Women, Infants, and Children Special Project:

A Final Report on A Client-Centered Approach to Education for Prevention of Overweight in Children

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PROJECT OVERVIEW

The Special Supplemental Nutrition Program for Women, Infants and Children (WIC) began in Missouri in 1974. There are currently 118 local WIC providers consisting of 104 local public health agencies, seven federally qualified health centers, three hospital-based agencies, three community action agencies and one non-profit agency. A total of 16 local providers (4 intervention and 12 comparison) participated in the WIC Special Grant project. Thirteen of them are local public health agencies, one hospital-based agency, one federally qualified health center and one non-profit agency. In 2003 when the project was initiated, approximately 75% of individuals served by the program were infants and children, while the remaining 25% were women. This percentage distribution was fairly the same in the years 2004 and 2005.

This was a three-year project that began on October 1, 2002, and ended on September 30, 2005. The main goal of the project was to demonstrate how the problem of at risk for overweight and overweight children enrolled in the WIC program in Missouri could be ameliorated by a client-centered approach to nutrition education and counseling, targeted to mothers/primary caregivers who serve as the proxy for the children. The Transtheoretical Model of Behavior Change (TTM) (Prochaska, 1992), also known as Transtheoretical Stages of Change Model, provides a theoretical framework for the client-centered approach used in this study. In recent years, the model has become an important way to determine an individual's readiness to change behaviors. At the heart of the model is the concept that change of behaviors is not a simple process. Rather, it involves progression through a series of stages (pre-contemplation, contemplation, preparation, action, and maintenance) and does not necessarily evolve in a linear fashion (Prochaska and DiClemente, 1983). An assumption of the model is that intervention to modify dietary behavior can be tailored to fit an individual's determined stage of change (Prochaska and DiClemente, 1983).

To apply the theory of the TTM, a client-centered approach, the Transtheoretical Stages of Change Model Approach (TTMA), was used. The TTMA included two major components: one was assessing the stage of change of each mother/primary caregiver, and the other was subsequently providing the appropriate nutrition education and counseling corresponding to that stage. The Sinclair School of Nursing at the University of Missouri-Columbia provided the training to nutritionists on how to accomplish the TTMA. A primary focus of the training was how to determine the appropriate education and/or counseling needed at any given stage. The staff of the Missouri Department of Health and Senior Services (DHSS) applied the knowledge from that training to conduct the assessment and provide nutrition education and counseling. The purpose of the TTMA was to move the mothers/primary caregivers forward through the stages of change continuum.

The groundwork for the project was laid in the first year (October 2002 to September 2003). The purpose of the groundwork was to ensure that all educational materials were ready for the nutritionists at the beginning of data collection on October 1, 2003. The groundwork involved contacts with administrators of WIC local agencies to introduce the study. Contacts were also made with staff of the Sinclair School of Nursing at the University of Missouri-Columbia. Part of the groundwork included development of scopes of work for the WIC local

agencies and Sinclair School of Nursing, policies and procedures, informed consent forms for the participants in the intervention and comparison agencies, and revision of the project outline with outcome objectives. Survey questionnaires (nutritionists and mothers/primary caregivers) were developed, pilot-tested, and revised. All materials developed were translated into Spanish to accommodate Spanish-speaking participants.

Training on the TTMA and policies and procedures was provided to nutritionists of the intervention agencies on September 3 and 4, 2003. Training on these policies and procedures was provided to nutritionists in the comparison agencies on September 25, 2003. Data were collected from October 2003 to March 2005. Data analysis and compilation of the final report continued through December 2005.

The purpose of the nutritionists' survey was to determine the competency level of their counseling, communication and relationship skills, and training in overweight education and counseling. The survey was developed, pilot-tested, revised and mailed to nutritionists in all local agencies in the state in 2002. Of the 400 questionnaires mailed, 197 were completed and returned (an effective response rate of 49.3%). Of the 197 nutritionists who returned questionnaires, less than 28% indicated having had training in counseling, communication, and relationship skills in the past two years. Of those indicating they participated in the trainings, none of the trainings were provided from a formal setting. All trainings were from attending WIC conferences, various seminars, customer service trainings, and various meetings.

ABSTRACT

Background: The prevalence of both at risk for overweight and overweight children enrolled in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) in Missouri increased from 2000 to 2004. (CDC/Missouri PedNSS, 2000-2004) Overweight in children is recognized as a health problem with potential life-long consequences. Some mothers/primary caregivers of infants and children enrolled in WIC have difficulties establishing and maintaining healthy eating routines that are necessary to prevent overweight. Such routines could be established and maintained by increasing mothers'/primary caregivers' readiness to discuss food and the overweight children. The Transtheoretical Stages of Change Model Approach (TTMA) provided the framework and skills to help WIC nutrition educators assist mothers/primary caregivers in becoming ready to be counseled.

Objectives: To adopt the TTMA to counsel mothers/primary caregivers who serve as proxy clients for infants and children, and to pilot the TTMA to counseling by WIC nutritionists in four intervention agencies in order to increase the readiness to change of mothers/primary caregivers and decrease the Body Mass Indexes (BMIs) or Ponderal Indexes (PIs) of their children.

Methods: Sixteen WIC agencies (4 intervention agencies and 12 comparison agencies) were selected from the four geographic areas of Missouri. Systematic random sampling was used to recruit participants for the study. Data for the stages of change of mothers/primary caregivers, height and weight measurements of children and mothers/primary caregivers, knowledge and attitudes of mothers/primary caregivers toward weight in children, etc. were collected and analyzed. Chi-square tests for comparing overall distributions, two-sample Z tests for comparing proportions, two-sample T tests and paired samples T tests for comparing means were conducted to examine the differences of interest.

Results: Statistically significant differences on the mean scores of stages of change for fat ($t = 3.793$ and $p < 0.0001$) and fiber ($t = 3.218$ and $p = 0.001$) intake were observed (two-sample T tests), respectively, between pre-intervention (Time 1) and six months after intervention (Time 2). For decreasing fat intake, the increases in the percentages of mothers/primary caregivers in the action ($Z = 1.97$ and $p = 0.025$) and maintenance ($Z = 2.34$ and $p = 0.01$) stages were statistically significant. For increasing fiber intake, the increases in the percentages of mothers/primary caregivers in the preparation ($Z = 3.96$ and $p < 0.0001$) and the action ($Z = 3.96$ and $p < 0.0001$) stages were statistically significant. No statistical tests were conducted on the comparisons between Time 1 and Time 3 data within each type of agency and the comparisons at Time 3 between the two types of agencies due to the high attrition rates. The TTMA did not result in a statistically significant change in the BMIs of children and mothers/primary caregivers.

Conclusions: Compared to mothers/primary caregivers who received the traditional nutrition education, mothers/primary caregivers who received TTMA to counseling showed an increase in their readiness to change for both fat and fiber intake after six months of intervention. The approach might have made positive changes on mothers'/primary caregivers' attitudes, as well as increased their knowledge on overweight. However, the approach did not have the impact that could decrease the BMIs of mothers/primary caregivers and children.

INTRODUCTION: BACKGROUND AND THEORETICAL BASIS

The prevalence of both at risk for overweight and overweight children enrolled in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) in Missouri increased from 2000 to 2004. In 2000, 15.4% of children ≥ 2 years and < 5 years old were at risk for overweight (Body Mass Indexes (BMIs) between the 85th and 95th percentiles), while 11.5% were overweight with BMIs > 95th percentiles (CDC/Missouri Pediatric Nutrition Surveillance System (PedNSS), 2000)[1]. In 2004, for the same age group, 16.6% were at risk for overweight and 13.8% were overweight (CDC/Missouri PedNSS, 2004). Likewise, the prevalence of at risk for overweight among the same group of children in the nation was 13.0% in 2000 and increased to 16.2% in 2004 (CDC/PedNSS, 2004). The prevalence of overweight among the same age group of children in the nation was 13.0% in 2000 and increased to 14.8% in 2004 (CDC/PedNSS, 2004).

Overweight in children is recognized as a health problem with potential life-long consequences including the risk of persistence into adulthood. Serdula et al. (1993) found that the risk of becoming an overweight adult was found to be higher for overweight children than their non-overweight peers. Other authors (Whitaker et al., 1997) observed children who began their weight gain earlier in life, determined from their age of maximal leanness (or adiposity rebound), had higher adult obesity rates (25%) than those (5%) whose weight gain began at a later age (Whitaker et al., 1998).

An equal concern is the co-factor of parent obesity with subsequent development of adult obesity in offspring. The adult obesity rates were 25% and 21% among those with obese mothers and fathers, respectively, compared with 5% among those whose parents were lean (Whitaker et al, 1998). Overweight status occurs more frequently among children of lower socioeconomic status than in the general population (Yip et al., 1993). Furthermore, a majority of the children in the WIC program are in this socioeconomic group.

Trend data from CDC/Missouri PedNSS shows that an increase in the prevalence of at risk for overweight and overweight children ≥ 2 years and < 5 years old in Missouri's WIC program has been ongoing for the past ten years. The prevalence of at risk for overweight children increased from 13.2% in 1994 to 16.6% in 2004, and the prevalence of overweight children increased from 8.3% in 1994 to 13.8% in 2004. This shows that some mothers/primary caregivers of infants and children enrolled in WIC have difficulties establishing and maintaining healthy eating routines that are necessary to prevent overweight. Such routines could be established and maintained by increasing mothers'/primary caregivers' readiness to change with regards to discussing food and overweight children. The challenge for WIC nutritionists therefore, was to assist mothers/primary caregivers in becoming ready to discuss and be counseled regarding food and overweight children. The Transtheoretical Stages of Change

[1] The Pediatric Nutrition Surveillance System (PedNSS) is a national surveillance system created in 1973 and maintained since then by the Centers for Disease Control and Prevention (CDC). The purpose of this system is to monitor the growth, anemia, and breastfeeding status of children in federally funded maternal and child health programs. The state of Missouri has been one of the contributors since 1988 to this system. With the assistance of CDC, data currently collected in this system are primarily from infants and children from low and moderate-income families who participate in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). In the year 2004, about 141,000 children in Missouri were enrolled in this program.

Model Approach (TTMA) provides the framework and skills to help WIC nutritionists assist mothers/primary caregivers increase their readiness to change. At the heart of the model is the concept that change is not a simple process. Rather, it involves progression through a series of behavioral stages (pre-contemplation, contemplation, preparation, action, and maintenance) and does not necessarily evolve in a linear fashion (Prochaska and DiClemente, 1983). An assumption of the model is that individuals at different behavioral stages are motivated to move forward through the stages of change continuum if information is tailored to their specific stage of change (Prochaska et al., 1992). Individuals in the pre-contemplation stage, for whatever reason, are not considering changing in the foreseeable future and are usually in denial or unaware and would be least responsive to interventions focused on change activities. Consequently, these individuals are not ready to acknowledge or take ownership of the problem, increase awareness of the negative aspects of the problem, and accurately evaluate self-efficacy in changing (Prochaska and Diclemente, 1992). Motivational interviewing, which reflects empathy and instills hope in individuals, would be the appropriate intervention to help individuals in the pre-contemplation stage begin progression through the stages of change continuum.

The purpose of this study was to demonstrate how the problem of at risk for overweight and overweight among children enrolled in the WIC program in Missouri could be ameliorated by a client-centered approach to nutrition education and counseling, targeted to mothers/primary caregivers who serve as proxy clients for the infants and children. The objectives were: 1) to adopt the TTMA to counsel mothers/primary caregivers of infants and children who were at risk for overweight and overweight, as well as normal weight, and 2) to pilot the TTMA to counseling by WIC Nutritionists in four intervention agencies. The analyses address three research questions: 1) Would the TTMA to counseling increase the readiness to change of mothers/primary caregivers by comparing the stages of change at baseline, at midpoint (after six months), and at the end of the study (after 12 months)? 2) Would the TTMA to counseling result in a decrease in the Body Mass Indexes[2] (BMIs) of the children who were 24 months or older? 3) Would the TTMA to counseling have any impact on the body weights (Ponderal Indexes[3]) of children less than 24 months?

Additional issues were examined, such as mothers'/primary caregivers' knowledge and attitude towards overweight in children and evaluation of nutritionists' competencies in applying the TTMA with mothers/primary caregivers.

METHODOLOGY

I. Research Design

The research design was quasi-experimental, consisting of a comparison of study outcomes between two groups, an intervention group and a comparison group. Mothers/primary

[2] Body Mass Index (BMI) is a number calculated from a person's weight and height. BMI provides a reliable indicator of body fatness for most people and is used to screen for weight categories that may lead to health problems. (CDC)

[3] The Ponderal Index (PI) is a way of characterizing the relationship of height to mass for an individual. It is determined by the ratio of the mass (in kilograms) divided by the cube of the height of the person in meters. (Dennison et al., 1997)

caregivers in the comparison group received traditional nutrition education and counseling, while those in the intervention group received the TTMA to counseling.

According to the research design, sampling of sites (local agencies) and study units (women-children or dyads) involved a two-staged sampling. The study units were selected from both the intervention and comparison sites using systematic sampling. In the first stage, 4 intervention and 12 comparison sites (WIC local agencies) were selected from the WIC local agencies in Missouri. The intervention agencies were selected based on size and location to allow for a good representation of small and large agencies. For purposes of this particular study, Missouri was divided into four geographic areas: Northwest, Northeast, Southwest, and Southeast. The selected intervention agencies were: Truman Medical Center Hospital Hill in the Northwestern Area, South County Health Center in the Northeastern Area, Springfield/Greene County Health Department in the Southwestern Area, and Cole County Health Department in the Southeastern Area. The comparison agencies were randomly selected after stratifying agencies by the four geographic areas and three types of facilities: small (< 1,000 participants a year), medium (1,000-3,000 participants a year) and large (> 3,000 participants a year). In each of the twelve groups defined by the geographic areas and type of facility, six sites were to be selected. The project initially began with 17 comparison agencies, although only 12 completed the project. Five of the agencies dropped out of the study primarily because of staff shortages.

