from T3 to T4 for the DE groups.
3. Behavioral results at T2 for the IE groups will be compared to behavioral results at T3 for the DE groups to assess participants' behavior immediately after the intervention. It is expected that there will be no significant difference in post-intervention behavior between the two groups.

DISCUSSION

Understanding the overall demographics of the sample, plus the differences in demographics between various groups (IE vs. DE groups, English-speaking vs. Spanish-speaking sites, T1 vs. T4, year 1 vs. year2) is important to fully assess the impacts of *HCHF* because differences in demographic characteristics may impact the outcomes of the intervention. Most importantly, demographic differences between IE and DE groups will influence future interpretation of the impacts of the intervention on participants and how these are reported.

As expected, comparisons of English-speaking and Spanish-speaking sites showed significant differences with respect to race and ethnicity. A large portion of the participants in Spanish-speaking sites identified themselves as “other” race. These participants were primarily Hispanic/Latino because most of the countries of origin indicated by them as “other” race in the surveys were in Latin America. Moreover, African American participants were only observed in English-speaking sites. Similarly, significantly more non-Hispanic participants were seen in English-speaking sites. Including these differences in further data analyses will be important because it allows the assessment of the impact of these variables on behavioral outcomes.

When comparing English-speaking to Spanish-speaking sites, household income, poverty level, and education level were significantly different at both T1 and T4 in both years. Participants in Spanish-speaking sites had lower household income and education level, and a greater proportion of them had incomes lower than the Federal poverty level. This indicates that

participants in Spanish-speaking sites in the study exhibited lower socioeconomic status. Differences in household income and poverty level were also observed when comparing demographics at T1 to those at T4. More participants at T4 had incomes over \$1400/month and more of them were above the Federal poverty level. Although there is some evidence in the literature that people with higher socioeconomic status or education level were more likely to participate and remain in lifestyle and weight loss interventions (110–112), the association between income levels and participant retention in the study is not yet clear in the *HCHF* study. Thus, regression analyses should be conducted in the future to determine the association between participants' household income and their retention in the study.

Furthermore, significant differences with respect to employment status and number of jobs were found between English-speaking and Spanish-speaking sites. There were more unemployed participants in Spanish-speaking sites at T1 in year 2 and at T4 in year 1.

Overall, the majority of participants were females. Some studies have indicated that women were more likely to be caregivers and spend more time on caregiving tasks than men, which might explain the higher proportion of female participants in the study (113–115). In particular, the proportion of female participants was slightly higher in Spanish-speaking sites at T4 in year 1, compared to English-speaking sites.

The difference in the age of children between T1 and T4 can be explained by the period between the entry and exit time of the study. There was a small increase in the age of parents/caregivers

but the difference between the two time points was not statistically significant. One possible explanation is that in the statistical analysis, child age was treated as a categorical variable that is broken down by half year, whereas participant's age was a continuous variable that is broken down by one year. Thus, the small increase in participant's age was not significant.

Interestingly, significantly more participants in Spanish-speaking sites lived with other adults. This might be associated with culture, immigration, income, and/or marital status. Racial/ethnic minorities were observed to live in extended family households more often than whites. In particular, people of Hispanic/Latino origin were more likely to include older family members in the extended households (116,117). This provides a possible explanation for the observation that a higher proportion of Spanish-speaking participants were living with other adults. The number of other adults should be considered as a covariate when analyzing the intervention effects in the future.

For the whole population, a small number of participants indicated that they did not have children ages 18 or younger living with them. A possible explanation is that parents or caregivers who had children aged 3-5 were eligible to participate in the study so they were not necessarily living with the target children in the survey. For instance, these participants might be the grandparents or other relatives who were caring for the children. Therefore, it is unclear whether the participant was actually the parent of the target child in the survey. Nursing status was also found to be different between IE and DE groups and between T1 and T4. This might be due to the fact that breastfeeding is not a continuous activity in a woman's life.

Future Plans

Only demographic characteristics were reported in the current study, which is part of my thesis. Analyses of behavioral outcomes and the possible influence of demographics and other factors on these outcomes will be conducted by the research team in the future to assess behavior change in participants from baseline to post-education and retention of changes in behavior for up to eighteen weeks post-intervention. Other factors that might influence the intervention outcomes, such as demographic variables, will be included as covariates in the analyses to control for confounding.

The effectiveness of the *HCHF* intervention in educating low-income parents/caregivers and improving their parenting practices around food and physical activity choices will then be evaluated to provide research-tested evidence.

CONCLUSION

The purpose of this study was to test the effectiveness of the *HCHF* intervention under research conditions, which can determine whether the curriculum can be disseminated in EFNEP and SNAP-Ed programs nationwide. Results of the demographic analyses demonstrate differences with respect to nursing status and the number of other adults living with the participant between intervention (IE) and control (DE) groups. Nonetheless, no other significant differences were found when comparing IE to DE groups, which limits the influence of demographic characteristics on outcomes of the intervention. In future analyses, differences in behavioral outcomes between IE and DE groups will therefore be able to demonstrate the impacts of *HCHF*. However, demographic differences observed between English-speaking and Spanish-speaking sites might affect participants' behavioral outcomes. In particular, the difference in socioeconomic status might influence the effectiveness of *HCHF* on participants in different study sites. The outcome results will provide information about whether this parent-focused curriculum is effective in promoting parenting practices to influence children's healthy eating and active play behavior that are best aligned with positive health outcomes.

APPENDIX A

Table A1.1. Baseline (T1) characteristics of *HCHF* participants by IE/DE group in 2017

Characteristic, n (%)	Immediate Education Group (n=89)	Delayed Education Group (n=92)	<i>P</i> Value ¹
Age of target child, yr (mean [SD])	3.71 ± 0.57	3.60 ± 0.59	0.27*
Age of parent/caregiver, yr (mean [SD])	37.55 ± 10.11	35.85 ± 10.13	0.26
Gender			0.74
Female	80 (89.9)	85 (92.4)	
Male	9 (10.1)	7 (7.6)	
Pregnancy status			0.38*
No	83 (93.3)	89 (96.7)	
Yes	5 (5.6)	3 (3.3)	
Not reported	1 (1.1)	0	
Nursing status			0.56*
No	78 (87.6)	80 (87.0)	
Yes	8 (9.0)	11 (12.0)	
Not reported	3 (3.4)	1 (1.1)	
Planning to nurse			0.43*
No	82 (92.1)	88 (95.7)	
Yes	6 (6.7)	4 (4.3)	
Not reported	1 (1.1)	0	
Race			0.42*
American Indian	2 (2.2)	0	
Asian/Pacific Islander	0	2 (2.2)	
Black	28 (31.5)	29 (31.5)	
Mixed Race	15 (16.9)	10 (10.9)	
Other	42 (47.2)	48 (52.2)	
White	2 (2.2)	3 (3.3)	
Ethnicity			1*
Hispanic	54 (60.7)	55 (59.8)	
Non-Hispanic	33 (37.1)	35 (38.0)	
Not reported	2 (2.2)	2 (2.2)	
Employment status			0.28
Unemployed	67 (75.3)	67 (72.8)	

Part Time	10 (11.2)	17 (18.5)	
Full Time	12 (13.5)	8 (8.7)	
Number of jobs			0.67*
0	67 (75.3)	67 (72.8)	
1	21 (23.6)	25 (27.2)	
>1	1 (1.1)	0	
Household income			0.83*
<\$900/month	30 (33.7)	28 (30.4)	
\$901 - \$1400/month	31 (34.8)	29 (31.5)	
\$1401 - \$1900/month	11 (12.4)	15 (16.3)	
\$1901 - \$2400/month	4 (4.5)	8 (8.7)	
>\$2400/month	10 (11.2)	10 (10.9)	
Not reported	3 (3.4)	2 (2.2)	
Poverty level			0.89*
<FPL	74 (90.2)	72 (88.9)	
1-1.35 FPL	4 (4.9)	6 (7.4)	
1.35-1.85 FPL	3 (3.7)	3 (3.7)	
>1.85 FPL	1 (1.2)	0	
Education			0.76*
Less than high school education	31 (34.8)	32 (34.8)	
High school graduate/GED	21 (23.6)	26 (28.3)	
More than high school education	36 (40.4)	34 (37.0)	
Not reported	1 (1.1)	0	
Household status (families living with children <18 y)			0.33*
No	3 (3.4)	7 (7.6)	
Yes	86 (96.6)	85 (92.4)	
Number of children			0.09*
1	20 (23.3)	22 (25.9)	
2	22 (25.6)	30 (35.3)	
3	21 (24.4)	22 (25.9)	
4	10 (11.6)	8 (9.4)	
>4	13 (15.1)	3 (3.5)	
Household status (families living with other adults)			0.73
No	24 (27.0)	28 (30.4)	
Yes	65 (73.0)	64 (69.6)	
Number of other adults			0.01*

1	46 (70.8)	43 (68.3)
2	5 (7.7)	12 (19.0)
3	9 (13.8)	3 (4.8)
4	1 (1.5)	5 (7.9)
>4	4 (6.2)	0

¹*P* values with an asterisk were calculated using the Fisher's exact tests; *p* values without an asterisk were calculated using t-tests and chi-squares for continuous and categorical variables, respectively.

