The Story of Team Nutrition:

Executive Summary of the Pilot Study

Final Report

United States Department of Agriculture
Food and Nutrition Service
Office of Analysis, Nutrition and Evaluation

This executive summary describes Team Nutrition (TN) and findings from a pilot evaluation of the initiative. Detailed research findings are contained in two separate reports. *The Story of Team Nutrition: Case Studies of the Pilot Implementation Communities,* provides a comprehensive report of how the initiative was implemented in each of the seven participating school districts. The case studies include assessments of satisfaction with the materials and activities among teachers and staff, and participation by parents and community partners in Team Nutrition activities. The second document, *Team Nutrition: Pilot Study Outcome Report,* presents findings from an outcome evaluation conducted in four of the pilot districts. The basic question guiding the evaluation is whether or not Team Nutrition has a positive impact on students' nutrition skills, motivation and, most importantly, food choices. An overview of Team Nutrition and highlights from both reports are presented below.

WHAT IS TEAM NUTRITION?

Team Nutrition is an USDA initiative launched in 1995. The mission of Team Nutrition is:

> *To improve the health and education of children by creating innovative public and private partnerships that promote food choices for a healthful diet through the media, schools, families, and the community.*

Team Nutrition has already been adopted by more than 30,000 local schools throughout the country. These TN schools demonstrate their commitment to meeting the Dietary Guidelines for Americans by distributing TN materials to teachers, children, and parents; by involving school food service, teachers, students, families, and administrators in lively and entertaining nutrition activities; by sharing successful strategies and projects with other schools; and by engaging private and public partners in the community to support TN activities.

Making School Lunches Healthier

The story of Team Nutrition begins with an initiative to provide students with healthy meals at school. The USDA School Meals Initiative for Healthy Children, published in 1995, is a comprehensive plan that aims to ensure that children have healthy meals at school. A major part of this plan is an update of nutrition standards that requires school meals to meet the Dietary Guidelines for Americans. Recognizing that simply publishing a regulation is not likely to change children's diets, USDA established Team Nutrition to ensure that schools are able to

implement the plan, and that students avail themselves of the healthier meals offered. The goals of Team Nutrition include:

- Eating less fat;
- Eating more fruits, vegetables, and grains; and
- Eating a variety of foods.

Team Nutrition supports the School Meals Initiative through two interrelated components:

Training and Technical Assistance is designed to ensure that school nutrition and food service personnel have the education, motivation, training, and skills necessary to provide healthy meals that appeal to children and meet the Dietary Guidelines for Americans. It also provides personnel with a clear vision of their roles in the school community; that is as integral team members of a comprehensive and ongoing school nutrition initiative. This training and technical assistance includes the dissemination of training standards and materials, grants to States to develop self-sustaining training projects, and an electronic resource system available on the Internet and designed to foster communication among interested professionals.

Multifaceted Nutrition Education is delivered through the media, in schools, and at home to build skills and motivate children to make food choices for a healthful diet. The educational component emphasizes the school setting to reinforce and support nutrition policy changes in school meals. In-school education is provided through the use of flexible curriculum modules designed by Scholastic, Inc. in partnership with the USDA. The materials bring focused, science-based nutrition messages to children in a language that they understand while strengthening social support for healthy food choices among parents, educators, and food service professionals.

The "Team" Approach

Team Nutrition operates through a variety of public and private partnerships to reach children with information and activities at schools, in their homes, and in the community. The school-based curriculum involves teachers, food service, and administrative staff. Parents are encouraged to participate in school- or community-based activities, and to continue classroom activities with take-home materials. Team Nutrition schools are encouraged to leverage

resources by developing partnerships with public and private sector organizations in the community, and to promote the TN messages and activities through the media. Media also reinforces TN messages through PSAs produced by Disney and featuring characters from the *Lion King*.