In the second stage, using systematic random sampling, potential dyads were selected from WIC participants in the intervention and comparison agencies on certification and re-certification dates. The selection process was extended over a period of one year, starting on October 1, 2003. In the two types of agencies, the following dyads were considered for recruitment:

1. A dyad with an infant/child and his/her non-pregnant mother/primary caregiver who were both WIC participants;
2. A dyad with an infant/child who was a WIC participant but his/her non-pregnant mother/primary caregiver who was not a WIC participant;

In a family where more than one child qualified for WIC, the youngest child (not infant) meeting the inclusion criteria was selected. In the same manner, in a family with twins, the one meeting the inclusion criteria was selected. In clinics accepting walk-ins, walk-ins meeting inclusion criteria were considered as potential participants and added to the list of daily potential participants. The exclusion criteria were slightly different for the two types of agencies. For the intervention agencies, any dyad with a child who was four years and five months or older, or a mother/primary caregiver who was pregnant would be excluded from study. Also, any mother/primary caregiver whose child had the following high risk factors would be excluded from the study. These risk factors were: inadequate growth or failure to thrive, low birthweight and very low birthweight, premature, small for gestational age, low head circumference, low hemoglobin/low hematocrit, and risk of low hemoglobin/low hematocrit. In the comparison agencies, any dyad with a child who was three years and four months or older, or a mother/primary caregiver who was pregnant would be excluded from study. Also, any mother/primary caregiver whose child had the high risk factors listed previously would be excluded from the study. Therefore, the study population consisted of only non-pregnant women

and their infants and children (who did not have any of the risk factors) enrolled in Missouri's WIC program. The mothers/primary caregivers served as proxy clients for the infants and children.

II. Data Collection

After selecting a potential dyad and explaining the study to the mother/primary caregiver, the mother/primary caregiver was asked if s/he would like to participate in the study. A mother/primary caregiver who agreed to participate was given an informed consent form to read and sign. If s/he could not read, the nutritionist would read and explain the content to her/him. Height and weight measurements of the dyad were taken and entered on the weight status caregiver's entry screen in the Health Agency Networks Data System (HANDS). The weight status caregivers' screens (entry, update and inquiry) and associated computer programs were created in the HANDS. The HANDS was enhanced to include the calculation of BMIs and the determination of stages of change of the mothers/primary caregivers. Nutritionists entered the standing height and weight measurements of dyads on the entry screen and the program calculated their BMIs. The stages of change screens (entry, update and inquiry) and accompanying computer programs to go with the weight status caregiver's screens were also created in the HANDS. The stages of change screens were programmed to determine the stages of change of mothers/primary caregivers.

A mothers'/primary caregivers' survey questionnaire (Appendix A) was developed to determine knowledge and attitudes toward overweight in children, and evaluation of the competencies of nutritionists in applying the TTMA. After recruiting the dyads, their height and weight measurements were taken and the survey questionnaires were given to the mothers/primary caregivers to take home, complete, and return two months later. These two activities were repeated six months and twelve months later at re-certifications. When mothers/primary caregivers returned to clinics two months later, they submitted the completed questionnaires and were given the readiness to change self-assessment questionnaire (Appendix B) to complete at the clinic. Responses to the self-assessment questionnaires were entered on the stages of change entry screen in the HANDS. The system was programmed to determine their stages of change (pre-contemplation, contemplation, preparation, action, and maintenance) for fat and fiber intake, based on a developed algorithm (Appendix C). Nutritionists tailored nutrition education/counseling to mothers'/primary caregivers' determined stages of change. The readiness to change self-assessment questionnaire was completed every two months.

Data entered into the HANDS by the local agencies were monitored in the central office using paper printouts. These printouts were developed at the beginning of the implementation phase. Completed mothers'/primary caregivers' questionnaires were collected by WIC agency nutritionists and sent to the central office to be received no later than the 5th of the following month. Data from the questionnaires were entered into another database as they were received. Nutritionists provided nutrition education and counseling tailored to mothers'/primary caregivers' determined stages of change. No counseling was provided after assessing mothers'/caregivers' stages of change at certification and re-certification dates. One of the features of the client-centered approach was to allow the mother/primary caregiver to choose the food category (fat or fiber) on which she would prefer nutritionists to focus nutrition education

and counseling. After reviewing a mother's/primary caregiver's determined stages of change for the two food categories (fat and fiber), the participant was asked to choose the food category s/he preferred to discuss during the session, and the nutritionists tailored education and counseling accordingly. When the mother/primary caregiver did not indicate a preference for a particular food category, the nutritionist focused nutrition education and counseling on a food category at the lowest stage of change for that particular mother/primary caregiver. When the lowest stage of change was the pre-contemplation stage, the nutritionist used motivational interviewing techniques to provide education and counseling. When a mother/primary caregiver chose to discuss matters other than food, the nutritionist was also advised to do that.

Except for assessments taken at certification or re-certifications dates, the stages of change of mothers/primary caregivers were assessed every two months and nutrition education and counseling were provided immediately after each assessment. At the end of each counseling session, the nutritionist provided corresponding card(s) or nutrition education materials (Appendix D) to a mother/primary caregiver, depending on which stage(s) of change and food categories for which counseling was provided. Nutrition education materials (cards) were developed to assist nutritionists in providing nutrition education/counseling to mothers/primary caregivers. Each stage of change had a different color card: contemplation was orange, preparation was yellow, action was green, and maintenance was blue. No cards were developed for the pre-contemplation stage. The number of cards provided during each nutrition education/counseling session varied, according to the receptiveness of the mother/primary caregiver. However, not more than three cards were provided at each counseling session. The cards provided to participants were documented on the stages of change caregiver entry screen. The same card could be provided to a mother/primary caregiver multiple times if it was determined that she was in the same stage of change for a food category that number of times. Although no cards were developed specifically for addressing physical activity, nutritionists were encouraged to provide counseling on this when appropriate.

III. Data Analysis

The two data sets, the data entered into the HANDS and the data collected by using the mothers/primary caregivers questionnaire were merged by using Departmental Client Numbers (DCNs) assigned to the mothers/primary caregivers who participated in the study. Frequency analysis was conducted on the stages of change variables, weight status variables, and knowledge and attitudes variables at baseline (Time 1), six months after intervention (Time 2) and 12 months after intervention (Time 3) for cases in the intervention agencies. The same type of analysis was also conducted on these same variables for the cases in the comparison agencies at Time 1 and Time 3 (no Time 2 data were collected in the comparison agencies). Chi-square tests for comparing overall distributions, two-sample Z tests for comparing proportions, two-sample T tests and paired samples T tests for comparing means were conducted to examine the differences of interest.

IV. Limitations of the Study

High attrition and missing data for some of the variables for dyads that were included in the study were the greatest limitations. These limitations left small sample sizes for rendering

analysis, made comparison within and between the intervention and comparison agencies difficult, as well as caused generalization of the results obtained to the population to be less valuable. Participants were free to request termination from the study according to the informed consent forms they signed, and furthermore were not required to provide an explanation for the request.

This study compared the effects of TTMA to counseling and traditional nutrition education and counseling on the readiness to change of mothers/primary caregivers. However, the effect of the TTMA to counseling in the four intervention agencies could vary due to the turnover and differences in the competency of nutritionists, and tests were not applied to address potential effects on counseling related to these issues. Furthermore, an effective tool to measure the competency was not available. On the other hand, local WIC providers use a variety of nutrition education methods under the one umbrella of traditional nutrition education and counseling. It is possible that different combinations of these methods were used by the comparison agencies.

One of the original research questions in the design of the study was whether the TTMA to counseling resulted in a decrease in the BMIs of the children who were 24 months or older. This question could not be answered due to the insufficient sample sizes in both the intervention and comparison agencies at different time periods. For example, out of the children who were at risk for overweight, there were only 26 cases in the intervention agencies and 19 cases in the comparison agencies at Time 1, 21 cases in the intervention agencies at Time 2, and 10 cases in the intervention agencies and 15 cases in the comparison agencies at Time 3. Therefore, the original research question was reformed as the one listed as the question No. 2 which included the BMIs of all children with available information.

Other limitations were length of the study and state and federal awareness campaigns on health promotion. A significant and steady decrease of the BMI of a mother/primary caregiver or child who is overweight may only happen at the stage of maintenance. Therefore, a time period of six months (or even 12 months) would be very likely insufficient to see the effect of the approach. Contextually, the anticipated “readiness to change” among the participants may not be completely due to the intervention, but rather could be related to other state and federal awareness campaigns and/or literature that might have heightened the clients’ awareness.

RESULTS AND DISCUSSIONS

I. Dyads in the Study

Out of 1,529 total dyads recruited, 1,027 (67.2%) were included in study with 32.8% terminating their participation. The majority (66.6%) of total intervention dyads recruited were included in the study, while 33.3% terminated their participation. Likewise, the majority (67.6%) of total comparison dyads recruited were included in the study and 32.4% terminated their participation. (Table 1) The most common reason for termination in the intervention agencies was due to participant’s request (45.1%). In contrast, within the comparison agencies, the most common reason was becoming pregnant during the project period (23.2%). (Table 2) Out of the

1,027 dyads that were included in the study, 212 (20.6%) did not answer the readiness to change self-assessment questionnaires for fat and fiber intake and 83 dyads (8.1%) did not have information on the education level of mothers/primary caregivers.

Table 1: Dyads Recruited, Terminated and Included in the Study by Agency

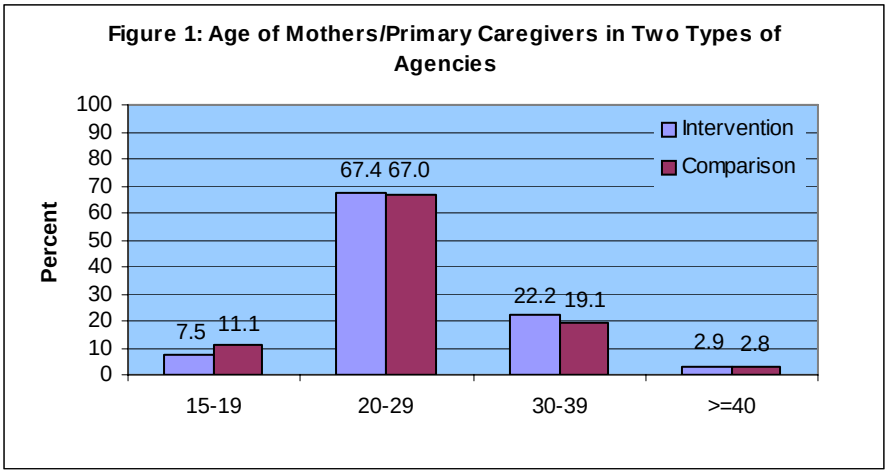
Agency	Total Recruited	Terminated		Included in Study	
	No.	No.	%	No.	%
Intervention Agency					
Cole County	133	45	33.8	88	66.2
South County Health Center	195	65	33.3	130	66.7
Springfield/Greene County	215	58	27.0	157	73.0
Truman Medical Ctr. Hosp. Hill	134	58	43.3	76	56.7
SubTotal	*677*	*226*	*33.3*	*451*	*66.6*
Comparison Agency					
Bollinger County	32	3	9.4	29	90.6
Butler County	56	1	1.8	55	98.2
Columbia/Boone County	77	1	1.3	76	98.7
Connect Care Flo-Hill	32	3	9.4	29	90.6
Family Care Carondelet	65	5	7.7	60	92.3
Newton County	92	31	33.7	61	66.3
Phelps County	141	64	45.4	77	54.6
Saline County	29	12	41.4	17	58.6
Scott County	29	1	3.4	28	96.6
Swope Health Services	79	47	59.5	32	40.5
Texas County	103	43	41.7	60	58.3
Wright County	117	65	55.6	52	44.4
SubTotal	*852*	*276*	*32.4*	*576*	*67.6*
Grand Total	**1,529**	**502**	**32.8**	**1,027**	**67.2**

Table 2: Dyads Terminated and Reasons for Termination for Intervention and Comparison Agencies

Reasons for Termination	Intervention		Comparison		Total	
	No.	%	No.	%	No.	%
Failure to pick up food instruments for 3 mos.	25	11.1	61	22.1	86	17.1
Became pregnant during project	47	20.8	64	23.2	111	22.1
Participant's request	102	45.1	41	14.9	143	28.5
Missing proof of income			4	1.4	4	0.8
If infant/child becomes high risk	13	5.8	11	4.0	24	4.8
Moved out of area	23	10.2	45	16.3	68	13.5
Dual participant/program abuse			1	0.4	1	0.2
Exceeds income level	5	2.2	3	1.1	8	1.6
Failure to re-certify	9	4.0	42	15.2	51	10.2
Child turned 5 years old	2	0.9	4	1.4	6	1.2
Total	**226**	**100.0**	**276**	**100.0**	**502**	**100.0**

II. Demographic Characteristics of Mothers/Primary Caregivers

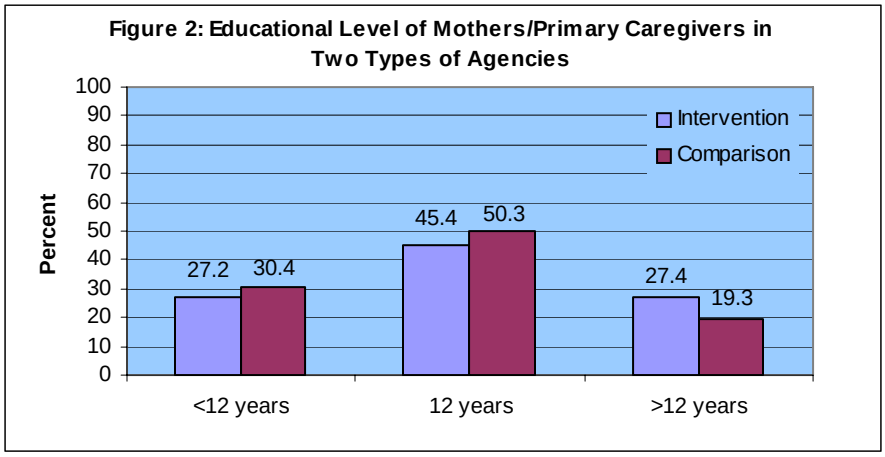
The majority of mothers/primary caregivers (Figure 1) were in the 20-29 age group in both types of agencies. There was a slight difference of 3.6 percentage points in the 15-19 age group and 3.1 percentage points in the 30-39 age group between the two types of agencies.