Table A1.2. Baseline (T1) characteristics of *HCHF* participants by IE/DE group in 2018

Characteristic, n (%)	Immediate Education Group (n=96)	Delayed Education Group (n=96)	<i>P</i> Value ¹
Age of target child, yr (mean [SD])	3.46 ± 0.52	3.51 ± 0.60	0.41*
Age of parent/caregiver, yr (mean [SD])	35.80 ± 10.28	34.54 ± 7.84	0.34
Gender			0.54*
Female	92 (95.8)	89 (92.7)	
Male	4 (4.2)	7 (7.3)	
Pregnancy status			0.41*
No	90 (93.8)	93 (96.9)	
Yes	3 (3.1)	3 (3.1)	
Not reported	3 (3.1)	0	
Nursing status			0.08*
No	84 (87.5)	83 (86.5)	
Yes	8 (8.3)	13 (13.5)	
Not reported	4 (4.2)	0	
Planning to nurse			0.4*
No	90 (93.8)	91 (94.8)	
Yes	2 (2.1)	4 (4.2)	
Not reported	4 (4.2)	1 (1.0)	
Race			0.49*

Asian/Pacific Islander	0	1 (1.0)	
Black	22 (22.9)	22 (22.9)	
Mixed Race	10 (10.4)	17 (17.7)	
Other	61 (63.5)	54 (56.2)	
White	3 (3.1)	2 (2.1)	
Ethnicity			0.35*
Hispanic	68 (70.8)	62 (64.6)	
Non-Hispanic	28 (29.2)	32 (33.3)	
Not reported	0	2 (2.1)	
Employment status			0.23*
Unemployed	70 (72.9)	64 (66.7)	
Part Time	20 (20.8)	20 (20.8)	
Full Time	5 (5.2)	12 (12.5)	
Missing data	1 (1.0)	0	
Number of jobs			0.42*
0	70 (73.7)	64 (67.4)	
1	23 (24.2)	26 (27.4)	
>1	2 (2.1)	5 (5.3)	
Household income			0.69*
<\$900/month	33 (34.4)	33 (34.4)	
\$901 - \$1400/month	24 (25.0)	28 (29.2)	
\$1401 - \$1900/month	18 (18.8)	11 (11.5)	
\$1901 - \$2400/month	9 (9.4)	7 (7.3)	
>\$2400/month	10 (10.4)	14 (14.6)	
Not reported	2 (2.1)	3 (3.1)	
Poverty level			0.55*
<FPL	80 (89.9)	74 (85.1)	
1-1.35 FPL	6 (6.7)	9 (10.3)	
1.35-1.85 FPL	1 (1.1)	3 (3.4)	
>1.85 FPL	2 (2.2)	1 (1.1)	
Education			0.53
Less than high school education	31 (32.3)	34 (35.4)	
High school graduate/GED	30 (31.2)	23 (24.0)	
More than high school education	35 (36.5)	39 (40.6)	
Household status (families living with children <18 y)			1*
No	2 (2.1)	1 (1.0)	

Yes	94 (97.9)	95 (99.0)	
Number of children			0.59*
1	23 (24.5)	22 (23.2)	
2	39 (41.5)	44 (46.3)	
3	19 (20.2)	22 (23.2)	
4	8 (8.5)	3 (3.2)	
>4	5 (5.3)	4 (4.2)	
Household status (families living with other adults)			0.26
No	14 (14.6)	21 (21.9)	
Yes	82 (85.4)	75 (78.1)	
Number of other adults			0.35*
1	47 (58.0)	41 (55.4)	
2	16 (19.8)	20 (27.0)	
3	10 (12.3)	11 (14.9)	
4	3 (3.7)	0	
>4	5 (6.2)	2 (2.7)	

¹*P* values with an asterisk were calculated using the Fisher's exact tests; *p* values without an asterisk were calculated using t-tests and chi-squares for continuous and categorical variables, respectively.

Table A2.1. Characteristics of *HCHF* participants (T4) by IE/DE group in 2017

Characteristic, n (%)	Immediate Education Group (n=63)	Delayed Education Group (n=71)	<i>P</i> Value ¹
Age of target child, yr (mean [SD])	4.20 ± 0.68	4.04 ± 0.74	0.34*
Age of parent/caregiver, yr (mean [SD])	37.38 ± 9.40	36.38 ± 8.90	0.53
Gender			0.82
Female	56 (88.9)	65 (91.5)	
Male	7 (11.1)	6 (8.5)	
Pregnancy status			0.34*
No	60 (95.2)	70 (98.6)	

Yes	3 (4.8)	1 (1.4)	
Nursing status			1*
No	59 (93.7)	67 (94.4)	
Yes	4 (6.3)	4 (5.6)	
Planning to nurse			0.046*
No	59 (93.7)	71 (100.0)	
Yes	4 (6.3)	0	
Race			0.42*
American Indian	2 (3.2)	0	
Asian/Pacific Islander	0	1 (1.4)	
Black	20 (31.7)	25 (35.2)	
Mixed Race	10 (15.9)	6 (8.5)	
Other	30 (47.6)	38 (53.5)	
White	1 (1.6)	1 (1.4)	
Ethnicity			0.43*
Hispanic	39 (61.9)	40 (56.3)	
Non-Hispanic	23 (36.5)	31 (43.7)	
Not reported	1 (1.6)	0	
Employment status			0.9*
Unemployed	42 (66.7)	44 (62.0)	
Part Time	13 (20.6)	18 (25.4)	
Full Time	7 (11.1)	8 (11.3)	
Not reported	1 (1.6)	1 (1.4)	
Number of jobs			0.35*
0	42 (67.7)	44 (62.0)	
1	17 (27.4)	26 (36.6)	
>1	3 (4.8)	1 (1.4)	
Household income			0.99
<\$900/month	17 (27.0)	21 (29.6)	
\$901 - \$1400/month	17 (27.0)	19 (26.8)	
\$1401 - \$1900/month	11 (17.5)	11 (15.5)	
\$1901 - \$2400/month	7 (11.1)	7 (9.9)	
>\$2400/month	11 (17.5)	13 (18.3)	
Poverty level			0.3*
<FPL	46 (78.0)	54 (83.1)	
1-1.35 FPL	5 (8.5)	7 (10.8)	
1.35-1.85 FPL	7 (11.9)	2 (3.1)	

>1.85 FPL	1 (1.7)	2 (3.1)	
Education			0.62
Less than high school education	21 (33.3)	23 (32.4)	
High school graduate/GED	15 (23.8)	22 (31.0)	
More than high school education	27 (42.9)	26 (36.6)	
Household status (families living with children <18 y)			1*
No	3 (4.8)	3 (4.2)	
Yes	60 (95.2)	68 (95.8)	
Number of children			0.47*
1	11 (18.3)	11 (15.9)	
2	22 (36.7)	26 (37.7)	
3	13 (21.7)	21 (30.4)	
4	8 (13.3)	9 (13.0)	
>4	6 (10.0)	2 (2.9)	
Household status (families living with other adults)			0.76
No	22 (34.9)	22 (31.0)	
Yes	41 (65.1)	49 (69.0)	
Number of other adults			0.47*
1	27 (65.9)	28 (57.1)	
2	9 (22.0)	10 (20.4)	
3	3 (7.3)	9 (18.4)	
4	1 (2.4)	2 (4.1)	
>4	1 (2.4)	0	

¹*P* values with an asterisk were calculated using the Fisher's exact tests; *p* values without an asterisk were calculated using t-tests and chi-squares for continuous and categorical variables, respectively.