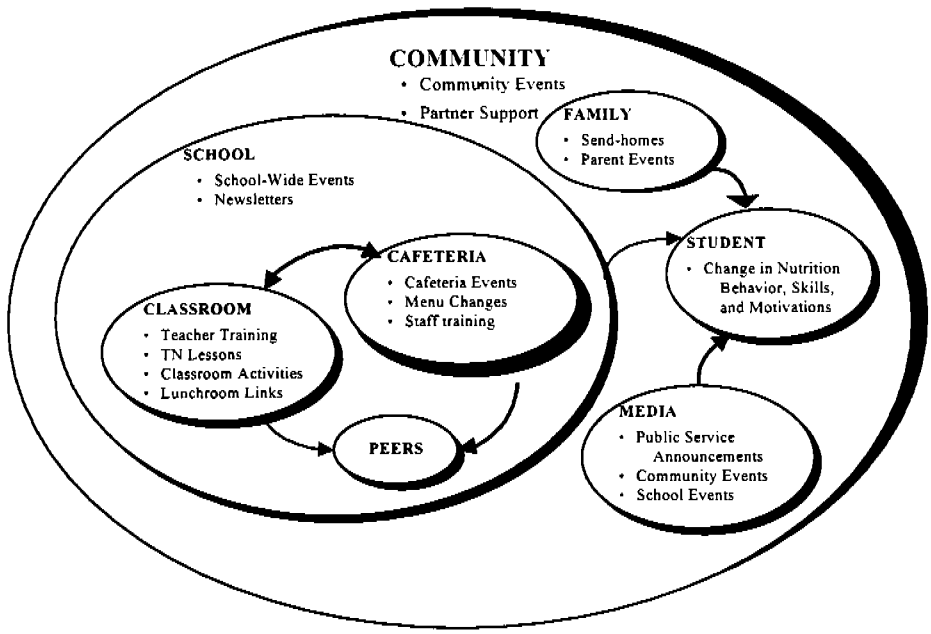
The use of multiple channels to reach children is a tenet of Social Learning Theory (SLT)—a theoretical framework that provides an explanation of how individuals make behavior choices (Bandura, 1986; Perry et al., 1990). SLT is the underlying theory for Team Nutrition, and has been used for many research studies focused on changing eating behaviors (Contento et al., 1995).

The premise of SLT is that personal characteristics, environmental factors and behaviors interact dynamically. In other words, behavior both affects and is affected by individual and environmental factors. Further, each of these dimensions has multiple components, including:

> Personal Characteristics: expected outcomes, relevant skills and knowledge, values and attitudes, self-efficacy;
>
> Environmental Factors: availability of role models, opportunities to engage in pertinent behaviors, social group norms and expectations, incentives and rewards; and
>
> Behaviors: intentions to act, specific behavior choices, and typical behavior.

Nutrition education projects grounded in SLT rely on multiple personal and environmental factors to influence behavior. As seen in Figure 1, the Team Nutrition approach reflects this concept. Also in concordance with SLT, individual characteristics, like skills and motivation, are both objects of and vehicles for change.

Figure 1. Team Nutrition Approach to Effective Nutrition Education



THE TEAM NUTRITION PILOT PROJECT

USDA launched a pilot implementation of Team Nutrition with two purposes: to systematically document the implementation process, and to evaluate whether the project results in healthier food choices by students.

The Team Nutrition Pilot project was implemented in two phases—once in the Spring of 1996 and again in the Fall of 1996. The Fall implementation was essentially a replication of Spring with a new set of students. However, participating districts made changes in the activities conducted in Phase II based on their initial experiences.

Since the pilot project was designed to fit the evaluation schedule, it differs from the intended TN effort in several ways. The most important distinction is that, for evaluation purposes, the outcome evaluation focused on only one grade level (the fourth grade) for one semester. This is a small slice of the intended initiative. Overall TN activities are to be implemented from pre-school through the middle-school years. During this time students are continually exposed to TN messages through curricula, school-based activities, cafeteria-based activities, community events, and the mass media.