Total: N=1,027. Intervention agencies: N=451; Comparison agencies: N=576.

Two-sample tests for proportions show that there was an almost statistically significant difference between the two types of agencies on the percentages of mothers/primary caregivers who were 15-19 years old ($Z = -1.93$ and $p = 0.053$), and there were statistically no significant differences in the other three age groups ($Z = 0.13$ and $p = 0.894$ for the 20-29 years old group; $Z = 1.21$ and $p = 0.225$ for 30-39 years old group; $Z = 0.10$ and $p = 0.920$ for ≥ 40 years old group). A Chi-square test for the overall distribution also shows that there was statistically no significant difference between the two types of agencies (Chi-square value = 4.57 and $p = 0.206$).

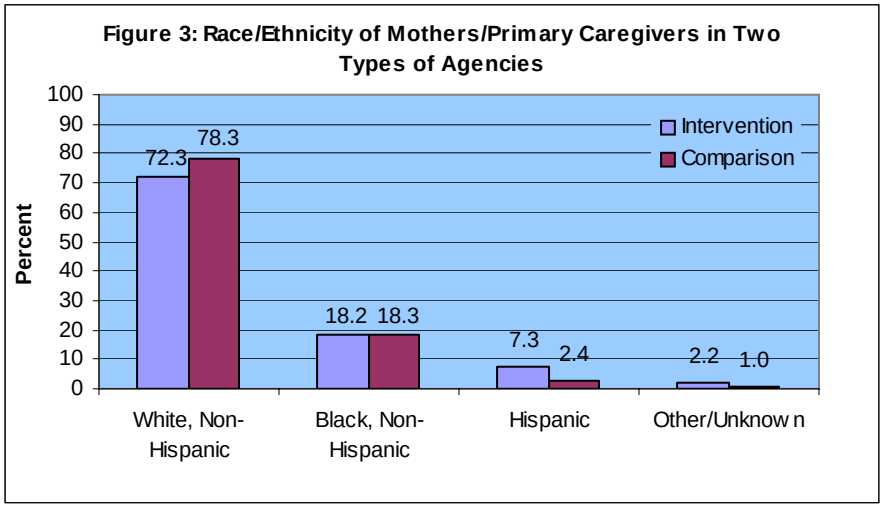
The percentages of mothers/primary caregivers who had received education for less than 12 years were 27.2% in the intervention agencies and 30.4% in the comparison agencies (3.2 percentage points difference), and those who had received education for 12 years were 45.4% in the intervention agencies and 50.3% in the comparison agencies (4.9 percentage points difference). However, mothers/primary caregivers who had received more than 12 years of education were about 8 percentage points higher in the intervention agencies than in the comparison agencies (Figure 2).



Total: N=944. Intervention agencies: N=394; Comparison agencies: N=550.

Two-sample tests for proportions show that there were statistically no significant differences between the two types of agencies on the percentages of mothers/primary caregivers who received < 12 years of education and those who received 12 years of education. (Z = -1.07 and p = 0.285 for <12 years of education group; Z = -1.44 and p = 0.150 for 12 years of education group.) However, there was a statistically significant difference in the >12 years of education group (Z = 2.87 and p = 0.004). A Chi-square test on the overall distribution between the two types of agencies shows there was a statistically significant difference (Chi-square value = 8.27 and p = 0.016).

The three main race/ethnicity groups included in the study were White (Non-Hispanic), Black (Non-Hispanic), and Hispanic mothers/primary caregivers (Figure 3). The majority (greater than 70%) of mothers/primary caregivers were White (Non-Hispanic) in both the intervention and comparison agencies. The two types of agencies had similar percentages (approximately 18%) of Black (Non-Hispanic) mothers/primary caregivers, but different percentages of White, Non-Hispanic and Hispanic mothers/primary caregivers. Two-sample tests for proportions show that there was statistically no significant difference between the percentages of the Black, Non-Hispanic mothers/primary caregivers in the two types of agencies (Z = -0.02 and p = 0.984). However, there was a statistically significant difference between the percentages of the White, Non-Hispanic mothers/primary caregivers (Z = -2.23 and p = 0.026) in the two types of agencies. There was also a statistically significant difference between the percentages of the Hispanic mothers/primary caregivers (Z = 3.72 and p = 0.002) in the two types of agencies. A Chi-square test shows there was a statistically significant difference on the overall distribution between the two types of agencies (Chi-square value = 17.33 and p = 0.004).



Total: N=1,027. Intervention agencies: N=451; Comparison agencies: N=576.

The study required that the two samples (mothers/primary caregivers in the intervention agencies and comparison agencies, respectively) should be similar in terms of age, education, and race/ethnicity (demographic variables), as well as the stages of change and weight status variables (dependent variables) before the implementation of the intervention program, so that the differences on the dependent variables that occurred later on in the intervention agencies could be attributed to the intervention program. However, there were more White, Non-Hispanic

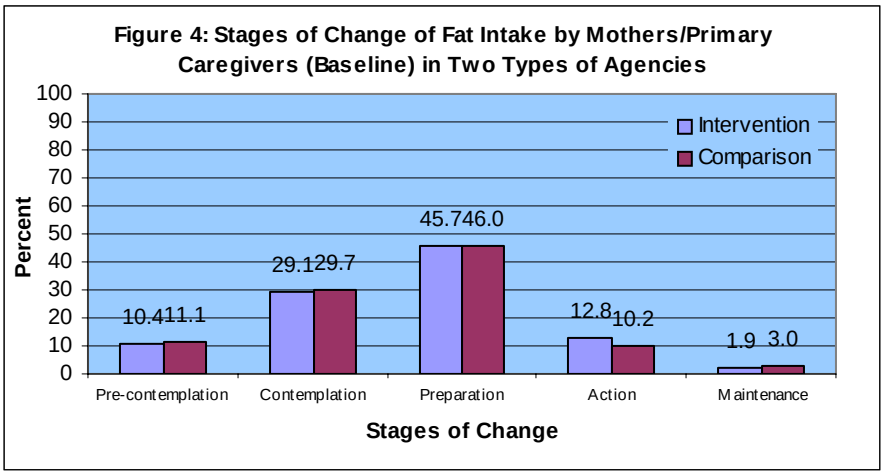
mothers/primary caregivers in the comparison agencies than in the intervention agencies and there were more mothers/primary caregivers who had received education for more than 12 years in the intervention agencies than in the comparison agencies. These differences, as will be demonstrated in the next sections of the report, created a bias in the distribution of the percentages of mothers/primary caregivers on the stages of change variable of fiber intake, though not fat intake, Body Mass Index (BMI) and Ponderal Index (PI), between the two types of agencies at pre-intervention (baseline). Therefore, the bias from the demographic variables on the baseline data for the stages of change variables needed to be controlled to allow for comparisons between the two types of agencies and within each type of agency.

III. Impact of the Transtheoretical Stages of Change Model Approach to Counseling on the Readiness to Change of Mothers/Primary Caregivers

A. Baselines for the Stages of Change in the Intervention and Comparison Agencies

To examine the effect of the TTMA on the readiness to change of mothers/primary caregivers in the intervention agencies, common baseline (pre-intervention) data were needed for the stages of change variables in the two types of agencies. This was accomplished by first comparing the stages of change of fat and fiber intake (Figures 4 and 5).

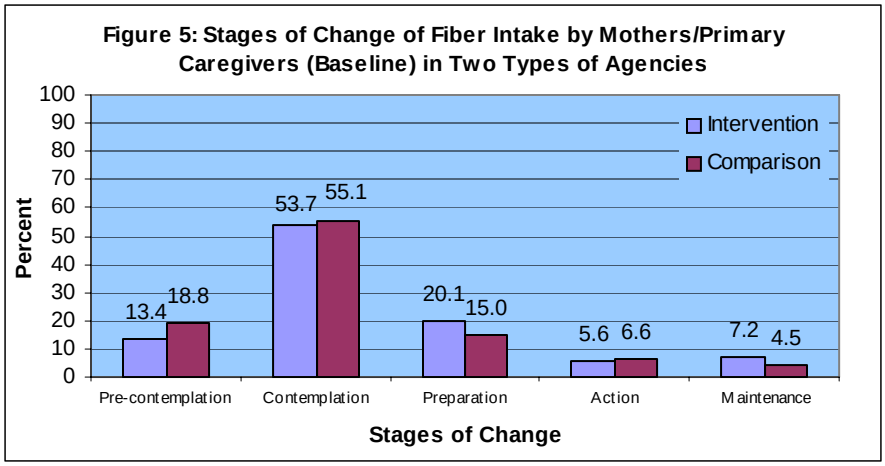
Figure 4 that relates to fat intake indicates that the percentages of mothers/primary caregivers on each stage between the two types of agencies were fairly similar. A Chi-square test shows there was statistically no significant difference (Chi-square value = 2.295 and p = 0.682) on the overall distribution of stages of change of decreasing fat intake between the intervention and comparison agencies. Two-sample tests for proportions show that there were statistically no significant differences between the percentages of the two types of agencies in the pre-contemplation (Z = -0.31 and p = 0.754), contemplation (Z = -0.18 and p = 0.861), preparation (Z = -0.09 and p = 0.930), action (Z = 1.18 and p = 0.239), and maintenance stages (Z = -0.99 and p = 0.322).



N=374 for intervention agencies; N=441 for comparison agencies

However, Figure 5 that relates to fiber intake shows there were more mothers/primary caregivers in the intervention agencies at the preparation (5.1 percentage points more) and

maintenance stages (2.7 percentage points more) than in the comparison agencies at those stages. In contrast, at the pre-contemplation stage, the percentage of mothers/primary caregivers was greater (5.4 percentage points more) in the comparison agencies than in the intervention agencies. A Chi-square test shows there was a statistically significant difference (Chi-square value = 9.615 and p = 0.047) on the overall distribution of stages of change of increasing fiber intake between the intervention and comparison agencies. Two-sample tests for proportions show that there was a statistically significant difference between the percentages of the two types of agencies in the pre-contemplation stage (Z = -2.10 and p = 0.036), and there was an almost statistically significant difference in the preparation stage (Z = 1.91 and p = 0.056). However, there were no statistically significant differences in the contemplation (Z = -0.39 and p = .698), action (Z = -0.57 and p = 0.569), and maintenance (Z = 1.64 and p = 0.101) stages. This shows that the baselines on the stages of change of fiber intake in the two types of agencies were slightly different which could have resulted from the statistically significant different values of the demographic variables.



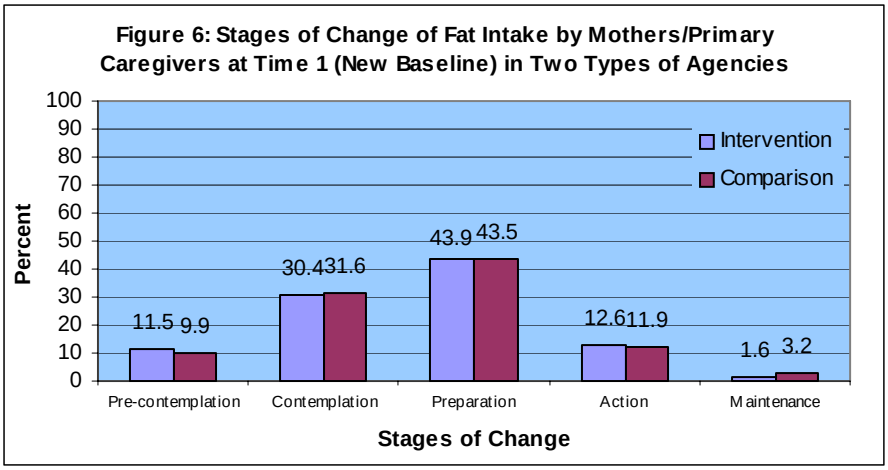
N=374 for intervention agencies; N=441 for comparison agencies

Therefore, to allow for the follow-up comparison of outcomes between the two types of agencies and within each type of agency, the effect from the biased distributions of the three demographic variables on the stages of change variables needed to be controlled.

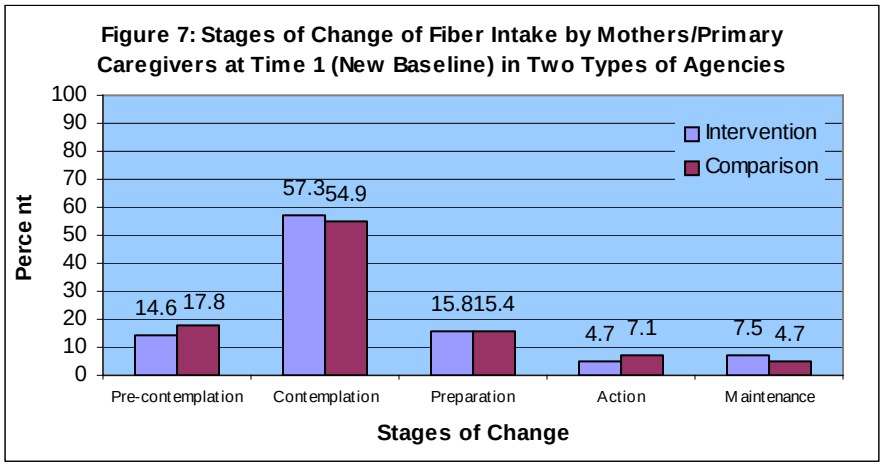
The method used in this study to control for the effect of the three demographic variables was matching mothers/primary caregivers on age, education, and race/ethnicity. For example, a mother/primary caregiver in the intervention agencies who was White, Non-Hispanic, 20-39 years old, and had an education of 12 years was matched to another mother/primary caregiver in the comparison agencies who had the same characteristics. As the result of matching, new baselines were established for the stages of change of fat and fiber intake (Figures 6 and 7).