Table A2.2. Characteristics of *HCHF* participants (T4) by IE/DE group in 2018

Characteristic, n (%)	Immediate Education Group (n=76)	Delayed Education Group (n=65)	<i>P</i> Value ¹
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Age of target child, yr (mean [SD])	4.06 ± 0.71	4.08 ± 0.67	0.81*
Age of parent/caregiver, yr (mean [SD])	35.83 ± 8.78	35.09 ± 8.09	0.61
Gender			0.41*
Female	74 (97.4)	61 (93.8)	
Male	2 (2.6)	4 (6.2)	
Pregnancy status			1*
No	73 (96.1)	63 (96.9)	
Yes	3 (3.9)	2 (3.1)	
Nursing status			0.11*
No	73 (96.1)	57 (87.7)	
Yes	3 (3.9)	8 (12.3)	
Planning to nurse			1*
No	73 (96.1)	62 (95.4)	
Yes	3 (3.9)	3 (4.6)	
Race			0.36*
Black	15 (19.7)	12 (18.5)	
Mixed Race	9 (11.8)	15 (23.1)	
Other	49 (64.5)	36 (55.4)	
White	3 (3.9)	2 (3.1)	
Ethnicity			0.32
Hispanic	55 (72.4)	41 (63.1)	
Non-Hispanic	21 (27.6)	24 (36.9)	
Employment status			0.21*
Unemployed	52 (68.4)	46 (70.8)	
Part Time	18 (23.7)	9 (13.8)	
Full Time	6 (7.9)	9 (13.8)	
Not reported	0	1 (1.5)	
Number of jobs			0.92*
0	52 (68.4)	46 (70.8)	
1	19 (25.0)	16 (24.6)	
>1	5 (6.6)	3 (4.6)	
Household income			0.15
<\$900/month	25 (32.9)	26 (40.0)	
\$901 - \$1400/month	24 (31.6)	9 (13.8)	
\$1401 - \$1900/month	12 (15.8)	11 (16.9)	
\$1901 - \$2400/month	5 (6.6)	8 (12.3)	

>\$2400/month	10 (13.2)	11 (16.9)	
Poverty level			0.09*
<FPL	66 (89.2)	45 (72.6)	
1-1.35 FPL	5 (6.8)	10 (16.1)	
1.35-1.85 FPL	2 (2.7)	4 (6.5)	
>1.85 FPL	1 (1.4)	3 (4.8)	
Education			0.98
Less than high school education	27 (35.5)	24 (36.9)	
High school graduate/GED	22 (28.9)	18 (27.7)	
More than high school education	27 (35.5)	23 (35.4)	
Household status (families living with children <18 y)			1*
No	1 (1.3)	1 (1.5)	
Yes	75 (98.7)	64 (98.5)	
Number of children			0.33*
1	16 (21.3)	16 (25.0)	
2	31 (41.3)	33 (51.6)	
3	19 (25.3)	13 (20.3)	
4	6 (8.0)	1 (1.6)	
>4	3 (4.0)	1 (1.6)	
Household status (families living with other adults)			0.47
No	16 (21.1)	18 (27.7)	
Yes	60 (78.9)	47 (72.3)	
Number of other adults			0.35*
1	32 (53.3)	25 (53.2)	
2	15 (25.0)	15 (31.9)	
3	8 (13.3)	2 (4.3)	
4	2 (3.3)	4 (8.5)	
>4	3 (5.0)	1 (2.1)	

¹*P* values with an asterisk were calculated using the Fisher's exact tests; *p* values without an asterisk were calculated using t-tests and chi-squares for continuous and categorical variables, respectively.

Table A3. Baseline (T1) characteristics of HCHF participants by 2017/2018

Characteristic, n (%)	2017 (n=181)	2018 (n=192)	P value¹
Age of target child, yr (mean [SD])	3.65 ± 0.58	3.48 ± 0.56	0.03*
Age of parent/caregiver, yr (mean [SD])	36.69 ± 10.13	35.17 ± 9.14	0.13
Gender			0.34
Female	165 (91.2)	181 (94.3)	
Male	16 (8.8)	11 (5.7)	
Pregnancy status			0.57*
No	172 (95.0)	183 (95.3)	
Yes	8 (4.4)	6 (3.1)	
Not reported	1 (0.6)	3 (1.6)	
Nursing status			1*
No	158 (87.3)	167 (87.0)	
Yes	19 (10.5)	21 (10.9)	
Not reported	4 (2.2)	4 (2.1)	
Planning to nurse			0.17*
No	170 (93.9)	181 (94.3)	
Yes	10 (5.5)	6 (3.1)	
Not reported	1 (0.6)	5 (2.6)	
Race			0.22*
American Indian	2 (1.1)	0	
Asian/Pacific Islander	2 (1.1)	1 (0.5)	
Black	57 (31.5)	44 (22.9)	
Mixed Race	25 (13.8)	27 (14.1)	
Other	90 (49.7)	115 (59.9)	
White	5 (2.8)	5 (2.6)	
Ethnicity			0.27*
Hispanic	109 (60.2)	130 (67.7)	
Non-Hispanic	68 (37.6)	60 (31.2)	
Not reported	4 (2.2)	2 (1.0)	
Employment status			0.29*
Unemployed	134 (74.0)	134 (69.8)	
Part Time	27 (14.9)	40 (20.8)	
Full Time	20 (11.0)	17 (8.9)	
Missing data	0	1 (0.5)	

Number of jobs			0.13*
0	134 (74.0)	134 (70.5)	
1	46 (25.4)	49 (25.8)	
>1	1 (0.6)	7 (3.7)	
Household income			0.87
<\$900/month	58 (32.0)	66 (34.4)	
\$901 - \$1400/month	60 (33.1)	52 (27.1)	
\$1401 - \$1900/month	26 (14.4)	29 (15.1)	
\$1901 - \$2400/month	12 (6.6)	16 (8.3)	
>\$2400/month	20 (11.0)	24 (12.5)	
Not reported	5 (2.8)	5 (2.6)	
Poverty level			0.57*
<FPL	146 (89.6)	154 (87.5)	
1-1.35 FPL	10 (6.1)	15 (8.5)	
1.35-1.85 FPL	6 (3.7)	4 (2.3)	
>1.85 FPL	1 (0.6)	3 (1.7)	
Education			0.92*
Less than high school education	63 (34.8)	65 (33.9)	
High school graduate/GED	47 (26.0)	53 (27.6)	
More than high school education	70 (38.7)	74 (38.5)	
Not reported	1 (0.6)	0	
Household status (families living with children <18 y)			0.048*
No	10 (5.5)	3 (1.6)	
Yes	171 (94.5)	189 (98.4)	
Number of children			0.04
1	42 (24.6)	45 (23.8)	
2	52 (30.4)	83 (43.9)	
3	43 (25.1)	41 (21.7)	
4	18 (10.5)	11 (5.8)	
>4	16 (9.4)	9 (4.8)	
Household status (families living with other adults)			0.02
No	52 (28.7)	35 (18.2)	
Yes	129 (71.3)	157 (81.8)	
Number of other adults			0.07*
1	89 (69.5)	88 (56.8)	
2	17 (13.3)	36 (23.2)	

3	12 (9.4)	21 (13.5)
4	6 (4.7)	3 (1.9)
>4	4 (3.1)	7 (4.5)

¹*P* values with an asterisk were calculated using the Fisher's exact tests; *p* values without an asterisk were calculated using t-tests and chi-squares for continuous and categorical variables, respectively.