Because of the evaluation, variations from more usual implementation procedures occurred. For example, teachers in the pilot project received in-person training on how to use nutrition lesson materials. In addition, project coordinators were designated for each pilot district and had regular contact with both USDA and evaluation contractor staff. More typically, TN schools and staff receive start-up kits containing a variety of materials but they do not have the personal contacts and support provided to pilot districts.

While the pilot communities benefited from some unique resources, they also operated under special constraints imposed by the research schedule. These included limited preparation time in Phase I and limited implementation time during both phases (roughly 8 to 10 weeks). In Phase II, the time constraints were heightened by the demands associated with beginning a new school year.

Although distinguished by these supports and constraints, the TN pilot schools operated in real world settings—not a laboratory environment. Pilot schools faced implementation obstacles that many schools might encounter. These included keen competition from other subjects and standardized test preparation for scarce class time, changes in food service contracts, and upheaval associated with a potential teacher strike in one district. Thus, the lessons learned from this pilot study should prove valuable to schools around the country as they consider pursuing Team Nutrition.

Who Participated in the Pilot Implementation?

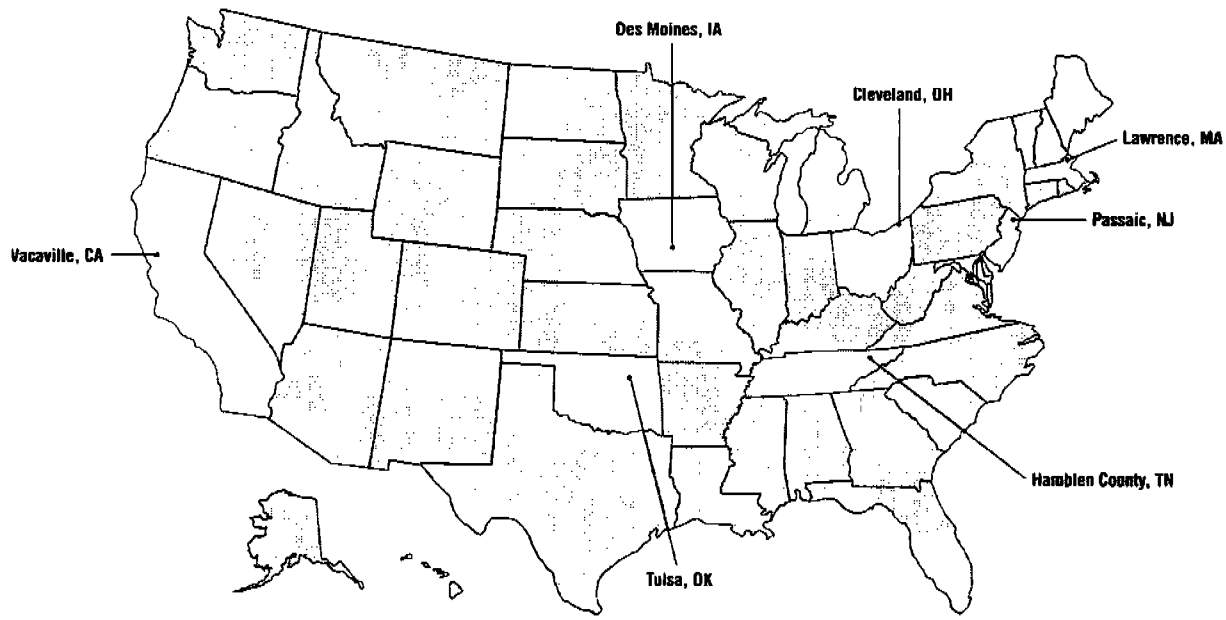
In July 1995, the USDA issued announcements through its regional offices to recruit school districts to participate in the TN Pilot Implementation Project.

The application for becoming a TN pilot community required answers to a set of questions about the district's ability to carry out the project. In addition, districts were asked to nominate at least two pairs of elementary schools. Each pair of schools was to be equivalent with respect to the number of students, the percentage of students eligible for free or reduced-price lunches, the racial/ethnic composition of the school student body, the extent of existing nutrition education efforts, and the type of cafeteria service provided (e.g., menu choices available and type of kitchen).