Chi-square tests show there were statistically no significant differences on the overall distributions of stages of change of decreasing fat intake (Chi-square value = 1.756 and p = 0.781) and increasing fiber intake (Chi-square value = 3.512 and p = 0.476) between the intervention and comparison agencies after mothers/primary caregivers were matched on the three demographic variables. In addition, two-sample tests for proportions show that there were statistically no significant differences between the percentages of mothers/primary caregivers in

the two types of agencies on the stages of change of fat intake in the pre-contemplation stage (Z = 0.58 and p = 0.565), contemplation (Z = -0.29 and p = 0.773), preparation (Z = 0.09 and p = 0.929), action (Z = 0.27 and p = 0.786), and maintenance stages (Z = -1.17 and p = 0.243) after matching.



N=253 for intervention agencies; N=253 for comparison agencies



N=253 for intervention agencies; N=253 for comparison agencies

Two-sample tests for proportions also show that there were statistically no significant differences between the percentages of the mothers/primary caregivers in the two types of agencies on the stages of change of fiber intake in the pre-contemplation stage (Z = -0.85 and p = 0.396), contemplation (Z = 0.54 and p = 0.591), preparation (Z = 0.00 and p = 1.000), action (Z = -1.13 and p = 0.259), and maintenance stages (Z = 1.30 and p = 0.194) after matching.

B. Beginning Stages of Change of Mothers/Primary Caregivers

Based on the new baselines, the percentage of mothers/primary caregivers at the beginning stages of change for each food category was determined in order to have an understanding of the initial stage of a majority of mothers/primary caregivers for each food category. It was observed that the highest percentages of mothers/primary caregivers in the

intervention and comparison agencies, 43.9% and 43.5% respectively, began in the preparation stage for fat intake (Table 3). This pattern was basically similar when the data were cross tabulated by the demographic variables except that there were more Black, Non-Hispanic mothers/primary caregivers in the contemplation stage than in the preparation stage for fat intake in the comparison agencies and equal percentages in the intervention agencies. This indicates that the behavior change could be the result of several state and federal awareness campaigns on fat and obesity, discussions about fat and obesity in the media at the local agencies and elsewhere.

Table 3. Percentages of Mothers/Primary Caregivers at Beginning Stages of Change for Fat Intake

		Pre-contemplation (%)	Contemplation (%)	Preparation (%)	Action (%)	Maintenance (%)
Intervention		11.5	30.4	43.9	12.6	1.6
Comparison		9.9	31.6	43.5	11.9	3.2
Age	**Intervention**					
	20-29 years	10.4	30.6	43.7	13.1	2.2
	30-39 years	13.6	27.3	50.0	9.1	0.0
	Comparison					
	20-29 years	10.9	33.3	42.1	11.5	2.2
	30-39 years	11.4	27.3	45.5	13.6	2.3
Education	**Intervention**					
	< High school	11.1	33.3	42.9	12.7	0.0
	High school	9.1	29.8	47.1	12.4	1.7
	> High school	15.9	29.0	39.1	13.0	2.9
	Comparison					
	< High school	6.3	38.1	39.7	14.3	1.6
	High school	10.7	28.1	47.9	10.7	2.5
	> High school	11.6	31.9	39.1	11.6	5.8
Race/ Ethnicity	**Intervention**					
	White	11.4	30.0	44.1	12.7	1.8
	Black	8.0	40.0	40.0	12.0	0.0
	Comparison					
	White	9.5	30.9	44.1	11.8	3.6
	Black	12.5	41.7	37.5	8.3	0.0

N=253 for the intervention agencies; N=253 for the comparison agencies.

The preparation stage has both intention and behavioral criteria (Prochaska, 1992). A study shows that individuals begin to take steps toward action as they move into the preparation stage (Greene et al., 1994). Individuals in this stage have either taken action in the past year, or have made some small behavior change (Prochaska, 1992). Mothers'/primary caregivers' awareness might have heightened and motivated them to take actions relating to their fat intake. It was observed that greater than 30% of mothers/primary caregivers were at contemplation stage, which indicates that they were seriously thinking about reducing their fat intake. Prochaska (1992) estimated that, on the average, individuals stay in this stage for at least two years.

A majority of mothers/primary caregivers in the intervention and comparison agencies, 57.3% and 54.9% respectively, were in the contemplation stage for fiber intake at the beginning of the study. (Table 4) Again, the pattern was similar with respect to age groups, education levels and race/ethnicity. This indicates that a majority of mothers/primary caregivers were seriously thinking about increasing their fiber intake at the start of the project. Individuals in the

contemplation stage are aware of a behavior change and are seriously thinking about overcoming problem behaviors, but have not yet committed to take action (Prochaska et al., 1994).

Table 4. Percentages of Mothers/Primary Caregivers at Beginning Stage of Change for Fiber Intake

		Pre-contemplation (%)	Contemplation (%)	Preparation (%)	Action (%)	Maintenance (%)
Intervention		14.6	57.3	15.8	4.7	7.5
Comparison		17.8	54.9	15.4	7.1	4.7
Age	**Intervention**					
	20-29 years	15.8	60.7	13.1	3.3	7.1
	30-39 years	9.1	45.5	27.3	6.8	11.4
	Comparison					
	20-29 years	16.9	59.0	13.7	6.0	4.4
	30-39 years	15.9	43.2	25.0	9.1	6.8
Education	**Intervention**					
	< High school	19.0	55.6	19.0	0.0	6.3
	High school	15.7	55.4	16.5	5.0	7.4
	> High school	8.7	62.3	11.6	8.7	8.7
	Comparison					
	< High school	17.5	57.1	14.3	6.3	4.8
	High school	14.9	54.5	17.4	7.4	5.8
	> High school	23.2	53.6	13.0	7.2	2.9
Race/ Ethnicity	**Intervention**					
	White	14.1	57.7	15.5	5.0	7.7
	Black	20.0	60.0	12.0	0.0	8.0
	Comparison					
	White	18.2	56.4	14.5	6.4	4.5
	Black	12.5	54.2	20.8	8.3	4.2

N=253 for the intervention agencies; N=253 for the comparison agencies.

C. Movement of Mothers/Primary Caregivers through the Stages of Change Continuum in the Intervention and Comparison Agencies

With many mothers/primary caregivers dropping out of the study, it was necessary to examine whether those mothers/primary caregivers who had information on the stages of change variables at Time 2 and Time 3 in the intervention agencies and Time 3 in the comparison agencies were still representative of the original samples. Table 5 shows the attrition rates of 41.7% from Time 1 to Time 2 in the intervention agencies and 62.8% from Time 1 to Time 3 in the comparison agencies. Table 6 shows that the percentages of mothers/primary caregivers on the three demographic variables at time 2 were still very similar to those at Time 1. Furthermore, Table 7 shows that the cases that had no information at Time 2 were also similar to those at Time 1, thus demonstrating that the sample at Time 2 can still be used to draw conclusions on the effect of the TTMA after six months of intervention.

However, a very high attrition rate of 85.3% on the stages of change variables occurred between Time 1 and Time 3 in the intervention agencies (Table 5). In addition, Table 6 shows that the percentage of mothers/primary caregivers who received more than 12 years of education at Time 3 (32.6%) was much higher than at Time 1 (28.4%). The table also shows that the percentage of mothers/primary caregivers who were White, Non-Hispanic at Time 3 (65.5%) was much lower than at Time 1 (72.2%). This attrition of the original sample and the dissimilarities in education level and race/ethnicity might have created a bias which affected the

external validity of the study results from the comparisons of the stages of change variables between Time 1 and Time 3. Therefore, no statistical tests were conducted on these comparisons.

Table 5: Number of Cases in Study at Time 1, Time 2, and Time 3 for the Stages of Change Variables in the Two Types of Agencies

	Time 1	Time 2		Time 3	
	N	N	Attrition Rate	N	Attrition Rate
Intervention Agencies	374	218	41.7%	55	85.3%
Comparison Agencies	441	---	---	164	62.8%
Total	815	---	---	219	73.1%

Table 6: Percentage Distribution for the Demographic Variables of Mothers/Primary Caregivers Who Had Information on the Stages of Change Variables in the Dataset at Time 1, Time 2 and Time 3

	Mothers/Primary Caregivers Who Had Information at Time 1		Mothers/Primary Caregivers Who Had Information at Time 2		Mothers/Primary Caregivers Who Had Information at Time 3	
	Intervention	Comparison	Intervention	Comparison	Intervention	Comparison
Age	*N=374*	*N=441*	*N=218*		*N=55*	*N=164*
15-19	6.7	10.9	6.9	---	3.6	9.2
20-29	65.8	66.0	60.1	---	47.3	65.9
30-39	24.1	19.5	28.0	---	41.8	22.6
≥ 40	3.5	3.6	4.6	---	7.3	2.4
Education	*N=335*	*N=422*	*N=195*		*N=49*	*N=157*
< 12 years	25.7	28.0	26.2	---	24.5	28.7
12 years	46.0	51.7	44.1	---	42.9	53.5
> 12 years	28.4	20.4	29.7	---	32.6	17.8
Race/Ethnicity	*N=374*	*N=441*	*N=218*		*N=55*	*N=164*
White, Non-Hispanic	72.2	83.0	68.8	---	65.5	89.0
Black, Non-Hispanic	18.5	13.4	21.1	---	23.6	7.3
Hispanic	7.8	2.5	7.3	---	7.3	3.1

Table 7: Percentage Distribution for the Demographic Variables of Mothers/Primary Caregivers Who Had Information on the Stages of Change Variables in the Dataset at Time 1, but Not at Time 2 and Time 3

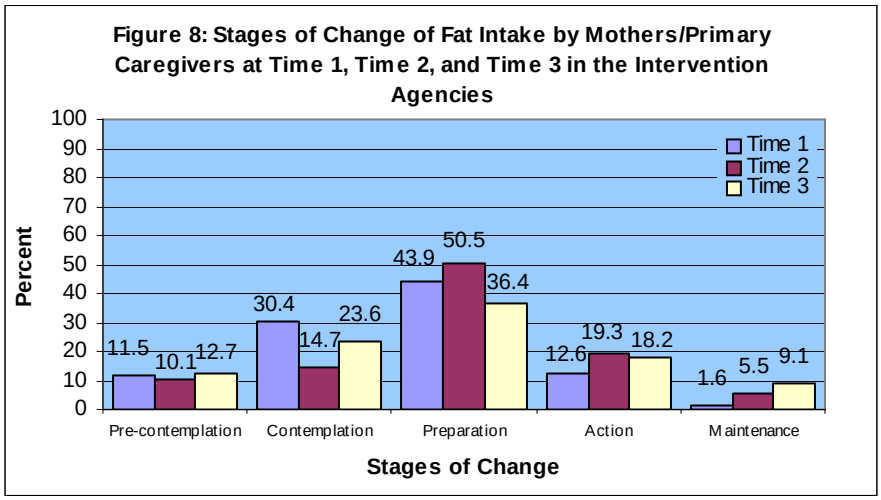
	Mothers/Primary Caregivers Who Had Information at Time 1		Mothers/Primary Caregivers Who <u>Had No Information</u> at Time 2		Mothers/Primary Caregivers Who <u>Had No Information</u> at Time 3	
	Intervention	Comparison	Intervention	Comparison	Intervention	Comparison
Age	*N=374*	*N=441*	*N=156*		*N=319*	*N=277*
15-19	6.7	10.9	6.4	---	7.2	11.9
20-29	65.8	66.0	73.1	---	69.0	66.1
30-39	24.1	19.5	18.6	---	21.0	17.7
≥ 40	3.5	3.6	1.9	---	2.8	4.3
Education	*N=335*	*N=422*	*N=140*		*N=286*	*N=265*
< 12 years	25.7	28.0	25.0	---	25.9	27.6
12 years	46.0	51.7	48.6	---	46.5	50.6
> 12 years	28.4	20.4	26.4	---	27.6	21.9
Race/Ethnicity	*N=374*	*N=441*	*N=156*		*N=319*	*N=277*
White, Non-Hispanic	72.2	83.0	76.9	---	73.4	79.4
Black, Non-Hispanic	18.5	13.4	14.7	---	17.6	17.0
Hispanic	7.8	2.5	8.3	---	7.8	2.2

(1). Movement through the Stages of Change of Fat Intake from Time 1 to Time 2 and from Time 1 to Time 3 in the Intervention Agencies

To determine whether the TTMA approach resulted in an increase in the readiness to change of mothers/primary caregivers for decreasing fat intake within the intervention agencies, the percentage distribution of stages of change at Time 1 (baseline or pre-intervention) were compared with those at Time 2 (six months later) and at Time 3 (12 months later). At the end of six months of intervention, mothers/primary caregivers were expected to have moved forward through the stages of change continuum and ended up in the higher stages of change, despite any relapses that might have occurred between Time 1 and Time 2. The same expectation holds for Time 3. In general, progression through the stages of change continuum includes regression (relapse) and stagnation. Individuals usually would progress, regress (relapse), or remain in the same stages of change after each education or counseling session and in between sessions. Relapse is a common characteristic often associated with the stages of change process (Prochaska and DiClemente, 1983; Prochaska and DiClemente, 1982).

Figure 8 shows a summary of the movement of mothers/primary caregivers through the stages of change continuum of decreasing fat intake from Time 1 (new baseline) to Time 2 (six months later), and then to Time 3 (12 months later). At the end of six months of intervention, the greatest advancement of mothers/primary caregivers (6.7 percentage points increase) was into the action stage. Some advancement of mothers/primary caregivers into the preparation stage (6.6 percentage points increase) and the maintenance stage (3.9 percentage points increase) also occurred.

Two-sample tests for proportions show that the decrease from Time 1 to Time 2 in the percentage of mothers/primary caregivers in the contemplation stage ($Z = 4.04$ and $p < 0.0001$) was statistically significant. In contrast, the increases in the percentages of mothers/primary caregivers in the action ($Z = 1.97$ and $p = 0.025$) and maintenance ($Z = 2.34$ and $p = 0.01$) stages were statistically significant. However, there were statistically no significant differences in the pre-contemplation ($Z = 0.48$ and $p = 0.633$) and the preparation ($Z = -1.43$ and $p = 0.153$) stages.