Table A4. Characteristics of HCHF participants (T4) by 2017/2018

Characteristic, n (%)	2017 (n=134)	2018 (n=141)	<i>P</i> value ¹
Age of target child, yr (mean [SD])	4.11 ± 0.71	4.07 ± 0.69	0.42*
Age of paren/caregiver, yr (mean [SD])	36.85 ± 9.12	35.49 ± 8.45	0.2
Gender			
Female	121 (90.3)	135 (95.7)	0.12
Male	13 (9.7)	6 (4.3)	
Pregnancy status			1*
No	130 (97.0)	136 (96.5)	
Yes	4 (3.0)	5 (3.5)	
Nursing status			0.72
No	126 (94.0)	130 (92.2)	
Yes	8 (6.0)	11 (7.8)	
Planning to nurse			0.75*
No	130 (97.0)	135 (95.7)	
Yes	4 (3.0)	6 (4.3)	
Race			0.02*
American Indian	2 (1.5)	0	
Asian/Pacific Islander	1 (0.7)	0	
Black	45 (33.6)	27 (19.1)	
Mixed Race	16 (11.9)	24 (17.0)	
Other	68 (50.7)	85 (60.3)	
White	2 (1.5)	5 (3.5)	
Ethnicity			0.15*

Hispanic	79 (59.0)	96 (68.1)	
Non-Hispanic	54 (40.3)	45 (31.9)	
Not reported	1 (0.7)	0	
Employment status			0.75*
Unemployed	86 (64.2)	98 (69.5)	
Part Time	31 (23.1)	27 (19.1)	
Full Time	15 (11.2)	15 (10.6)	
Not reported	2 (1.5)	1 (0.7)	
Number of jobs			0.28*
0	86 (64.7)	98 (69.5)	
1	43 (32.3)	35 (24.8)	
>1	4 (3.0)	8 (5.7)	
Household income			0.72
<\$900/month	38 (28.4)	51 (36.2)	
\$901 - \$1400/month	36 (26.9)	33 (23.4)	
\$1401 - \$1900/month	22 (16.4)	23 (16.3)	
\$1901 - \$2400/month	14 (10.4)	13 (9.2)	
>\$2400/month	24 (17.9)	21 (14.9)	
Poverty level			0.8*
<FPL	100 (80.6)	111 (81.6)	
1-1.35 FPL	12 (9.7)	15 (11.0)	
1.35-1.85 FPL	9 (7.3)	6 (4.4)	
>1.85 FPL	3 (2.4)	4 (2.9)	
Education			0.76
Less than high school education	44 (32.8)	51 (36.2)	
High school graduate/GED	37 (27.6)	40 (28.4)	
More than high school education	53 (39.6)	50 (35.5)	
Household status (families living with children <18 y)			0.16*
No	6 (4.5)	2 (1.4)	
Yes	128 (95.5)	139 (98.6)	
Number of children			0.054*
1	22 (17.1)	32 (23.0)	
2	48 (37.2)	64 (46.0)	
3	34 (26.4)	32 (23.0)	
4	17 (13.2)	7 (5.0)	
>4	8 (6.2)	4 (2.9)	

Household status (families living with other adults)				0.14
No	44 (32.8)	34 (24.1)		
Yes	90 (67.2)	107 (75.9)		
Number of other adults				0.43*
1	55 (61.1)	57 (53.3)		
2	19 (21.1)	30 (28.0)		
3	12 (13.3)	10 (9.3)		
4	3 (3.3)	6 (5.6)		
>4	1 (1.1)	4 (3.7)		

¹*P* values with an asterisk were calculated using the Fisher's exact tests; *p* values without an asterisk were calculated using t-tests and chi-squares for continuous and categorical variables, respectively.

Table A5. Baseline (T1) characteristics of *HCHF* participants by English/Spanish speaking site in 2017 and 2018

Characteristic, n (%)	English (n=167)	Spanish (n=206)	<i>P</i> value ¹
Age of target child, yr (mean [SD])	3.52 ± 0.56	3.60 ± 0.59	0.53*
Age of parent/caregiver, yr (mean [SD])	36.54 ± 10.11	35.39 ± 9.24	0.25
Gender			0.08
Female	150 (89.8)	196 (95.1)	
Male	17 (10.2)	10 (4.9)	
Pregnancy status			0.85*
No	160 (95.8)	195 (94.7)	
Yes	5 (3.0)	9 (4.4)	
Not reported	2 (1.2)	2 (1.0)	
Nursing status			0.6*
No	147 (88.0)	178 (86.4)	
Yes	18 (10.8)	22 (10.7)	
Not reported	2 (1.2)	6 (2.9)	
Planning to nurse			0.56*
No	159 (95.2)	192 (93.2)	

Yes	5 (3.0)	11 (5.3)	
Not reported	3 (1.8)	3 (1.5)	
Race			<0.001*
American Indian	1 (0.6)	1 (0.5)	
Asian/Pacific Islander	3 (1.8)	0	
Black	101 (60.5)	0	
Mixed Race	28 (16.8)	24 (11.7)	
Other	31 (18.6)	174 (84.5)	
White	3 (1.8)	7 (3.4)	
Ethnicity			<0.001*
Hispanic	37 (22.2)	202 (98.1)	
Non-Hispanic	124 (74.3)	4 (1.9)	
Not reported	6 (3.6)	0	
Employment status			0.06*
Unemployed	112 (67.1)	156 (75.7)	
Part Time	32 (19.2)	35 (17.0)	
Full Time	23 (13.8)	14 (6.8)	
Missing data	0	1 (0.5)	
Number of jobs			0.1*
0	112 (67.1)	156 (76.5)	
1	50 (29.9)	45 (22.1)	
>1	5 (3.0)	3 (1.5)	
Household income			0.001
<\$900/month	49 (29.3)	75 (36.4)	
\$901 - \$1400/month	40 (24.0)	72 (35.0)	
\$1401 - \$1900/month	26 (15.6)	29 (14.1)	
\$1901 - \$2400/month	14 (8.4)	14 (6.8)	
>\$2400/month	33 (19.8)	11 (5.3)	
Not reported	5 (3.0)	5 (2.4)	
Poverty level			0.004*
<FPL	125 (82.8)	175 (93.1)	
1-1.35 FPL	14 (9.3)	11 (5.9)	
1.35-1.85 FPL	8 (5.3)	2 (1.1)	
>1.85 FPL	4 (2.6)	0	
Education			<0.001*
Less than high school education	26 (15.6)	102 (49.5)	
High school graduate/GED	44 (26.3)	56 (27.2)	

More than high school education	96 (57.5)	48 (23.3)	
Not reported	1 (0.6)	0	
Household status (families living with children <18 y)			0.86
No	5 (3.0)	8 (3.9)	
Yes	162 (97.0)	198 (96.1)	
Number of children			0.65
1	39 (24.1)	48 (24.2)	
2	63 (38.9)	72 (36.4)	
3	33 (20.4)	51 (25.8)	
4	13 (8.0)	16 (8.1)	
>4	14 (8.6)	11 (5.6)	
Household status (families living with other adults)			<0.001
No	54 (32.3)	33 (16.0)	
Yes	113 (67.7)	173 (84.0)	
Number of other adults			0.68*
1	71 (63.4)	106 (62.0)	
2	22 (19.6)	31 (18.1)	
3	14 (12.5)	19 (11.1)	
4	3 (2.7)	6 (3.5)	
>4	2 (1.8)	9 (5.3)	

¹*P* values with an asterisk were calculated using the Fisher's exact tests; *p* values without an asterisk were calculated using t-tests and chi-squares for continuous and categorical variables, respectively.

Table A5.1. Baseline (T1) characteristics of *HCHF* participants by English/Spanish speaking site in 2017

Characteristic, n (%)	English (n=91)	Spanish (n=90)	<i>P</i> value ¹
Age of target child, yr (mean [SD])	3.65 ± 0.57	3.66 ± 0.60	0.93*
Age of parent/caregiver, yr (mean [SD])	37.78 ± 10.08	35.57 ± 10.12	0.14
Gender			0.06*
Female	79 (86.8)	86 (95.6)	

Male	12 (13.2)	4 (4.4)	
Pregnancy status			0.39*
No	88 (96.7)	84 (93.3)	
Yes	3 (3.3)	5 (5.6)	
Not reported	0	1 (1.1)	
Nursing status			0.16*
No	81 (89.0)	77 (85.6)	
Yes	10 (11.0)	9 (10.0)	
Not reported	0	4 (4.4)	
Planning to nurse			0.43*
No	87 (95.6)	83 (92.2)	
Yes	4 (4.4)	6 (6.7)	
Not reported	0	1 (1.1)	
Race			<0.001*
American Indian	1 (1.1)	1 (1.1)	
Asian/Pacific Islander	2 (2.2)	0	
Black	57 (62.6)	0	
Mixed Race	13 (14.3)	12 (13.3)	
Other	17 (18.7)	73 (81.1)	
White	1 (1.1)	4 (4.4)	
Ethnicity			<0.001*
Hispanic	20 (22.0)	89 (98.9)	
Non-Hispanic	67 (73.6)	1 (1.1)	
Not reported	4 (4.4)	0	
Employment status			0.65
Unemployed	66 (72.5)	68 (75.6)	
Part Time	13 (14.3)	14 (15.6)	
Full Time	12 (13.2)	8 (8.9)	
Number of jobs			0.61*
0	66 (72.5)	68 (75.6)	
1	25 (27.5)	21 (23.3)	
>1	0	1 (1.1)	
Household income			0.003*
<\$900/month	25 (27.5)	33 (36.7)	
\$901 - \$1400/month	22 (24.2)	38 (42.2)	
\$1401 - \$1900/month	16 (17.6)	10 (11.1)	
\$1901 - \$2400/month	8 (8.8)	4 (4.4)	