Seven TN pilot districts were chosen competitively from the applications received. The selection criteria included the district's ability to carry out the project, a desire to have a district in

each USDA region, and the need to have cost-efficient access to the communities for evaluation purposes. Applications were approved from one district in each of the seven USDA regions, as seen in Figure 2.

Figure 2. Districts Participating in the Team Nutrition Pilot Implementation



All of the districts were expected to implement a comprehensive TN initiative. However, four of the seven school districts (Des Moines, Hamblen County, Tulsa, and Vacaville) were selected to participate in an intensive process and outcome evaluation of the TN Pilot Implementation Project. The remaining three (Lawrence, Passaic, and Cleveland) were subject only to a more limited process evaluation.

In the four outcome evaluation districts, one-half of the matched school pairs were randomly assigned to the treatment condition (i.e., to implement Team Nutrition). The others became comparison sites and agreed to suspend existing nutrition education lessons until after the evaluation. In the remaining three pilot districts, all of the nominated schools implemented Team Nutrition.

Altogether, Team Nutrition was implemented at 19 schools in Phase I and 18 schools in Phase II and in over 140 classrooms at three different grade levels.

Components of the Pilot Implementation

All of the TN schools agreed to conduct the full set of grade-specific lessons available at the time. These lessons are organized into three modules, one for each of the following sets of grades:

- Module 1: Pre-Kindergarten and Kindergarten (Pre-K and K).
- Module 2: First- and Second Grades (1 and 2).
- Module 3: Third- through Fifth Grades (3 through 5).

Implementation schools in the seven pilot districts delivered each moudel to a single grade. Module 3 was targeted to fourth grade in all the implementation schools.

The three modules share some distinguishing characteristics. Although based on classroom delivery, they are designed to involve other students in the school, as well as cafeteria staff and parents. That is, the lessons include a variety of activities and materials that extend the lessons to people and places outside of class. Lessons are also designed to actively engage students in the learning process by applying what is learned to choices and decisions they make. Finally the lesson content offers flexibility. Teachers may use the materials either as a separate nutrition curriculum or integrate them into other more tradition subjects, such as math and science.

Team Nutrition schools also agreed to have teachers participate in two half-day training sessions, to offer at least ten hours of training to food service staff, and to implement a variety of school-wide and community nutrition activities. With respect to the latter activities, every implementation school was expected to conduct at least:

- Two school-wide cafeteria events;
- Three parent contacts;
- Two chef events;

- One district-wide community event; and
- One media event.

While some of the activities could overlap, all TN pilot schools committed to conducting a minimum of five core activities during each project phase.

To manage this comprehensive nutrition education initiative, as well as to support evaluation requirements, each pilot district provided one or more people to serve in a coordinating capacity. More specifically, the role involved planning school-wide and community events, coordinating the efforts of teachers and cafeteria staff, developing partnerships with community organizations, ensuring media coverage, and facilitating the evaluation data collection.

The approach to this coordination varied across districts. In some cases two or three persons shared the role and divided responsibilities, while in one district the coordinator's job was a single full time position. The food service manager acted in a coordinating capacity in every district, but there was more variation across districts with respect to the involvement of curriculum specialists. Coordinators also varied in terms of how much direct support and communication they had with teachers, the extent to which they delegated responsibilities, and the degree to which they used established school and community events as the foundation for TN activities.

How Was the Pilot Implementation Assessed?

The **process evaluation** was designed to systematically describe the nature and magnitude of the Team Nutrition effort in all seven pilot districts. Information was collected from a variety of sources on a wide range of relevant topics:

- School and district features, such as student enrollment and demographic characteristics, came from routine extant records.
- Team Nutrition implementation plans, project diaries and progress reports were submitted by project coordinators in each district to track events and document strategies for involving others. These materials were supplemented by regular interviews with coordinators.
- Details about school lunches, including menus, preparation methods and number served came from a combination of extant records, kitchen observations, and interviews with food service staff.