N=253 for Time 1; N=218 for Time 2; N=55 for Time 3.

In order to determine the overall extent to which the TTMA increased the readiness to change of mothers/primary caregivers from Time 1 to Time 2 with regards to decreasing fat intake, the stages of change variable of fat intake was converted from a categorical variable to a numerical one by assigning scores to the five stages of change as follows: maintenance = 5, action = 4, preparation = 3, contemplation = 2 and pre-contemplation = 1. For example, if a mother was in the action stage, she would be assigned a score of "4". This allowed a two-sample T test conducted on the mean scores of stages of change at Time 1 (Mean score = 2.62, Std. Dev. = .90, N = 253) and Time 2 (mean score = 2.95, Std. Dev. = .98, N = 218). The test showed that there was a statistically significant difference on the mean scores ($t = 3.793$ and $p < 0.0001$). In addition, a paired samples T test was conducted on the mean scores of stages of change at Time 1 (Mean score = 2.63, Std. Dev. = .83, N = 218) and Time 2 (Mean score = 2.95, Std. Dev. = .98, N = 218). The test shows that there was a statistically significant difference on the mean scores of stages of change of fat intake ($t = 4.238$ and $p < 0.0001$). Therefore, after six months of intervention, there was a statistically significant increase in the readiness of mothers/primary caregivers regarding decreasing fat intake.

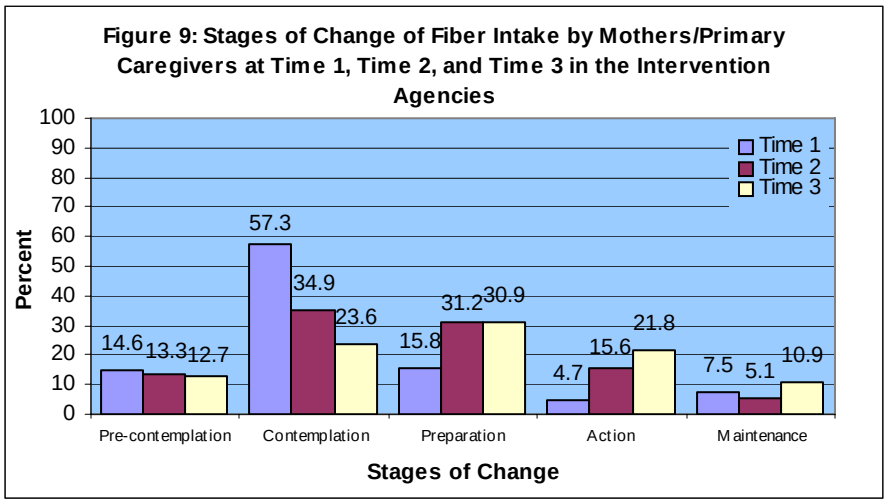
As a result of the high attrition rate (85.3%) from Time 1 to Time 3, only 55 mothers/primary caregivers had information on the stages of change of fat intake at Time 3. The small sample size at Time 3 did not allow valuable conclusions to be drawn from comparing Time 3 data to Time 1 data. Therefore, no tests were conducted to examine if the changes of the percentages were statistically significant. At the end of 12 months, the most advancement was into the maintenance stage (7.5 percentage points increase from Time 1). In addition, a good proportion of mothers/primary caregivers moved into the action stage (5.6 percentage points increase from Time 1).

(2). Movement through the Stages of Change of Fiber Intake from Time 1 to Time 2 and from Time 1 to Time 3 in the Intervention Agencies

Although a majority of mothers/primary caregivers (57.3%) started at the contemplation stage for fiber intake (Figure 9), after six months of intervention, the greatest advancements were into the preparation and action stages, with 15.4 and 10.9 percentage points increase, respectively. Movement from the contemplation stage into the action stage reflects a complete passage through one stage of change (preparation). Such a response is a great effect of the counseling approach, considering that individuals at the contemplation stage may stay there, on the average, for at least two years (Prochaska, 1992).

Two-sample tests for proportions show that from Time 1 to Time 2 there was a statistically significant decrease in the percentage of mothers/primary caregivers in the contemplation stage ($Z = 4.87$ and $p < 0.0001$), but not in the pre-contemplation stage ($Z = 0.41$ and $p = 0.340$). The tests also show that there were statistically significant increases in the percentages of mothers/primary caregivers in the in the preparation ($Z = 3.96$ and $p < 0.0001$) and the action ($Z = 3.96$ and $p < 0.0001$) stages, but not in the maintenance stage ($Z = -1.09$ and $p = 0.863$).

Likewise for treating the stages of change variable of fat intake, the stages of change variable of fiber intake was also converted from a categorical variable to a numerical one. The purpose was to determine the overall extent to which the TTMA increased the readiness to change of mothers/primary caregivers with regards to increasing fiber intake. A two-sample T test was conducted on the mean scores of stages of change at Time 1 (Mean score = 2.33, Std. Dev. = 1.06, N = 253) and Time 2 (Mean score = 2.64, Std. Dev. = 1.03, N = 218). The test shows that there was a statistically significant difference on the means scores of stages of change ($t = 3.218$ and $p = 0.001$). In addition, a paired samples t-test was conducted on the mean scores of stages of change at Time 1 (Mean score = 2.43, Std. Dev. = 0.99, N = 218) and Time 2 (mean score = 2.64, Std. Dev. = 1.06, N = 218). The test shows there was a statistically significant difference on the means scores of stages of change of fiber intake ($t = 2.657$ and $p = 0.004$). Therefore, after six months of intervention, there was a statistically significant increase in the readiness of mothers/primary caregivers regarding increasing fiber intake.



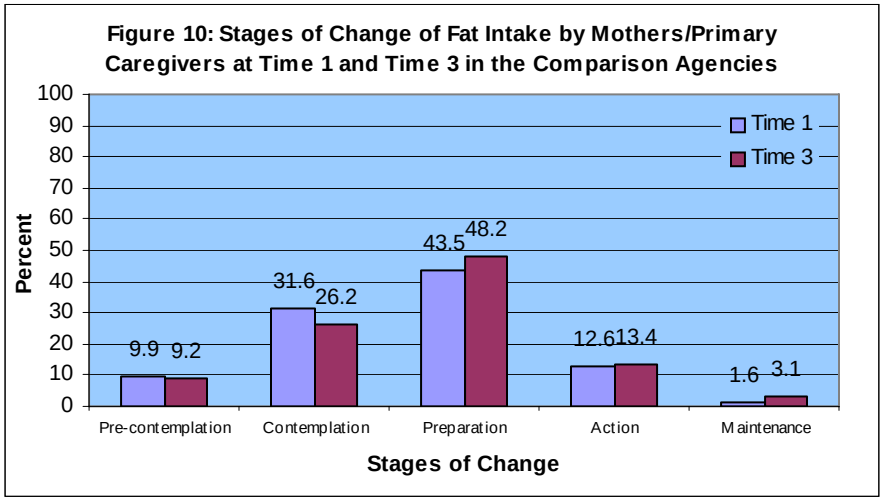
N =253 for Time 1; N=218 for Time 2; N=55 for Time 3.

Similar to the stages of change of fat intake, a high attrition rate (85.3%) from Time 1 to Time 3 resulted in only 55 mothers/primary caregivers who had information on the stages of change of fiber intake at Time 3. Figure 9 shows that at Time 3, a higher percentage of mothers/primary caregivers moved into the action stage (17.1 percentage points increase from Time 1), than into the preparation stage (15.1 percentage points increase from Time 1). Movement into the action stage reflects a complete passage though one stage of change (preparation). Some advancement into the maintenance stage (3.4 percentage points increase from Time 1) also occurred. Because of the very small sample size at Time 3, no statistical tests were conducted to determine if the differences in the percentages of mothers/primary caregivers in the preparation, action, and maintenance stages at Time 3 were statistically significant.

(3). Movement through the Stages of Change of Fat and Fiber Intake from Time 1 to Time 3 in the Comparison Agencies

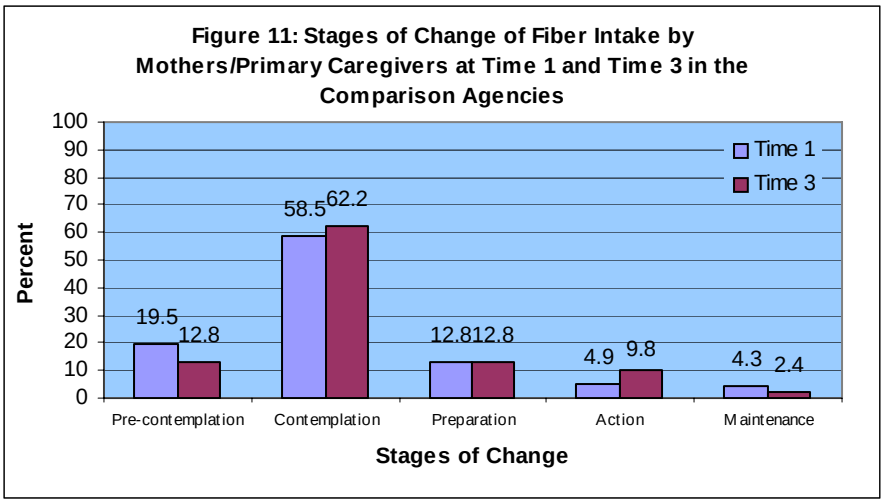
Mothers/primary caregivers in the comparison agencies received traditional nutrition education/counseling usually provided in WIC agencies. To examine if traditional nutrition education had any impact on the stages of change for decreasing fat intake and increasing fiber

intake in the comparison agencies, the stages of change at Time 1 (baseline or pre-intervention) were compared with the stages of change at Time 3 (12 months later). No data were collected at Time 2 for the comparison agencies. The attrition rate was 62.8% from Time 1 to Time 3 in the comparison agencies. In addition, mothers/primary caregivers who were White, Non Hispanic were 6 percentage points higher at Time 3 than at Time 1. The attrition from the original sample and the dissimilarities of the demographic characteristics led to a decision that no tests would be conducted to examine if the changes were statistically significant.



N=253 for Time 1; N=164 for Time 3.

Figure 10 indicates that traditional nutrition education and counseling might have some impact on the stages of change of decreasing fat intake. At Time 3, the greatest advancement was into the preparation stage (4.7 percentage points increase). There was also a decrease of 5.4 percentage points at the contemplation stage. Considering that a majority of mothers/primary caregivers started the study in the preparation stage for fat intake, the traditional nutrition education only succeeded in moving a few individuals into the preparation stage, although no statistical test was conducted to determine if this change was statistically significant.

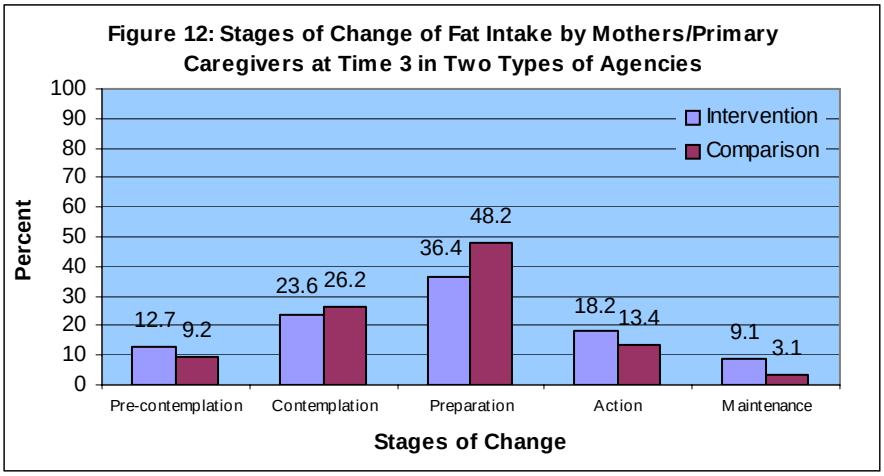


N=253 for Time 1; N=164 for Time 3.

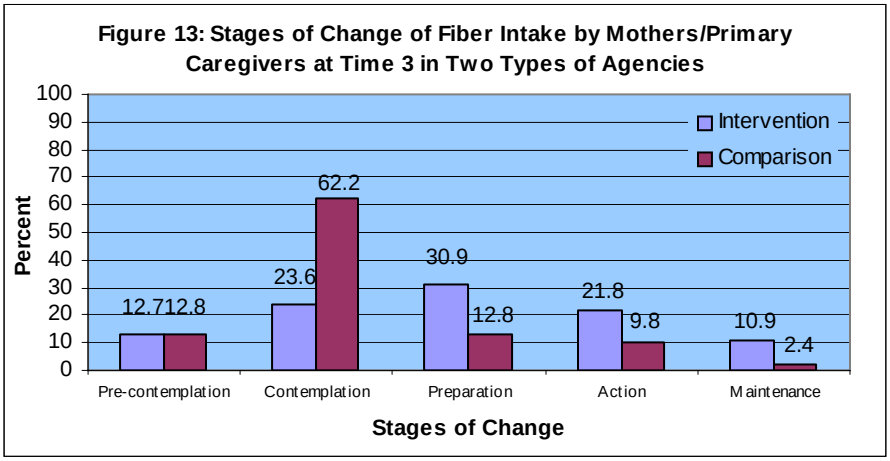
Figure 11 shows that after 12 months of traditional nutrition education and counseling, the greatest advancement of mothers/primary caregivers on the stages of change of fiber intake was into the action stage (4.9 percentage points increase). For the exact same reasons as just mentioned for the stages of change of fat intake, no tests were conducted to examine if the changes were statistically significant.

(4). Comparison on Stages of Change for Decreasing Fat Intake and Increasing Fiber Intake at Time 3 Between the Intervention and Comparison Agencies

Distributions of percentages of mothers/primary caregivers on the five stages of change for decreasing fat intake and increasing fiber intake at Time 3 (after 12 months of intervention) between the two types of agencies are displayed in Figures 12 and 13. The purpose was to compare the effect of the TTMA and traditional nutrition education on the stages of change of mothers/primary caregivers.