>\$2400/month	18 (19.8)	2 (2.2)	
Not reported	2 (2.2)	3 (3.3)	
Poverty level			0.046*
<FPL	69 (83.1)	77 (96.2)	
1-1.35 FPL	8 (9.6)	2 (2.5)	
1.35-1.85 FPL	5 (6.0)	1 (1.2)	
>1.85 FPL	1 (1.2)	0	
Education			<0.001*
Less than high school education	15 (16.5)	48 (53.3)	
High school graduate/GED	24 (26.4)	23 (25.6)	
More than high school education	51 (56.0)	19 (21.1)	
Not reported	1 (1.1)	0	
Household status (families living with children <18 y)			0.21*
No	3 (3.3)	7 (7.8)	
Yes	88 (96.7)	83 (92.2)	
Number of children			0.6
1	22 (25.0)	20 (24.1)	
2	29 (33.0)	23 (27.7)	
3	20 (22.7)	23 (27.7)	
4	7 (8.0)	11 (13.3)	
>4	10 (11.4)	6 (7.2)	
Household status (families living with other adults)			0.006
No	35 (38.5)	17 (18.9)	
Yes	56 (61.5)	73 (81.1)	
Number of other adults			0.4*
1	37 (66.1)	52 (72.2)	
2	11 (19.6)	6 (8.3)	
3	4 (7.1)	8 (11.1)	
4	2 (3.6)	4 (5.6)	
>4	2 (3.6)	2 (2.8)	

¹*P* values with an asterisk were calculated using the Fisher's exact tests; *p* values without an asterisk were calculated using t-tests and chi-squares for continuous and categorical variables, respectively.

Table A5.2. Baseline (T1) characteristics of *HCHF* participants by English/Spanish speaking site in 2018

Characteristic, n (%)	English (n=76)	Spanish (n=116)	<i>P</i> value ¹
Age of target child, yr (mean [SD])	3.38 ± 0.50	3.55 ± 0.58	0.11*
Age of parent/caregiver, yr (mean [SD])	35.05 ± 10.03	35.25 ± 8.55	0.88
Gender			0.93
Female	71 (93.4)	110 (94.8)	
Male	5 (6.6)	6 (5.2)	
Pregnancy status			0.74*
No	72 (94.7)	111 (95.7)	
Yes	2 (2.6)	4 (3.4)	
Not reported	2 (2.6)	1 (0.9)	
Nursing status			0.94*
No	66 (86.8)	101 (87.1)	
Yes	8 (10.5)	13 (11.2)	
Not reported	2 (2.6)	2 (1.7)	
Planning to nurse			0.34*
No	72 (94.7)	109 (94.0)	
Yes	1 (1.3)	5 (4.3)	
Not reported	3 (3.9)	2 (1.7)	
Race			<0.001*
Asian/Pacific Islander	1 (1.3)	0	
Black	44 (57.9)	0	
Mixed Race	15 (19.7)	12 (10.3)	
Other	14 (18.4)	101 (87.1)	
White	2 (2.6)	3 (2.6)	
Ethnicity			<0.001*
Hispanic	17 (22.4)	113 (97.4)	
Non-Hispanic	57 (75.0)	3 (2.6)	
Not reported	2 (2.6)	0	
Employment status			0.04*
Unemployed	46 (60.5)	88 (75.9)	
Part Time	19 (25.0)	21 (18.1)	
Full Time	11 (14.5)	6 (5.2)	

Missing data	0	1 (0.9)	
Number of jobs			0.03*
0	46 (60.5)	88 (77.2)	
1	25 (32.9)	24 (21.1)	
>1	5 (6.6)	2 (1.8)	
Household income			0.2*
<\$900/month	24 (31.6)	42 (36.2)	
\$901 - \$1400/month	18 (23.7)	34 (29.3)	
\$1401 - \$1900/month	10 (13.2)	19 (16.4)	
\$1901 - \$2400/month	6 (7.9)	10 (8.6)	
>\$2400/month	15 (19.7)	9 (7.8)	
Not reported	3 (3.9)	2 (1.7)	
Poverty level			0.06*
<FPL	56 (82.4)	98 (90.7)	
1-1.35 FPL	6 (8.8)	9 (8.3)	
1.35-1.85 FPL	3 (4.4)	1 (0.9)	
>1.85 FPL	3 (4.4)	0	
Education			<0.001
Less than high school education	11 (14.5)	54 (46.6)	
High school graduate/GED	20 (26.3)	33 (28.4)	
More than high school education	45 (59.2)	29 (25.0)	
Household status (families living with children <18 y)			0.56*
No	2 (2.6)	1 (0.9)	
Yes	74 (97.4)	115 (99.1)	
Number of children			0.67*
1	17 (23.0)	28 (24.3)	
2	34 (45.9)	49 (42.6)	
3	13 (17.6)	28 (24.3)	
4	6 (8.1)	5 (4.3)	
>4	4 (5.4)	5 (4.3)	
Household status (families living with other adults)			0.08
No	19 (25.0)	16 (13.8)	
Yes	57 (75.0)	100 (86.2)	
Number of other adults			0.18*
1	34 (60.7)	54 (54.5)	
2	11 (19.6)	25 (25.3)	

3	10 (17.9)	11 (11.1)
4	1 (1.8)	2 (2.0)
>4	0	7 (7.1)

¹*P* values with an asterisk were calculated using the Fisher's exact tests; *p* values without an asterisk were calculated using t-tests and chi-squares for continuous and categorical variables, respectively.

Table A6. Characteristics of HCHF participants (T4) by English/Spanish speaking site in 2017 and 2018

Characteristic, n (%)	English (n=119)	Spanish (n=156)	<i>P</i> value ¹
Age of target child, yr (mean [SD])	3.98 ± 0.68	4.17 ± 0.71	0.02*
Age of parent/caregiver, yr (mean [SD])	37.29 ± 9.57	35.28 ± 8.06	0.06
Gender			0.04
Female	106 (89.1)	150 (96.2)	
Male	13 (10.9)	6 (3.8)	
Pregnancy status			0.31*
No	117 (98.3)	147 (95.5)	
Yes	2 (1.7)	7 (4.5)	
Nursing status			1
No	111 (93.3)	145 (92.9)	
Yes	8 (6.7)	11 (7.1)	
Planning to nurse			0.52*
No	116 (97.5)	149 (95.5)	
Yes	3 (2.5)	7 (4.5)	
Race			<0.001*
American Indian	1 (0.8)	1 (0.6)	
Asian/Pacific Islander	1 (0.8)	0	
Black	72 (60.5)	0	
Mixed Race	24 (20.2)	16 (10.3)	
Other	19 (16.0)	134 (85.9)	
White	2 (1.7)	5 (3.2)	
Ethnicity			<0.001*

Hispanic	22 (18.5)	153 (98.1)	
Non-Hispanic	96 (80.7)	3 (1.9)	
Not reported	1 (0.8)	0	
Employment status			0.004*
Unemployed	68 (57.1)	116 (74.4)	
Part Time	29 (24.4)	29 (18.6)	
Full Time	19 (16.0)	11 (7.1)	
Not reported	3 (2.5)	0	
Number of jobs			0.01
0	68 (57.6)	116 (74.4)	
1	43 (36.4)	35 (22.4)	
>1	7 (5.9)	5 (3.2)	
Household income			<0.001
<\$900/month	23 (19.3)	64 (41.0)	
\$901 - \$1400/month	27 (22.7)	42 (26.9)	
\$1401 - \$1900/month	18 (15.1)	27 (17.3)	
\$1901 - \$2400/month	17 (14.3)	9 (5.8)	
>\$2400/month	34 (28.6)	14 (9.0)	
Poverty level			0.005*
<FPL	83 (72.8)	128 (87.7)	
1-1.35 FPL	14 (12.4)	13 (8.9)	
1.35-1.85 FPL	11 (9.7)	4 (2.7)	
>1.85 FPL	6 (5.3)	1 (0.7)	
Education			<0.001
Less than high school education	16 (13.4)	79 (50.6)	
High school graduate/GED	31 (26.1)	46 (29.5)	
More than high school education	72 (60.5)	31 (19.9)	
Household status (families living with children <18 y)			0.47*
No	2 (1.7)	6 (3.8)	
Yes	117 (98.3)	150 (96.2)	
Number of children			0.67
1	23 (19.5)	31 (20.7)	
2	52 (44.1)	60 (40.0)	
3	25 (21.2)	41 (27.3)	
4	11 (9.3)	13 (8.7)	
>4	7 (5.9)	5 (3.3)	

Household status (families living with other adults)				<0.001
No	48 (40.3)	30 (19.2)		
Yes	71 (59.7)	126 (80.8)		
Number of other adults				0.15*
1	45 (63.4)	67 (53.2)		
2	12 (16.9)	37 (29.4)		
3	11 (15.5)	11 (8.7)		
4	2 (2.8)	7 (5.6)		
>4	1 (1.4)	4 (3.2)		

¹*P* values with an asterisk were calculated using the Fisher's exact tests; *p* values without an asterisk were calculated using t-tests and chi-squares for continuous and categorical variables, respectively.