- Classroom lessons, school-wide events, and community activities were described by implementing teachers, TNCs, and community partners, respectively.

Information about teachers' training, interest, and experience with nutrition education generally and Team Nutrition specifically (implementation teachers only) was obtained from surveys before and after the intervention.

The primary objective of the **outcome evaluation** was to determine whether or not Team Nutrition changes students' skills, motivations and behavior as they relate to food choices. Survey items and observational measures were chosen to assess changes associated with the more specific TN messages to eat more fruits, vegetables and grains, less fat, and more variety.

Given that TN activities expose all students in a school to at least some components of the intervention, it was not feasible to randomly assign classrooms or students to treatment and control conditions. Instead, random assignment occurred for matched pairs of schools, and student outcomes were measured for treatment and comparison students both before and after TN implementation. This "double difference" design provides considerable confidence that outcomes can be attributed to the treatment.

This basic design was applied twice. The replication offers a chance to assess the reliability of TN effects and to evaluate the impacts of a somewhat more "mature" project when it is implemented a second time.[1] In addition, students who participated in the first pilot phase were surveyed again at the end of Phase II to determine whether the initial impacts were sustained over time—i.e., six months.

The outcome evaluation focused on fourth grade students. This grade was chosen because it represents the youngest age group (8 to 10 years) who are able to complete survey instruments and food frequencies reliably (Domel et al., 1994). Such capability was pre-requisite to this evaluation.

[1] Although teachers and staff were more experienced during the second phase of Team Nutrition, students were at a different level developmentally. This is because Phase II takes place at the start of the school year.

The primary data used for the outcome analysis included:

- Fourth grader responses to a self-administered questionnaire;
- Observations of fourth graders' food choices and consumption in the cafeteria; and
- Parent responses to a telephone survey that included questions about their fourth grader's nutrition-related behavior at home.

Across the four districts in the outcome evaluation, approximately 1,650 fourth-graders were eligible to participate in each study phase. Students were divided about evenly between implementation and comparison schools. Response rates for the student survey ranged between 86 and 91 percent. Somewhat fewer students ate meals from their school's cafeteria so participation in the observations ranged from 79 to 85 percent.

Parent phone interviews were conducted with the family adult who is most knowledgeable about their fourth grader's nutrition behavior. Not surprisingly, this was typically the mother or female guardian. The parents' response rates ranged from 72 to 87 percent with lower rates in the second pilot phase. This decline is attributable to the challenge schools face to complete accurate family rosters at the start of a new school year.

KEY FINDINGS

Successes and Challenges with the Introduction of Team Nutrition

While four of the seven pilot districts had a formal nutrition education component in their curricula prior to the implementation of Team Nutrition, there was broad latitude across schools and teachers with respect to what was actually taught. Nevertheless, from 90 to 100 percent of pilot study teachers indicated on the baseline survey that they were very interested in teaching nutrition and believed the classroom was an appropriate place to do so. In general, there was widespread support among teachers and administrators that nutrition education is an important part of the classroom agenda. The prevailing view is perhaps best reflected by the one of the Tulsa principals who said, "It is as important to teach nutrition as it is the basic academics in order to help children form good habits that will last them the rest of their lives. Nutrition is a basic life skill."

With this level of interest, one would expect successful TN implementation despite the short start-up period and a squeeze to complete each phase within 8-10 weeks. In fact, all seven districts completed most of the required TN activities. Most lessons were introduced in each class. There were also a variety of school-wide and community nutrition events that reinforced the classroom messages. These activities included taste tests, cooking demonstrations from visiting chefs, plays written and/or performed by students, and community nutrition fairs. In addition, all districts obtained at least some media coverage to promote events and support the healthy food choice messages. Finally, the pilot project included training for school food service staff and changes to menus and meal preparation that were collectively intended to result in healthier cafeteria meal items.