N=55 for intervention agencies; N=164 for comparison agencies.



N=55 for intervention agencies; N=164 for comparison agencies.

With many dyads dropping out of the study, only 55 mothers/primary caregivers in the intervention agencies and 164 mothers/primary caregivers in the comparison agencies remained

at Time 3. For decreasing fat intake, the percentages of mothers/primary caregivers in the intervention agencies were higher in the action (by 4.8 percentage points) and maintenance (by 6.0 percentage points) stages than those in the comparison agencies (Figure 12). For increasing fiber intake, the percentages of mothers/primary caregivers in the intervention agencies were also higher in the preparation (by 18.1 percentage points), action (by 12.0 percentage points) and maintenance (by 8.5 percentage points) stages (Figure 13). However, since the attrition rates were very high, no statistical tests were conducted on these differences.

IV. Impact of the Transtheoretical Stages of Change Model Approach to Counseling on the Weight Status of Mothers/Primary Caregivers and Children

The comparison of the effect of the TTMA on the weight status of mothers/primary caregivers and children between the two types of agencies required common baseline (pre-intervention) data from the variables of BMI of mothers/primary caregivers, BMI of children who were 24 months or older, and the Ponderal Index (PI) of infants and children who were less than 24 months old. This was accomplished by conducting two-sample T tests on these variables at Time 1 (pre-intervention). There was statistically no significant difference ($t = 1.903$ and $p = 0.06$) on the mean BMIs of mothers/primary caregivers between the intervention agencies (Mean value = 30.2, Std. Dev. = 8.70, N = 451) and the comparison agencies (Mean value = 29.3, Std. Dev. = 7.21, N = 576). Also, there was statistically no significant difference ($t = 0.979$ and $p = 0.328$) on the mean BMIs of children who were 24 months or older between the intervention agencies (Mean value = 17.1, Std. Dev. = 1.718, N = 170) and the comparison agencies (Mean value = 17.0, Std. Dev. = 2.089, N = 173). Likewise, there was statistically no significant difference ($t = -0.806$ and $p = 0.42$) on the mean PIs of children who were less than 24 months old between the intervention agencies (Mean value = 25.1, Std. Dev. = 3.95, N = 281) and the comparison agencies (Mean value = 25.3, Std. Dev. = 4.06, N = 403). Therefore, these tests show that the two types of agencies had common baseline data on these variables.

The impact of the TTMA to counseling on the BMIs of mothers/primary caregivers, the BMIs of children 24 months or older, and the PIs of infants and children less than 24 months old, was determined by examining whether the approach resulted in any decrease in the mean BMI and PI of these individuals. However, high attrition from Time 1 to Time 3 required examination of the mothers/primary caregivers remaining in the study at Time 2 and Time 3 to determine if they had similar demographic characteristics as the mothers/primary caregivers included in study at Time 1.

Table 8: Number of Cases in Study at Time 1, Time 2, and Time 3 for the BMIs of Mothers/Primary Caregivers in the Two Types of Agencies

	Time 1	Time 2		Time 3	
	N	N	Attrition Rate	N	Attrition Rate
Intervention Agencies	451	233	48.3%	72	84.0%
Comparison Agencies	576	---	---	253	56.1%
Total	1027			325	68.4%

Table 8 shows that the attrition rate from Time 1 to Time 2 in the intervention agencies was 48.3%. Table 9 shows that the percentages of mothers/primary caregivers in the intervention agencies on the three demographic variables at time 2 were still similar to those at

Time 1 except that there were more mothers/primary caregivers in the age group of 30-39 years old and fewer mothers/primary caregivers in the age group of 20-29 years old at Time 2. Furthermore, Table 10 shows that the cases lost at Time 2 were also similar to those at Time 1, thus demonstrating that the sample at Time 2 can still be used to draw conclusions on the effect of the TTMA on the weight status of mothers/primary caregivers and their children after six months of intervention.

Table 9: Percentage Distribution for the Demographic Variables of Mothers/Primary Caregivers Who Had Information on BMI in the Dataset at Time 1, Time 2 and Time 3

	Mothers/Primary Caregivers Who Had Information at Time 1		**Mothers/Primary Caregivers Who Had Information at Time 2**		**Mothers/Primary Caregivers Who Had Information at Time 3**	
	Intervention	Comparison	Intervention	Comparison	Intervention	Comparison
Age	*N=451*	*N=576*	*N=233*		*N=72*	*N=253*
15-19	7.5	11.1	6.9	---	4.2	10.3
20-29	67.4	67.0	60.5	---	52.8	66.9
30-39	22.2	19.1	28.3	---	36.1	20.6
≥ 40	2.9	1.8	4.3	---	7.0	3.2
Education	*N=394*	*N=550*	*N=206*		*N=63*	*N=241*
< 12 years	27.2	30.4	27.7	---	33.3	26.1
12 years	45.4	50.3	42.7	---	41.3	53.5
> 12 years	27.4	19.3	29.6	---	25.4	20.3
Race/Ethnicity	*N=451*	*N=576*	*N=233*		*N=72*	*N=253*
White, Non-Hispanic	72.3	78.3	69.1	---	62.5	83.4
Black, Non-Hispanic	18.2	18.3	20.6	---	20.8	13.4
Hispanic	7.3	2.4	7.3	---	12.5	2.4

Table 10: Percentage Distribution for the Demographic Variables of Mothers/Primary Caregivers Who Had Information on BMI in the Dataset at Time 1, but Not at Time 2 and Time 3

	Mothers/Primary Caregivers Who Had Information at Time 1		**Mothers/Primary Caregivers Who <u>Had No Information</u> Time 2**		**Mothers/Primary Caregivers Who <u>Had No Information</u> Time 3**	
	Intervention	Comparison	Intervention	Comparison	Intervention	Comparison
Age	*N=451*	*N=576*	*N=218*		*N=379*	*N=323*
15-19	7.5	11.1	8.3	---	8.2	11.8
20-29	67.4	67.0	74.8	---	70.2	67.8
30-39	22.2	19.1	15.6	---	19.5	18.0
≥ 40	2.9	1.8	1.4	---	2.1	2.5
Education	*N=394*	*N=550*	*N=188*		*N=331*	*N=309*
< 12 years	27.2	30.4	26.6	---	26.0	33.7
12 years	45.4	50.3	48.4	---	46.2	47.6
> 12 years	27.4	19.3	25.0	---	27.8	18.8
Race/Ethnicity	*N=451*	*N=576*	*N=218*		*N=379*	*N=323*
White, Non-Hispanic	72.3	78.3	75.7	---	74.1	74.0
Black, Non-Hispanic	18.2	18.3	15.6	---	17.7	22.0
Hispanic	7.3	2.4	7.3	---	6.3	2.5

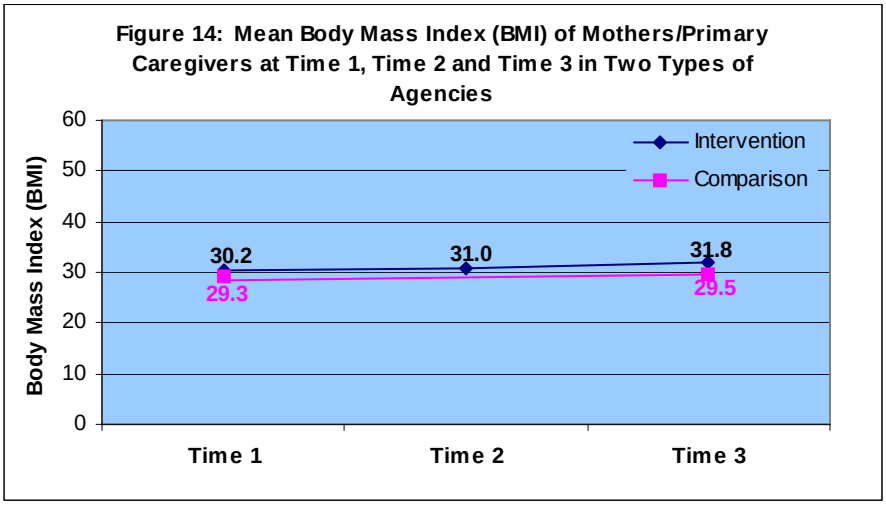
However, the attrition rate on BMIs of mothers/primary caregivers was very high (84.0%) from Time 1 to Time 3 in the intervention agencies (Table 8). Also, Table 9 shows that

the percentage of mothers/primary caregivers in the intervention agencies who received less than 12 years of education at Time 3 was much higher than that at Time 1 (6.1 percentage points difference), and the percentage of mothers/primary caregivers who were White, Non-Hispanic at Time 3 was much lower than that at Time 1 (9.8 percentage points difference). This attrition from the original sample and the dissimilarities of the demographic characteristics might have created a bias, which affected the external validity of the study results from Time 1 to Time 3. Therefore, no statistical tests were conducted on the change of the mean BMI of mothers/primary caregivers in the intervention agencies between Time 1 and Time 3.

The attrition rate for the mothers/primary caregivers in the comparison agencies was 56.1% from Time 1 to Time 3. In addition, there was a 5.1 percentage points increase for the mothers/primary caregivers who were White, Non-Hispanic at Time 3. Therefore, no test was conducted to determine if the change on the mean BMI of mothers/primary caregivers from Time 1 to Time 3 in the comparison agencies was statistically significant.

A. BMIs of Mothers/Primary Caregivers

The mean BMI of mothers/primary caregivers increased from 30.2 at Time 1 to 31.0 at Time 2 and 31.8 at Time 3 in the intervention agencies (Figure 14). The impact of the TTMA on the BMIs of mothers/primary caregivers was determined by conducting a two-sample T test on the mean BMIs at Time 1 and Time 2 in the intervention agencies. The test showed that there was statistically no significant difference (t = - 1.09 and p = 0.86) between the mean BMI at Time 1 (Mean value = 30.2, Std. Dev. = 8.70, N= 451) and the mean BMI at Time 2 (Mean value = 31.0, Std. Dev.= 8.63, N = 233) in the intervention agencies, indicating that the TTMA did not result in any significant decrease in the BMIs of mothers/primary caregivers after six months of intervention.



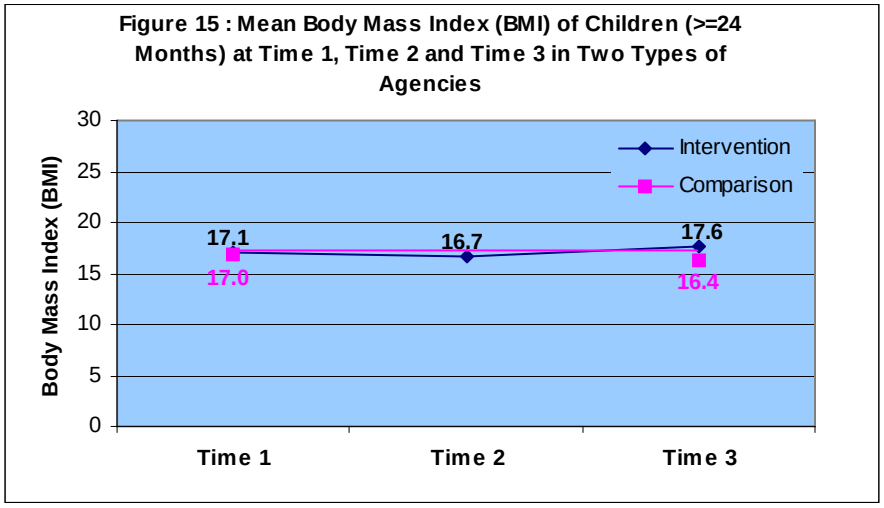
Time 1: N=1,027; 451 in intervention agencies and 576 in comparison agencies;
Time 2: N=233; 233 in intervention agencies and 0 in comparison agencies;
Time 3: N=325; 72 in intervention agencies and 253 in comparison agencies.

The mean BMI of mothers/primary caregivers in the intervention agencies at Time 3 increased slightly (Mean value = 31.8, Std. Dev. = 9.17, N = 72). However, since there were only 72 cases left in the sample, no statistical test was conducted on this difference.

The mean BMI in the comparison agencies also increased slightly from 29.3 at Time 1 to 29.5 at Time 3. No statistical test was conducted on this difference.

B. BMIs of Children 24 Months or Older

To determine whether the TTMA resulted in any change in the BMIs of children, the mean BMI at Time 1 was compared with the mean BMI at Time 2 in the intervention agencies. (Figure 15) A two-sample T test on the mean BMIs between Time 1 (Mean value = 17.1, Std. Dev. = 1.72, N = 170) and Time 2 (Mean value = 16.7, Std. Dev. = 1.95, N = 89) in the intervention agencies shows there was statistically no significant difference (t = 1.704 and p = 0.090) between them. This indicates that the TTMA did not result in any decrease in the mean BMI of children who were 24 months or older after six months of intervention.



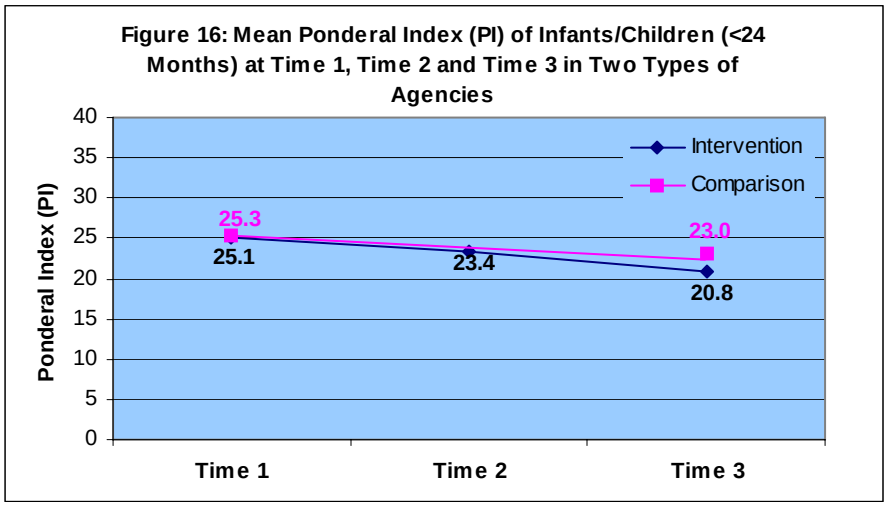
Time 1: N=343; 170 in intervention agencies and 173 in comparison agencies;
Time 2: N=89; 89 in intervention agencies and 0 in comparison agencies;
Time 3: N=103; 28 in intervention agencies and 75 in comparison agencies.