Table A6.1. Characteristics of *HCHF* participants (T4) by English/Spanish speaking site in 2017

Characteristic, n (%)	English (n=66)	Spanish (n=68)	<i>P</i> value ¹
Age of target child, yr (mean [SD])	4.12 ± 0.67	4.10 ± 0.76	0.11*
Age of parent/caregiver, yr (mean [SD])	38.30 ± 9.46	35.44 ± 8.60	0.07
Gender			0.04*
Female	56 (84.8)	65 (95.6)	
Male	10 (15.2)	3 (4.4)	
Pregnancy status			0.62*
No	65 (98.5)	65 (95.6)	
Yes	1 (1.5)	3 (4.4)	
Nursing status			0.49*
No	61 (92.4)	65 (95.6)	
Yes	5 (7.6)	3 (4.4)	
Planning to nurse			1*
No	64 (97.0)	66 (97.1)	
Yes	2 (3.0)	2 (2.9)	
Race			<0.001*
American Indian	1 (1.5)	1 (1.5)	

Asian/Pacific Islander	1 (1.5)	0	
Black	45 (68.2)	0	
Mixed Race	9 (13.6)	7 (10.3)	
Other	10 (15.2)	58 (85.3)	
White	0	2 (2.9)	
Ethnicity			<0.001*
Hispanic	12 (18.2)	67 (98.5)	
Non-Hispanic	53 (80.3)	1 (1.5)	
Not reported	1 (1.5)	0	
Employment status			0.02*
Unemployed	35 (53.0)	51 (75.0)	
Part Time	18 (27.3)	13 (19.1)	
Full Time	11 (16.7)	4 (5.9)	
Not reported	2 (3.0)	0	
Number of jobs			0.02*
0	35 (53.8)	51 (75.0)	
1	28 (43.1)	15 (22.1)	
>1	2 (3.1)	2 (2.9)	
Household income			<0.001*
<\$900/month	13 (19.7)	25 (36.8)	
\$901 - \$1400/month	13 (19.7)	23 (33.8)	
\$1401 - \$1900/month	10 (15.2)	12 (17.6)	
\$1901 - \$2400/month	11 (16.7)	3 (4.4)	
>\$2400/month	19 (28.8)	5 (7.4)	
Poverty level			0.002*
<FPL	43 (68.3)	57 (93.4)	
1-1.35 FPL	9 (14.3)	3 (4.9)	
1.35-1.85 FPL	8 (12.7)	1 (1.6)	
>1.85 FPL	3 (4.8)	0	
Education			<0.001
Less than high school education	8 (12.1)	36 (52.9)	
High school graduate/GED	18 (27.3)	19 (27.9)	
More than high school education	40 (60.6)	13 (19.1)	
Household status (families living with children <18 y)			0.68*
No	2 (3.0)	4 (5.9)	
Yes	64 (97.0)	64 (94.1)	

Number of children			0.38*
1	11 (16.9)	11 (17.2)	
2	27 (41.5)	21 (32.8)	
3	14 (21.5)	20 (31.2)	
4	7 (10.8)	10 (15.6)	
>4	6 (9.2)	2 (3.1)	
Household status (families living with other adults)			0.004
No	30 (45.5)	14 (20.6)	
Yes	36 (54.5)	54 (79.4)	
Number of other adults			0.58*
1	24 (66.7)	31 (57.4)	
2	5 (13.9)	14 (25.9)	
3	6 (16.7)	6 (11.1)	
4	1 (2.8)	2 (3.7)	
>4	0	1 (1.9)	

¹*P* values with an asterisk were calculated using the Fisher's exact tests; *p* values without an asterisk were calculated using t-tests and chi-squares for continuous and categorical variables, respectively.

Table A6.2. Characteristics of *HCHF* participants (T4) by English/Spanish speaking site in 2018

Characteristic, n (%)	English (n=53)	Spanish (n=88)	<i>P</i> value ¹
Age of target child, yr (mean [SD])	3.81 ± 0.65	4.22 ± 0.67	0.003*
Age of parent/caregiver, yr (mean [SD])	36.04 ± 9.65	35.16 ± 7.67	0.55
Gender			0.67*
Female	50 (94.3)	85 (96.6)	
Male	3 (5.7)	3 (3.4)	
Pregnancy status			0.65*
No	52 (98.1)	84 (95.5)	
Yes	1 (1.9)	4 (4.5)	
Nursing status			0.54*
No	50 (94.3)	80 (90.9)	

Yes	3 (5.7)	8 (9.1)	
Planning to nurse			0.41*
No	52 (98.1)	83 (94.3)	
Yes	1 (1.9)	5 (5.7)	
Race			<0.001*
Black	27 (50.9)	0	
Mixed Race	15 (28.3)	9 (10.2)	
Other	9 (17.0)	76 (86.4)	
White	2 (3.8)	3 (3.4)	
Ethnicity			<0.001*
Hispanic	10 (18.9)	86 (97.7)	
Non-Hispanic	43 (81.1)	2 (2.3)	
Employment status			0.23*
Unemployed	33 (62.3)	65 (73.9)	
Part Time	11 (20.8)	16 (18.2)	
Full Time	8 (15.1)	7 (8.0)	
Not reported	1 (1.9)	0	
Number of jobs			0.19*
0	33 (62.3)	65 (73.9)	
1	15 (28.3)	20 (22.7)	
>1	5 (9.4)	3 (3.4)	
Household income			0.048
<\$900/month	12 (22.6)	39 (44.3)	
\$901 - \$1400/month	14 (26.4)	19 (21.6)	
\$1401 - \$1900/month	8 (15.1)	15 (17.0)	
\$1901 - \$2400/month	7 (13.2)	6 (6.8)	
>\$2400/month	12 (22.6)	9 (10.2)	
Poverty level			0.41*
<FPL	40 (78.4)	71 (83.5)	
1-1.35 FPL	5 (9.8)	10 (11.8)	
1.35-1.85 FPL	3 (5.9)	3 (3.5)	
>1.85 FPL	3 (5.9)	1 (1.2)	
Education			<0.001
Less than high school education	8 (15.1)	43 (48.9)	
High school graduate/GED	13 (24.5)	27 (30.7)	
More than high school education	32 (60.4)	18 (20.5)	

Household status (families living with children <18 y)				0.53*
No	0	2 (2.3)		
Yes	53 (100.0)	86 (97.7)		
Number of children				0.84*
1	12 (22.6)	20 (23.3)		
2	25 (47.2)	39 (45.3)		
3	11 (20.8)	21 (24.4)		
4	4 (7.5)	3 (3.5)		
>4	1 (1.9)	3 (3.5)		
Household status (families living with other adults)				0.06
No	18 (34.0)	16 (18.2)		
Yes	35 (66.0)	72 (81.8)		
Number of other adults				0.47*
1	21 (60.0)	36 (50.0)		
2	7 (20.0)	23 (31.9)		
3	5 (14.3)	5 (6.9)		
4	1 (2.9)	5 (6.9)		
>4	1 (2.9)	3 (4.2)		

¹*P* values with an asterisk were calculated using the Fisher's exact tests; *p* values without an asterisk were calculated using t-tests and chi-squares for continuous and categorical variables, respectively.