Nevertheless, student exposure varied widely across teachers, schools and districts. While most lessons were introduced in each class, teachers used different numbers of the available lesson components. Thus, on average, students received between 12 and 33 hours of classroom education. Similarly, students had an opportunity to participate in four to ten school-wide or community nutrition events. This variation provided an evaluation opportunity to examine the relationship between implementation features and student impacts.

First, however, here are the highlights of what TN stakeholders had to say about participating in this initiative:

As expected, **Team Nutrition Coordinators** began the project with considerable enthusiasm and commitment. They also brought to the study some goals specific to their individual districts. These included an interest in using Team Nutrition as a vehicle to involve the many new immigrant families from the community in school activities, as well as a desire to develop the professionalism of food service staff and involve them in the educational process.

The continued commitment of coordinators is reflected in the variety of TN activities that were completed in each district. Coordinators repeatedly mentioned during evaluation interviews, however, that the compressed schedule for planning and implementation added significantly to the challenge of generating support and organizing others. For some, the task of building community partnerships was new, and the job of getting media coverage for Team Nutrition was a first for most coordinators. While they each offered lessons to share in these areas, they also recommended more guidance up front.

When asked about the future of Team Nutrition at the end of the pilot, coordinators were similarly committed and realistic. Without exception there were plans to continue activities in the pilot schools and expand the initiative to additional schools. At the same time, it was clear that the schedule and intensity of activities would probably be relaxed. The challenge of obtaining enough time and dollars to implement a comprehensive version of Team Nutrition was mentioned by all the coordinators. At the same time, at least some coordinators reported steps to help institutionalize the initiative. These included lobbying school boards and state legislatures to require nutrition education, in addition to applying for grants to support key activities.

School principals from implementation schools were interviewed at the beginning of Phase II to get their reactions to the initial TN experience. All expressed a high degree of satisfaction with the project, and some observed that students were eating things that they weren't previously.

Reactions to their schools cafeteria menus were more varied. Some expressed dissatisfaction with the quality and/or limited choices of food items. Others noted improvements, such as the introduction of salad bars, which they attributed to participation in the pilot project. The variation in responses is explained at least in part by the relative emphasis that districts placed on this TN channel during the first phase.

In contrast to school principals who generally viewed their role as one of support and encouragement, **teachers** were actively engaged in planning and carrying out TN activities. The amount of time required for classroom education imposed some strain. Thirty-three percent to 100 percent of all TN teachers reported that preparation time was reasonable and 33 percent to 88 percent judged the amount of teaching time was reasonable. Along the same lines, the percentage of teachers who reported satisfaction with TN classroom materials ranged from 41 to 100 percent.

There are several explanations for the negative reactions. Some are specific to a particular school or district, such as the one where teachers were faced with introducing a new math curriculum during the pilot study. Other explanations are generic. For example, teachers stated that the short time frame in which the curriculum had to be delivered was a key factor in the feeling of time compression and that this would be resolved if lessons were spread out over the entire school year. Similarly, teachers objected to the prescriptive nature of the study protocol,

which required all lessons and most components to be delivered. Based on their experience and given a future choice, they indicated that they would be more selective in which lesson components to pursue.

Nevertheless, teachers repeatedly said that the TN materials engaged their students and made a difference. Typical of the comments offered is the statement, "Kids are really excited about learning this stuff and seem to like talking about Team Nutrition." One fourth-grade teacher noted," a lot of kids have become label readers and bring in labels from snacks." Another teacher passed along comments received at a recent parent conference, "both of our children are involved in Team Nutrition, and at dinner they discuss what food groups are in the meal."

Food service managers and staff were also active participants in Team Nutrition. In addition to their participation in training workshops and efforts to make lunch choices more healthful and appealing, the cafeteria staff became partners in the student education process. For example, classroom lessons include a component known as the "Lunchroom Link." These typically involve a connection with the cafeteria such as a kitchen tour or preparing a student-created menu. The goal is to reinforce educational messages from the classroom. In addition, cafeteria staff played a significant role in supporting classroom, school-wide, and community activities—very often by obtaining and/or preparing foods for taste testing which was mentioned by the staff when interviewed at the end of each pilot phase.