The mean BMI of children in the intervention agencies who were 24 months or older at Time 1 was also compared to their mean BMI at Time 3 (Mean value = 17.6, Std. Dev. = 2.29, N = 28). However, since the number of cases at Time 3 (28) in the sample was very small, no test was conducted to examine whether the change was statistically significant.

Likewise, the mean BMI of children in the comparison agencies who were 24 months or older at Time 1 (Mean value = 16.9, Std. Dev. = 2.10, N = 173) was compared to their mean BMI at Time 3 (Mean value = 16.4, Std. Dev. = 1.59, N = 75). (Figure 15) The difference between the two means was 0.5. However, since the number of cases at Time 3 (75) was small, no test was conducted to examine if this difference was statistically significant.

C. Ponderal Indexes of Children Less than 24 Months Old

Ponderal Indexes (PIs) of children less than 24 months old were calculated based on the formula: PI = kg /m^3 (Dennison et al., 1997; Lande et al., 2005). The PI is used in this study because the BMI of a child less than two years old cannot be calculated. PI is comparable to BMI, but gives a more fair comparison between individuals of different stature. In contrast to BMIs of children 24 months or older, PIs of children less than 24 months decreased progressively at follow up times (6^{th} month and 12^{th} month later) in both the intervention and comparison agencies. (Figure 16)



Time 1: N=684; 281 in intervention agencies and 403 in comparison agencies;
Time 2: N=136; 136 in intervention agencies and 0 in comparison agencies;
Time 3: N=220; 44 in intervention agencies and 176 in comparison agencies.

In the intervention agencies, the mean PI decreased from 25.1 at Time 1 to 23.4 at Time 2 and then to 20.8 at Time 3. A two-sample T test on the mean PIs at Time 1 (Mean value = 25.1, Std. Dev. = 3.95, N = 281) and Time 2 (Mean value = 23.4, Std. Dev. = 3.93, N = 136) in the intervention agencies shows there was a statistically significant difference ($t = 4.07$ and $p < 0.0001$) between them. The mean PI of children in the intervention agencies who were less than 24 months at Time 1 was also compared to their mean PI at Time 3 (Mean value = 20.8, Std. Dev. = 3.54, N = 44). However, since the number of cases at Time 3 (44) in the sample was very small, no test was conducted to examine whether the change of the mean value was statistically significant or not. The TTMA might not have contributed to the significant decrease in PIs of children in the intervention agencies who were less than 24 months after six months of intervention since young children's mean PI values tend to decrease as children grow older (Dennison et al., 1997).

Similar as the trend in the intervention agencies, the mean PI in the comparison agencies decreased from 25.3 at Time 1 to 23.0 at Time 3. Likewise, as a result of small sample size at Time 3 (176), no test was conducted to determine if this difference was statistically significant.

V. Impact of the Transtheoretical Stages of Change Model to Counseling on the Attitudes and Knowledge of Mothers/Primary Caregivers Regarding Overweight in Children

A. Attitudes of Mothers/Primary Caregivers towards Overweight in Children

To determine whether mothers'/primary caregivers' attitudes towards overweight in their children improved with the counseling, they were asked to check all that apply to complete the statements listed in Tables 11 and 12.

In Table 11, the percentages of mothers/primary caregivers who indicated that they were worried about overweight for certain reasons (increasing the risk of chronic diseases, affecting quality of life in the future, being teased by peers, and child becoming overweight) were higher at Time 3 than at Time 1 in the intervention agencies. By contrast, these percentages were lower at Time 3 than at Time 1 in the comparison agencies except for affecting quality of life in the future. It could be concluded that unlike traditional nutrition education and counseling, the TTMA to counseling might have changed mothers'/primary caregivers' attitudes towards overweight in these areas. However, it did not seem to have any effect in the other areas (weight gain as a child could lead to overweight adult; and family has a history of overweight, diabetes and heart problems). This is probably because mothers/primary caregivers did not think that gaining weight as a child could possibly lead to overweight adult, or they did not come from a family with a history of overweight, diabetes and heart problems.

Table 11: Percentages of Mothers/Primary Caregivers Worried about Their Child Gaining Weight

I worry about my child gaining a lot of weight because	**Time 1**		**Time 3**	
	Intervention (%)	Comparison (%)	Intervention (%)	Comparison (%)
Child could become overweight	41.0	44.5	42.1	43.7
Weight gain as a child could lead to overweight adult	59.4	64.4	57.9	59.1
Overweight increases the risk of chronic diseases	60.7	60.7	63.2	55.8
Overweight affects quality of life in the future	48.0	49.1	60.5	49.7
Other children tease overweight children	48.2	52.1	57.9	47.5
Family history of overweight, diabetes and heart problems	42.2	46.4	42.1	44.2

Intervention agencies: Time 1: N = 313; Time 3: N=38. Comparison agencies: Time 1: N = 438; Time 3: N=181

Table 12: Percentages of Mothers/Primary Caregivers Not Worried about Their Child Gaining Weight

I do not worry if my child gains a lot of weight because	**Time 1**		**Time 3**	
	Intervention (%)	Comparison (%)	Intervention (%)	Comparison (%)
Larger child is a sign that the child is healthy	0.6	3.4	0.0	0.6
It shows that I am feeding my child well	7.8	8.2	5.3	5.5
The weight will go away as the child grows older	6.7	9.4	0.0	5.0
I am big my child will be big too	2.2	1.8	0.0	0.0
My child is just as active as other children who are smaller	14.4	17.4	5.3	13.8
There is nothing that I can do anyway	1.0	0.2	0.0	0.0
I have a hard time getting my child to cooperate	2.0	1.6	0.0	0.6
My child has healthy eating habits	52.1	59.8	60.5	64.1

Intervention agencies: Time 1: N = 313; Time 3: N=38. Comparison agencies: Time 1: N = 438; Time 3: N=181

In Table 12, after 12 months of counseling, the percentages of mothers/primary caregivers who did not worry about their children gaining weight for certain reasons ("The weight will go away as the child grows older; I am big my child will be big too; my child is just as active as other children who are smaller.") decreased in both the intervention and comparison agencies. However, the percentages of mothers/primary caregivers who were not worried because their child had healthy eating habits increased by about 8% in the intervention agencies and by about 4% in the comparison agencies at Time 3. Therefore, while such results indicated that the traditional nutritional education and counseling provided to the mothers/primary caregivers contributed to the understanding of healthy eating habits, the greater increase reported for those in the intervention agencies indicated the TTMA might have achieved a greater effect.

B. Knowledge of Mothers/Primary Caregivers about Overweight in Children

The impact of TTMA to counseling and traditional nutrition counseling on the knowledge of mothers/primary caregivers about overweight in children was determined by comparing their responses to the statements in Table 13 at Time 1 and Time 3. They were asked to check "Yes, I agree", "No, I disagree", or "Don't know" for each of the statements. The results show that at Time 3 a higher percentage of mothers/primary caregivers agreed to the three statements in the intervention than comparison agencies. Therefore, the TTMA might have increased the knowledge of mothers/primary caregivers about overweight in children.

Table 13: Percentage of Mothers/Primary Caregivers Who Agreed with the Statements

	Time 1		**Time 3**	
Statements	Intervention (%)	Comparison (%)	Intervention (%)	Comparison (%)
A child who is overweight could have serious health problems.	93.3	94.5	100.0	92.3
The longer a child stays overweight, the more likely the weight will continue into adulthood.	88.8	90.2	97.4	90.6
Being overweight as an adult has several health risks.	95.5	97.0	100.0	96.8

Intervention agencies: Time 1: N = 313; Time 3: N=38. Comparison agencies: Time 1 N = 438; Time 3: N=181

VI. Mothers'/Primary Caregivers' Evaluation on the Transtheoretical Model Approach to Counseling

Mothers/primary caregivers in the intervention agencies evaluated the counseling approach by responding "yes" or "no" to the following statements:

1) My nutrition educator is concerned about what I feed my family;
2) My nutrition educator is concerned about my problems;
3) My nutrition educator gives me just the right information when I need it;
4) My nutrition educator is easy to talk to about my child's weight;
5) My nutrition educator is easy to talk to about my weight;
6) My nutrition educator helps me to take care of my child's weight; and
7) My nutrition educator helps me to take care of my weight. (Table 14)

The number of positive responses from each mother/primary caregiver was transformed into an evaluation score to the nutritionist who provided counseling. For example, when a mother/primary caregiver responded "yes" to 3 of the statements, a score of "3" was assigned as her/his evaluation on the nutritionist's competency. Likewise, if a mother/primary caregiver responded "yes" to 5 of the statements, a score of "5" was assigned. Finally, an evaluation scale was established with a minimum score of 0 and a maximum score of 7.

Table 14 shows that 41.2% of mothers/primary caregivers gave an evaluation score of "5" to the nutritionists at Time 1. At Time 2 and Time 3, the percentages of mothers/primary caregivers who gave this evaluation score decreased to 32.3% and 27.3%, respectively. In contrast, 34.5% of mothers/primary caregivers gave an evaluation score of "7" to the nutritionists at Time 1. At Time 2 and Time 3, the percentages of mothers/primary caregivers who gave this evaluation score increased to 44.4% and 51.5%, respectively. This shows that as time progressed, mothers/primary caregivers appeared to be more satisfied with the counseling provided by the nutritionists.

Table 14. Mothers'/Primary Caregivers' Evaluation on Nutritionists' Counseling

Evaluation Score	Time 1	Time 2	Time 3
	%	%	%
0	1.3	0.8	0.0
1	0.0	0.8	0.0
2	1.3	0.0	0.0
3	2.5	2.4	3.0
4	3.8	4.8	6.1
5	41.2	32.3	27.3
6	15.6	14.5	12.1
7	34.5	44.4	51.5

Time 1: N = 238; Time 2: N = 124; Time 3: N =33.

CONCLUSIONS AND RECOMMENDATIONS

The results of the study indicated that the TTMA to counseling did not seem to affect the BMIs of the children and mothers. One reason could be the short duration of the counseling to produce visible changes in weight, and consequently BMIs. Another reason could be that the movement through the stages of change was associated with dietary change (Greene and Rossi, 1998), and such a change was not enough to produce a change in BMIs. Mothers'/primary caregivers' readiness to change increased for both fat and fiber intake after six months of intervention. In addition, the results indicated that mothers'/primary caregivers' knowledge and attitudes towards overweight in children seemed to be more improved in the intervention than in the comparison agencies. Changes in the mothers/primary caregivers in the intervention agencies could indicate that nutritionists' application of the TTMA increased with time. The study results suggest the need to go beyond traditional nutrition education and counseling to a more client-oriented approach in the WIC program. Further studies are needed to verify this. In addition, a clear definition of traditional nutrition education and counseling is needed in order to compare its impact on the stages of change.

EVALUATION FRAMEWORK

In order to ensure proper implementation of the project by staff in the local agencies, process and formative evaluations were conducted. The purpose of the process evaluation was to ascertain compliance with the project's policies and procedures. Monitoring tools and instructions to accompany the tools were developed and used in monitoring the agencies. The Department of Health and Senior Services conducted monitoring during the study twice, at six-month intervals (April 2004 and October 2004). The purpose of the formative evaluation was to evaluate the effectiveness of counseling using the TTMA and to provide suggestions for the project's improvement. The trainer from the University of Missouri, Columbia, conducted formative evaluations four times, at three-month intervals during the study, starting December 2003 and ending June 2004. Initially, the trainer visited each of the trained nutritionists to assess the use of TTMA and to provide coaching and support. The next two evaluations, following the initial visit, were conferences conducted by phone, while the last evaluation was a meeting between the trainer and the nutritionists. The trainer sent a list of discussion questions to nutritionists two weeks prior to each phone conference. Each conference session was 45 minutes to one hour in duration.

FINDINGS FROM THE PROCESS AND FORMATIVE EVALUATIONS

There were no major findings from the process evaluation. However, the results of the formative evaluation indicated that nutritionists needed additional skills during the counseling sessions to assist some parents who were in denial of their children's weight problem. The nutritionists also needed additional training to encourage input from parents who were hesitant about discussing their children's weight problems. Both needs were resolved through discussions at a meeting between the trainer and the nutritionists. Also, formative evaluation results indicated that nutritionists needed assistance in knowing how to ask open-ended questions. This was resolved by providing them training on the motivational interviewing technique. Furthermore, an evaluation of such training indicated that nutritionists were pleased with the knowledge and skills gained.

LESSONS LEARNED

There were several lessons learned from implementing the project:

1) Frequent data collection on the stages of change was a burden for both the nutritionists and the participants. It could have been more beneficial if data for the stages of change were only collected at six month intervals (Time 1, Time 2, and Time 3) during the project, rather than collected at an additional two times, each, between Time 1 and Time 2, and Time 2 and Time 3, ultimately resulting in a total of seven data collections.

2) Also, frequent data collection on the mothers'/primary caregivers' survey questionnaires could have been reduced to two times, at pre-intervention and at post-

intervention, instead of at midpoint, as well. Reduced frequency of data collection could have reduced the nutritionists' workloads and the dropout rates of mothers/primary caregivers from the study. Participants indicated that they were responding to the same survey questionnaires too many times.

3) Data were not collected on any of the variables at Time 2 in the comparison agencies. This made it impossible to compare outcomes at Time 2 between the types of agencies. For future studies, data need to be collected at the same intervals in both the intervention and comparison agencies.