Table A7. Characteristics of HCHF participants by T1/T4 in 2017 and 2018

Characteristic, n (%)	T1 (n=373)	T4 (n=275)	<i>P</i> value ¹
Year			1
2017	181 (48.5)	134 (48.7)	
2018	192 (51.5)	141 (51.3)	
Age of target child, yr (mean [SD])	3.57 ± 0.58	4.09 ± 0.70	<0.001*
Age of parent/caregiver, yr (mean [SD])	35.91 ± 9.65	36.15 ± 8.79	0.74
Gender			1

Female	346 (92.8)	256 (93.1)	
Male	27 (7.2)	19 (6.9)	
Pregnancy status			0.26*
No	355 (95.2)	266 (96.7)	
Yes	14 (3.8)	9 (3.3)	
Not reported	4 (1.1)	0	
Nursing status			0.007*
No	325 (87.1)	256 (93.1)	
Yes	40 (10.7)	19 (6.9)	
Not reported	8 (2.1)	0	
Planning to nurse			0.08*
No	351 (94.1)	265 (96.4)	
Yes	16 (4.3)	10 (3.6)	
Not reported	6 (1.6)	0	
Race			1*
American Indian	2 (0.5)	2 (0.7)	
Asian/Pacific Islander	3 (0.8)	1 (0.4)	
Black	101 (27.1)	72 (26.2)	
Mixed Race	52 (13.9)	40 (14.5)	
Other	205 (55.0)	153 (55.6)	
White	10 (2.7)	7 (2.5)	
Ethnicity			0.36*
Hispanic	239 (64.1)	175 (63.6)	
Non-Hispanic	128 (34.3)	99 (36.0)	
Not reported	6 (1.6)	1 (0.4)	
Employment status			0.16*
Unemployed	268 (71.8)	184 (66.9)	
Part Time	67 (18.0)	58 (21.1)	
Full Time	37 (9.9)	30 (10.9)	
Not reported	0	3 (1.1)	
Missing data	1 (0.3)	0	
Number of jobs			0.17
0	268 (72.2)	184 (67.2)	
1	95 (25.6)	78 (28.5)	
>1	8 (2.2)	12 (4.4)	
Household income			0.02*
<\$900/month	124 (33.2)	89 (32.4)	

\$901 - \$1400/month	112 (30.0)	69 (25.1)	
\$1401 - \$1900/month	55 (14.7)	45 (16.4)	
\$1901 - \$2400/month	28 (7.5)	27 (9.8)	
>\$2400/month	44 (11.8)	45 (16.4)	
Not reported	10 (2.7)	0	
Poverty level			0.07*
<FPL	300 (88.5)	211 (81.2)	
1-1.35 FPL	25 (7.4)	27 (10.4)	
1.35-1.85 FPL	10 (2.9)	15 (5.8)	
>1.85 FPL	4 (1.2)	7 (2.7)	
Education			0.96*
Less than high school education	128 (34.3)	95 (34.5)	
High school graduate/GED	100 (26.8)	77 (28.0)	
More than high school education	144 (38.6)	103 (37.5)	
Not reported	1 (0.3)	0	
Household status (families living with children <18 y)			0.85
No	13 (3.5)	8 (2.9)	
Yes	360 (96.5)	267 (97.1)	
Number of children			0.45
1	87 (24.2)	54 (20.1)	
2	135 (37.5)	112 (41.8)	
3	84 (23.3)	66 (24.6)	
4	29 (8.1)	24 (9.0)	
>4	25 (6.9)	12 (4.5)	
Household status (families living with other adults)			0.17
No	87 (23.3)	78 (28.4)	
Yes	286 (76.7)	197 (71.6)	
Number of other adults			0.41
1	177 (62.5)	112 (56.9)	
2	53 (18.7)	49 (24.9)	
3	33 (11.7)	22 (11.2)	
4	9 (3.2)	9 (4.6)	
>4	11 (3.9)	5 (2.5)	

¹*P* values with an asterisk were calculated using the Fisher's exact tests; *p* values without an asterisk were calculated using t-tests and chi-squares for continuous and categorical variables, respectively.

APPENDIX B

Today we are going to be asking questions about yourself and your family.

Please write in the name of your child that attends this Head Start (or this child care):

What is the age of this child? _____

While answering the following questions, please think about this child.

SECTION 1

1.	How many days each week do you usually eat fruit (including fresh, dried, frozen, and canned)?	None	1-2 days each week	3-4 days each week	5-6 days each week	Every day
2.	How many days each week do you usually eat vegetables (including fresh, frozen, and canned)?	None	1-2 days each week	3-4 days each week	5-6 days each week	Every day
3.	How often do you drink regular (NOT diet) soda?	Less than 1 day each week	1-3 days each week	4-6 days each week	Once each day	2 or more times each day
4.	How often do you use 1% milk, skim milk, or low-fat yogurt?	Never	Less than once each day	Once each day	Twice each day	3 or more times each day
5.	How often are you physically active for at least 30 minutes a day – active enough that you breathe a little harder or your heart beats faster? This includes brisk walking, dancing, and playing actively with kids.	Less than 1 day each week	1-2 days each week	3-4 days each week	5-6 days each week	Every day

6.	How many days each week does your child usually eat fruit (including fresh, dried, frozen, and canned)?	None	1-2 days each week	3-4 days each week	5-6 days each week	Every day
7.	How many days each week does your child usually eat vegetables (including fresh, frozen, and canned)?	None	1-2 days each week	3-4 days each week	5-6 days each week	Every day
8.	How often does your child drink regular (NOT diet) soda?	Less than 1 day each week	1-3 days each week	4-6 days each week	Once each day	2 or more times each day

9.	How often does your child have 1% milk, skim milk, or low-fat yogurt?	Never	Less than once each day	Once each day	Twice each day	3 or more times each day
10.	In a typical week, how often do you let your child decide how much food to eat?	Almost never	Less than half the time	Half the time	More than half the time	Almost always
11.	How much time does your child spend watching TV, using the computer, or playing video games?	Less than 1 hour each day	1-2 hours each day	3-4 hours each day	5-6 hours each day	7 or more hours each day
12.	How often does your child play actively for at least 60 minutes a day -- actively enough that your child breathes a little harder or his or her heart beats faster?	Less than 1 day each week	1-2 days each week	3-4 days each week	5-6 days each week	Every day
13.	How often does your child usually eat take out, delivery, or fast foods	Almost never	1-2 days each week	3-4 days each week	5-6 days each week	Every day

	(such as burgers, fried chicken, pizza, Chinese food)?					
14.	How often do you eat together with your child at least one meal a day?	Almost never	1-2 days each week	3-4 days each week	5-6 days each week	Every day
15.	In a typical month, how often are high-fat or high-sugar snacks available at home for your child to eat? This includes chips, candy, cookies, and sweets.	Almost never	Less than half the time	Half the time	More than half the time	Almost always
16.	In a typical month, how often are fruits available at home for your child to eat?	Almost never	Less than half the time	Half the time	More than half the time	Almost always

SECTION 2

17.	How sure are you that you can help your child get 1 hour of moderate intensity physical activity most days?	Not sure	A little sure	Sure	Very sure	Extremely sure
18.	How sure are you that you can help your child get 5 servings of fruits and vegetables every day?	Not sure	A little sure	Sure	Very sure	Extremely sure
19.	How sure you are that you can limit your child to 1 or fewer servings per week of sugary drinks, such as Sunny Delight, Kool-Aid, Gatorade, or soda?	Not sure	A little sure	Sure	Very sure	Extremely sure
20.	How sure are you that you	Not sure	A little	Sure	Very	Extremely

	could limit your child's consumption of 100% fruit juice to one small glass each day?		sure		sure	sure
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SECTION 3