While only a few schools directly involved the food service staff as classroom teachers, the Team Nutrition approach generally calls for a dynamic and synergistic relationship between the classroom and cafeteria. One of the important lessons came as a wish expressed by many food service staff—that is a desire to have been more involved in the up-front planning and curriculum training. We should note that food service staff involvement did increase as the districts expanded Team Nutrition following the pilot project.

Even though Team Nutrition increased the workload of food service staff, there was a uniformly high level of satisfaction expressed. As one manager put it, "When I first found out about Team Nutrition, I thought, 'Oh, no, I don't want to do this.' But afterwards, my attitude changed a lot. I'm very positive about the project now."

It makes sense that at least some of this positive attitude is tied to the changes which cafeteria staff noted among students. Among the behaviors more frequently mentioned are—conversations in the cafeteria line about the nutritional quality of different menu items,

references to the Food Guide Pyramid when making food choices, choosing skim or milk with one percent fat, and eating more of the fruits and vegetables that are served.

Parents are another important channel for children's nutrition education. In the TN environment, parents have a number of opportunities to become aware and involved. Although teachers and pilot coordinators reported some dissatisfaction with the degree of parent participation, the numbers suggest cause for some optimism.

During the telephone interviews with the parents of fourth graders' in TN schools, 47 percent reported hearing about the initiative through the media. Twenty-three percent reported participating in a school or community event. The most frequently attended activities typically took place before or after usual work hours, such as a chef breakfast at school, or events in which their children participated, like the nutrition skit performed during a meeting of the Parent/Teacher Organization.

When asked if they had participated in any nutrition activities at home, the number is much higher. Seventy-seven percent reported involvement; a majority (71 percent) of these described using Team Nutrition materials sent home with students for use with parents.

In general, then, the pilot schools engaged a variety of partners and successfully delivered nutrition education through multiple channels. While time was a constraint for all the partners, the schedule demands of the study were most challenging for teachers and food service staff.. However, the same project participants reported that TN students were enthusiastically engaged in learning and applying what they had learned.

Team Nutrition Had Positive Impacts on Students

The results of the outcome evaluation show that Team Nutrition **modestly increased the skill-based knowledge and motivation to eat healthier** among fourth graders. According to the theoretical foundation of Team Nutrition, such changes are prerequisites, but not sufficient in and of themselves, to shifts in voluntary behavior.

The regression coefficients reported in Table 1 show that Team Nutrition produced statistically significant increases in the number of correct responses even after controlling for other potential explanations, such as general changes over time. The only exception occurs in Phase I with respect to items, which ask students how the balanced diet concept applies to behavior.

Table 1. Overall Team Nutrition Impact on Number of Correct Answers to Nutrition Skill Questions (Regression Coefficients)

Students' Ability to:	Immediate Impact by Phase		Impact at 6-Month Followup
	Phase I	Phase II	Phase I
Identify Healthier Choice	0.31**	0.33**	0.16*
Apply Food Guide Pyramid Knowledge	0.68**	0.83**	0.49**
Apply Balanced Diet Concept	0.02	0.09	0.10

*p <0.05. **p <0.01.

NOTE: Regression coefficients reflect the Team Nutrition-related increase in the number of correct answers relative to scores received in the pretest.

Overall, the impact is small, an increase of less than one additional item answered correctly. The largest improvement occurs for questions that ask students to apply their knowledge of the Food Guide Pyramid to behavior—for example, "from which food group should you eat the most servings each day?" Results are, however, generally consistent in their direction across different measures, for each phase, and over time for the Phase I students.