4) Participants left the project for various reasons, such as moving out of the area. Other reasons for leaving the project which nutritionists had little or no control over were failure to pick up food instruments for three consecutive months, becoming pregnant during the project, and at participants' request. The reasons of mothers/primary caregivers in the intervention and the comparison agencies who were terminated from the study were listed in Table 2 on Page 7. Providing incentives for participating in the study might have motivated more mothers/primary caregivers to remain in the study.

5) The one training session provided to nutritionists on the TTMA to counseling was not sufficient to equip them with the necessary information and skills needed. Also, it did not provide an adequate basis to evaluate the nutritionists' competencies with regard to the application of the TTMA. Another training session could have provided an opportunity to evaluate the counseling skills of the nutritionists and consequently, to determine and address any additional or specific skills needed.

6) Likewise, only one coaching and support visit to the nutritionists was not adequate to provide the assistance needed to apply the TTMA to counseling. One or more additional visits during the project would have increased the nutritionists' knowledge about the TTMA and consequently, their confidence in its application.

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APPENDICES

Appendix A

DCN _____

Name _____

Readiness to Change Self - Assessment

Directions: ***Please answer these questions based on how you eat. Make sure you answer all the questions in each section. Thank you.***

Section I: Fat

1. How would you describe the amount of fat in your overall diet? (Please check **One** only).
   a)____Very high
   b)____High
   c)____Moderate
   d)____Low
   e)____Very low

2. If you checked "LOW" or "VERY LOW" on Question 1, how long have you followed a diet that is low in fat? (Check **One** only**)**
   a)____Less than a month
   b)____1-3 months
   c)____4-6 months
   d)____Longer than 6 months
   e)____ I did NOT check "LOW" or "VERY LOW" on Question 1.

3. Over the **next six months,** do you **plan to cut down** the amount of fat in your meals? (Check **One** only)
   a)____Definitely yes
   b)____Yes
   c)____Not sure
   d)____No
   e)____Definitely no

4. Have you tried to make any changes to lower the fat in your diet in the **past six months?**
   a)____Yes
   b)____No

5. If you checked "Yes" on Question 4, how successful were you in making those changes? (Check **One** only)
   a)____Extremely successful

b)____Very successful
c)____Successful
d)____Not very successful
e)____Not successful
f)____ I did NOT check "Yes" on Question 4.

Section II: Fiber

1. How would you describe the amount of fiber in your overall diet? (Check **One** only)
   a)____Very high
   b)____High
   c)____Moderate
   d)____Low
   e)____Very low

2. If you checked "VERY HIGH" or "HIGH" on Question 1, how long have you followed a diet that is high in fiber? (Check **One** only)
   a)____Less than a month
   b)____1-3 months
   c)____4-6 months
   d)____Longer than 6 months
   e)____ I did NOT check "VERY HIGH" or "HIGH" on Question 1.

3. Over the **next six months**, do you **plan to increase** the amount of fiber in your diet? (Check **One** only)
   a)____Definitely yes
   b)____Yes
   c)____Not sure
   d)____No
   e)____Definitely no

4. Have you tried to make any changes to increase the fiber in your diet in the **past six months?**
   a)____Yes
   b)____No

5. If you checked "Yes" on Question 4, how successful were you in making those changes? (Check **One** only)
   a)____Extremely successful
   b)____Very successful
   c)____Successful
   d)____Not very successful
   e)____Not successful
   f)____ I did NOT check "Yes" on Question 4.

Thank you for completing this survey.

Appendix B

Algorithm for Fat Consumption Behavior

Maintenance
1 = d or e
2 = d

Action

1 = d or e	Or	4 = a
2 = a or b or c		5 = a or b or c

Preparation

1 = a or b or c		
4 = a	Or	3 = a or b
5 = d or e		

Contemplation
1 = a or b or c
3 = a or b or c
4 = b

Pre-contemplation
1 = a or b or c
3 = d or e
4 = b

<u>Algorithm for Fiber Consumption Behavior</u>

Maintenance
1 = a or b
2 = d

Action

1 = a or b	Or	4 = a
2 = a or b or c		5 = a or b or c

Preparation

1 = c or d or e	Or	3 = a or b
4 = a		
5 = d or e		

Contemplation
1 = c or d or e
3 = d or e
4 = b

Pre-contemplation
1 = c or d or e
3 = a or b or c
4 = b

Appendix C

DCN _____

Date _____

Agency Name _____

Mothers'/Primary Caregivers' Survey

Directions: Please answer these questions based on what you think. This information will be used only to improve the WIC program.

1. I can tell when my child is gaining too much weight. (Check only **ONE**).
   ____Yes, I can
   ____No, I cannot
   ____Don't know

2. This best describes my child's weight lately: (Check only **ONE**).
   ____My child has lost weight
   ____My child has stayed the same weight
   ____My child has gained just the right amount of weight
   ____My child has gained a lot of weight

3. I can help my child maintain a healthy weight by: (Check **All** that apply).
   ____Cutting down on the amount of food I give him/her
   ____Making sure my child is physically active
   ____Cooking healthy meals
   ____Buying healthy meals
   ____Making sure my child has a healthy breakfast every day
   ____Keeping healthy foods and snacks at home
   ____Making family meals a priority
   ____Showing my kids a good example by eating healthy myself
   ____Introducing balanced meals gradually
   ____Breastfeeding my child for one year or more
   ____Not doing anything special
   ____Leaving out certain foods from his/her meal. What foods would you leave out?
   _____
   ____Other (Specify):_____

4. Which of the following foods have a lot of fat? (Check **All** that apply).
____Grapes
____Carrots
____French Fries
____Greens
____Chips
____Pizza
____Donut

5. My child plays actively indoors and outdoors: (Check only **ONE**).
____Every day
____Six days a week
____Five days a week
____Four days a week
____Three days a week
____Two days a week
____One day a week

6. I try to get my child to play actively indoors and outdoors.
____Yes, I agree
____No, I disagree

7. A child who is overweight could have serious health problems. (Check only **ONE**).
____Yes, I agree
____No, I disagree
____Don't know

8. The longer a child stays overweight, the more likely the weight will continue into adulthood. (Check only **ONE**).
____Yes, I agree
____No, I disagree
____Don't know

9. Being overweight as an adult has several health risks. (Check only **ONE**).
____Yes, I agree
____No, I disagree
____Don't know

10. I worry about my child gaining a lot of weight because: (Check **All** that apply).
____My child could become overweight
____Gaining a lot of weight as a child could lead to overweight in adulthood
____Overweight increases the risk of developing chronic diseases
____Overweight in childhood or adolescence affects quality of life in the future
____Other children tease overweight children
____Of family history of overweight, diabetes and heart problems
____I do not worry
____Other (Specify):_____

11. I do not worry if my child gains a lot of weight because: (Check **All** that apply).
____A larger child is a sign that the child is healthy
____It shows that I am feeding my child well
____The weight will go away as the child grows older
____I am big so he/she is going to be big, too
____My child is just as active as other children who are smaller
____There is nothing that I can do anyway
____I have a hard time getting my child to cooperate
____My child has healthy eating habits
____Other (Specify):_____

12. I obtain my nutrition education information from: (Check **All** that apply).
____Dietitians and/or WIC nutritionists
____Medical doctors
____Friends
____Family members
____Web/Internet
____Books
____Magazines
____Video streaming
____Kiosk (Interactive Program)
____Experience
____Common Knowledge
____Other (Specify):_____

People have different reasons for the amount of fruits and vegetables they eat. Please tell me if any of the following statements explain your eating patterns.

13. I eat fruits and vegetables. (Check only **ONE**).
____Every day
____Six days a week
____Five days a week
____Four days a week
____Three days a week
____Two days a week
____One day a week
____Occasionally
____Never

14. I would eat **more** fruits and vegetables if they: (Check **All** that apply).
____Took less time to prepare
____Were more available in the stores
____Were not so expensive
____Tasted good
____Were fruits I liked
____Were vegetables I liked
____Didn't go bad so quickly
____Could preserve for a longer period of time
____Other (Specify):_____

15. I use mostly: (Check **All** that apply).
a)____Fresh fruits
b)____Fresh vegetables
c)____Canned fruits
d)____Canned vegetables
e)____Frozen fruits
f)____Frozen vegetables

16. I get most of my fruits and vegetables from: (Check **All** that apply).
a)____Supermarkets
b)____Convenience stores
c)____Farmers' markets
d)____My garden
e)____Relative's garden
f)____Friend's garden
g)____Other (Specify):_____

17. I think I eat enough fruits and vegetables. (Check **All** that apply).
a)____Yes, I agree
b)____No, I disagree
c)____Should eat less
d)____Should eat more
e)____Don't know

18. Has a doctor, nutritionist, nurse, WIC nutritionist or other health professional advised you to eat more fruits and vegetables? (Check only **ONE**).

a)____Yes
b)____No
c)____Don't remember

19. Consuming between 5 and 10 servings of fruits and vegetables daily can provide the following health benefits: (Check **All** that apply).
____Reduce the risk of getting certain cancers
____Help maintain a healthy weight
____Provide the body with essential vitamins and minerals
____Prevent colds and infections
____Help maintain a healthy heart
____Help maintain good eyesight, strong bones and healthy teeth
____Other (Specify):_____

20. My nutrition educator is concerned about: (Response to **All** statements).

What I feed my family	____Yes	____No
My problems	____Yes	____No

21. My nutrition educator: (Response to **All** statements).

Gives me just the right amount of information when I need it	____Yes	____No
Is easy to talk to about my child's weight	____Yes	____No
Is easy to talk to about my weight	____Yes	____No
Takes too much time during counseling	____Yes	____No

22. Nutrition education: (Response to **All** statements).

Helps me to take care of my child's weight	____Yes	____No
Helps me to take care of my weight	____Yes	____No
Is helpful for me	____Yes	____No

23. Do you now consider yourself to be overweight, underweight or about average? (Check only **ONE**).

____Overweight
____Underweight
____About average
____Don't know
____Not sure

24. I would like to: (Check only **ONE**).

____Stay the same weight
____Lose some weight
____Gain some weight

Appendix D

Stages of Education Materials (please see hard copy cards attached to this report)

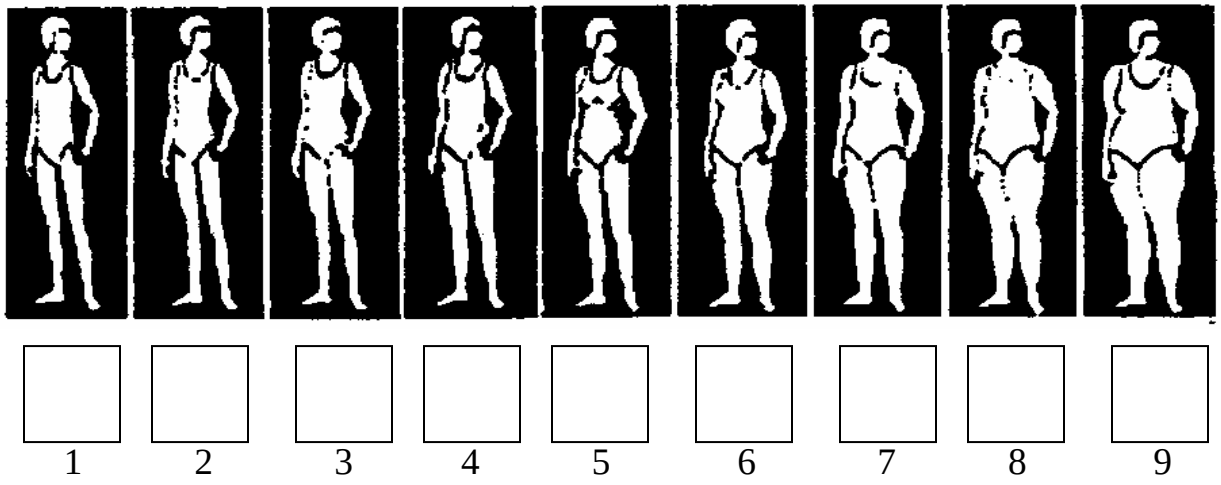
The education materials (cards) were developed to reflect the different stages of change in the Transtheoretical Stages of Change Model Approach (TTMA), and were provided to the mothers/primary caregivers. Each stage of change had a different color card: contemplation was orange, preparation was yellow, action was green, and maintenance was blue. No cards were developed for the pre-contemplation stage.

Appendix E

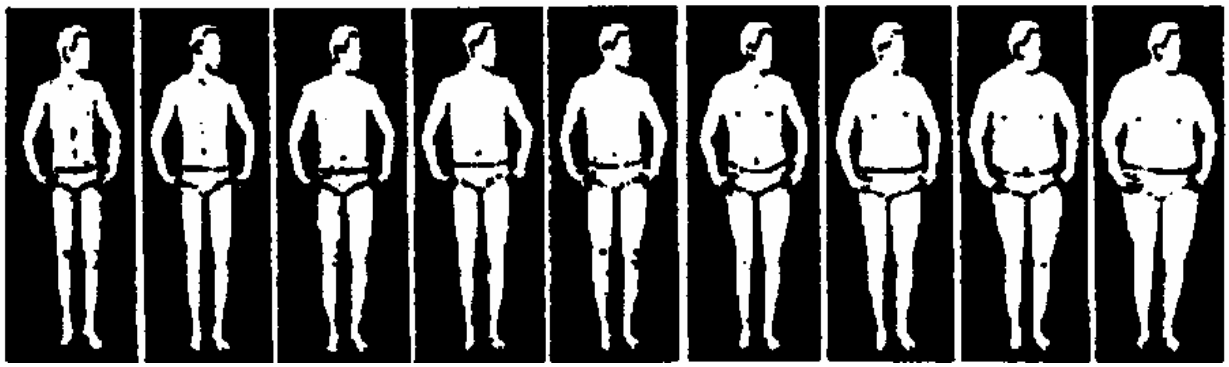
Body Image Perception

Body image perception is how you think and feel about your body and physical appearance.

Please check the body image that applies to you:



1 2 3 4 5 6 7 8 9



1 2 3 4 5 6 7 8 9

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