21.	Do you let your child eat whatever s/he wants?	Never	Rarely	Sometimes	Mostly	Always
22.	Do you encourage this child to eat healthy foods before unhealthy ones?	Never	Rarely	Sometimes	Mostly	Always
23.	At dinner, do you let this child choose the foods s/he wants from what is served?	Never	Rarely	Sometimes	Mostly	Always
24.	If this child does not like what is being served, do you make something else?	Never	Rarely	Sometimes	Mostly	Always
25.	Do you allow this child to eat snacks whenever s/he wants?	Never	Rarely	Sometimes	Mostly	Always
26.	Do you allow this child to leave the table when s/he is full, even if your family is not done eating?	Never	Rarely	Sometimes	Mostly	Always
27.	I offer sweets (candy, ice cream, cake, pastries) to my child as a reward for good behavior.	Disagree	Slightly disagree	Neutral	Slightly agree	Agree
28.	I model healthy eating for my child by eating healthy foods myself.	Disagree	Slightly disagree	Neutral	Slightly agree	Agree
29.	My child should always eat all of the food on his/her plate.	Disagree	Slightly disagree	Neutral	Slightly agree	Agree
30.	Most of the food I keep in the house is	Disagree	Slightly	Neutral	Slightly	Agree

	healthy.		disagree		agree	
31.	I encourage my child to try new foods.	Disagree	Slightly disagree	Neutral	Slightly agree	Agree
32.	I withhold sweets/dessert from my child in response to bad behavior.	Disagree	Slightly disagree	Neutral	Slightly agree	Agree
33.	I try to eat healthy foods in front of my child, even if they are not my favorite.	Disagree	Slightly disagree	Neutral	Slightly agree	Agree
34.	If my child says, "I'm not hungry," I try to get him/her to eat anyway.	Disagree	Slightly disagree	Neutral	Slightly agree	Agree
35.	I keep a lot of snack food (potato chips, Doritos, cheese puffs) in my house.	Disagree	Slightly disagree	Neutral	Slightly agree	Agree
36.	I tell my child that healthy food tastes good.	Disagree	Slightly disagree	Neutral	Slightly agree	Agree
37.	I offer my child his/her favorite foods in exchange for good behavior.	Disagree	Slightly disagree	Neutral	Slightly agree	Agree
38.	I try to show enthusiasm about eating healthy foods.	Disagree	Slightly disagree	Neutral	Slightly agree	Agree
39.	If my child eats only a small helping, I try to get him/her to eat more.	Disagree	Slightly disagree	Neutral	Slightly agree	Agree
40.	A variety of healthy foods are available to my child at each meal served at home.	Disagree	Slightly disagree	Neutral	Slightly agree	Agree
41.	I show my child how much I enjoy eating healthy foods.	Disagree	Slightly disagree	Neutral	Slightly agree	Agree
42.	When my child says he/she is finished eating, I try to get my child to eat one more (or two more, etc.) bites of food.	Disagree	Slightly disagree	Neutral	Slightly agree	Agree

43.	I keep a lot of sweets (candy, ice cream, cake, pies, pastries) in my house.	Disagree	Slightly disagree	Neutral	Slightly agree	Agree
44.	I encourage my child to eat a variety of foods.	Disagree	Slightly disagree	Neutral	Slightly agree	Agree

SECTION 4

45.	Do you eat more than one kind of fruit daily?	Always	Often	Sometimes	Never
46.	How many servings of fruit do you eat each day? (The food models illustrate the size of a serving of fruit.)	___ Servings			
47.	During the past week, did you have citrus fruit or citrus juice?	Yes	No		
48.	Do you eat more than one kind of vegetable each day?	Always	Often	Sometimes	Never
49.	How many servings of vegetables do you eat each day? (The food models illustrate the size of a serving of vegetables.)	___ Servings			
50.	Do you eat two or more servings of vegetables at your main meal?	Always	Often	Sometimes	Never
51.	During the past week, did you have raw vegetables?	Yes	No		
52.	Do you eat fruit and vegetables as snacks?	Always	Often	Sometimes	Never
53.	Do you eat low-fat instead of high-fat foods?	Always	Often	Sometimes	Never
54.	When shopping, do you use the Nutrition Facts on the food label to choose foods?	Always	Often	Sometimes	Never
55.	Do you drink regular soft drinks?	Always	Often	Sometimes	Never

56.	Do you buy Kool-Aid, Gatorade, Sunny Delight, or other fruit drink/punch?	Always	Often	Sometimes	Never	
57.	Would you describe your diet as excellent, very good, good, fair, or poor?	Excellent	Very good	Good	Fair	Poor

SECTION 5

58.	On an average day, how many times does your child drink chocolate milk or sweetened milk?	_____ Times per day
59.	On an average day, how many times does your child drink 100% fruit juice?	_____ Times per day
60.	On an average day, how many other fruit juice drinks that are <u>not</u> 100% juice, such as Sunny Delight, Capri Sun, or lemonade, does your child drink?	_____ Drinks per day
61.	On an average day, about how many sweetened drinks, such as Gatorade, Kool-Aid, or Nestea, does your child drink?	_____ Drinks per day
62.	On an average day, how many times does your child eat sweets or sweetened foods, such as sweetened cereals, fruit bars, Pop-Tarts, donuts, cookies, and candies?	_____ Times per day

SECTION 6

63.	In the past year, has any adult in your household ever had their meals cut or had to skip meals due to lack of money?	Yes Answer next question	No Skip next question	
64.	How often during the year did this happen- almost every month, some but not all months, or only 1 or 2 months?	Almost monthly	Several months	Only 1 or 2 months

65.	In the past 12 months, did you ever eat less than you felt you should because there was not enough money to buy food?	Yes	No	
66.	In the last 12 months, were you ever hungry but did not eat because you could not afford enough food?	Yes	No	
67.	In the last 12 months, the food that I bought just did not last, and we did not have money to get more.	Often true	Sometimes true	Never true
68.	In the last 12 months, we could not afford to eat balanced meals.	Often true	Sometimes true	Never true

Tell Me about You!

Age: _____

Gender: _____ Male _____ Female



If you are female

Are you pregnant? _____ Yes _____ No

Are you nursing? _____ Yes _____ No

Are you planning to nurse? _____ Yes _____ No

What is your ethnicity?

_____ Not Hispanic/Latino/Latina

_____ Hispanic/Latino/Latina

_____ Hawaiian Islander or Other Pacific Islander

_____ White

_____ Other: _____

What is your race? More than one can be selected

_____ American Indian or American Native

_____ Asian

_____ Black or African American

Approximate household income per month?

_____ \$ 0 to \$900

_____ \$ 901 to \$1,400

_____ \$1,401 to \$1,900

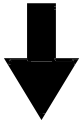
- ___ \$1,901 to \$2,400
- ___ \$2,401 to \$2,900
- ___ \$2,901 to \$3,400
- ___ \$3,401 to \$3,900
- ___ \$3,901 to \$4,400
- ___ over \$4,400

What is your highest grade completed in school?

- ___ 6th grade or less
- ___ 7th grade
- ___ 8th grade
- ___ 9th grade
- ___ 10th grade
- ___ 11th grade
- ___ 12th grade
- ___ GED
- ___ Some college
- ___ Graduated 2-year college
- ___ Graduated college
- ___ Post graduate

Are you currently working for money?

No (not currently working for money)



Would you say you are:

- ___ student
- ___ homemaker
- ___ retired
- ___ unemployed, looking for work
- ___ unemployed, not looking for work
- ___ on disability
- ___ on temporary sick leave

If on sick leave: How long have you been on sick leave?

Yes (currently working for money)



What is your current work status?

- ___ full time (37 or more hours/week)
- ___ more than half time (21-36 hours/week)
- ___ half time or less (1-20 hours/week)

Where are you working?

- ___ in home
- ___ out of home

How many paying jobs do you currently have?

- ___ 1
- ___ 2
- ___ 3 or more

In what category would you consider your current job?

- professional
- managerial
- clerical

- sales
- skilled worker, craftsman, foreman
- semi-skilled worker, laborer
- service industry

More about you!

What programs do you and your family participate in?

____ School Lunch/Breakfast (Child nutrition)

____ Food Distribution Program on
Indian Reservations (FDPIR)

____ Use EBT when you buy food (SNAP)

____ Head Start

____ Temporary Assistance for Needy Families
(TANF)

____ Early Head Start

____ Emergency Food Assistance Program (TEFAP)

____ WIC/CSFP

____ CACFP Child Care

____ Child or Family Health Plus

____ Summer Youth Feeding Programs

____ Senior citizens dining sites

____ Farmers' Market Nutrition
Program (FMNP) coupons

____ HEAP Home Energy Assistance

____ Medicaid*

____ Medicare

____ PCAP Prenatal Care Assistance

____ Social Security Disability

____ Supplemental Security Income

____ Food pantries/Soup kitchens

____ Emergency dining sites

____ Workforce development programs

Other: _____

We want to know about the people in your household.

Do you have children ages 18 or younger living with you?

No Yes

If yes, how many? _____

What are their ages? _____

If No, are you primarily responsible for feeding and caring for the children during the day?
No Yes

Do other adults live with you, including your adult children?

No Yes

If yes, how many? _____

Thank you for completing the survey!

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