Similarly, the data in Table 2 indicate positive and statistically significant impacts of Team Nutrition on motivation to make healthier food choices. The pattern is consistent across all three impact measures, including the "cognitive rules" scale items which asks students to indicate both their willingness to make the healthier food choice and an understanding of what that requires.

Table 2. Overall Team Nutrition Impact on Nutrition Motivation (Regression Coefficients)

Students' Motivation	Immediate Impact by Phase		Impact at 6-Month Followup
	Phase I	Phase II	Phase I
General Attitudes	0.48**	0.50**	0.49**
Perceived Consequences of More Fruits, Vegetables, and Grains	0.28**	0.41**	0.53**
Cognitive Rules for Healthy Choices	0.71**	0.64**	0.50**

*p <0.05. **p <0.01.

NOTE: Regression coefficients reflect the Team Nutrition-related increase in the number of answers that indicate positive nutrition motivation, relative to scores received in the pretest.

Positive impacts are on the order of an additional one-half of a healthier response. Again the pattern holds for both groups of fourth graders and over time for Phase I students.

One of the strengths of the evaluation is its incorporation of three different approaches to measuring eating behavior. They include fourth graders' self-reports on the classroom survey, parents' perceptions of their children's behavior, and observations of student food choices and consumption in the cafeteria. Each of these approaches has particular strengths and limitations. Collectively, they provide a more comprehensive assessment of TN impacts.

In general, there were **some, but not consistently, positive impacts across the different measures of eating behavior**. The results from analyses of student self-reports are the most uniform (see Table 3). Team Nutrition students were significantly more likely than comparison school students to improve the quality of their responses when asked about usual food choices, food choices in the last two weeks, and yesterday's choices.

Table 3. Overall Team Nutrition Impact on Self-Reported Eating Behavior (Univariate Regression Coefficients)

Students' Behavior	Immediate Impact by Phase		Impact at 6-Month Followup
	Phase I	Phase II	Phase I
Usual Food Choices	0.53**	0.96**	0.11
Choices in Last 2 Weeks	0.43**	0.53**	0.17
Variety of Food Choices Yesterday	0.38**	0.34**	0.07

**p <0.01.

NOTE: Regression coefficients reflect the Team Nutrition-related increase in the number of answers that indicate healthy eating behavior, in comparison with the scores received in the pretest.

The degree of change is modest and comparable to that observed for nutrition skills and motivation. In contrast, however, the self-reported behavior changes were not statistically significant at the 6-month followup for Phase I students.

Table 4 summarizes the results from the cafeteria observations. Here fourth graders' food choices and consumption were measured for up to three matched pairs of days before and after Team Nutrition. The focus of these observations was on behaviors that Team Nutrition is expected to affect, e.g., increased grain consumption and selection of lower-fat milk.

Table 4. Summary Effect Size Statistics for Team Nutrition Implementations

Food Group	Measure	Mean Effect Size	Homogeneity Across Districts & Phases
Grains	Number Selected	0.13*	No
	Amount Consumed	0.13*	Yes
Fruits	Number Selected	-0.01	No
	Amount Consumed	0.01	No
Vegetables	Number Selected	0.04	No
	Amount Consumed	0.09	No
% Fat, Milk	% Fat, Milk Selected	0.01	Yes
	% Fat, Milk Consumed	0.04	Yes
Diversity	Group/Day, Tasted	0.22*	Yes
	Item/Day, Tasted	0.22*	Yes

* p < 0.05.

Established techniques for meta-analysis were used for averaging the results across districts whose menus differed from one another (Cooper and Hedges, 1994; Hunter and Schmidt, 1990). An unambiguous and positive TN impact requires that the mean effect is in the predicted direction, statistically significant, and passes the homogeneity test (i.e., has essentially the same value across districts and phases).

Team Nutrition produced such impacts in the amount of grains consumed from school lunches, as well as in the diversity of food items and food groups tasted. The size of such changes is again relatively small. The mean effect sizes are not equivalent to amounts selected or consumed, rather they correspond to modest shifts in the proportion of students who chose foods in a more healthful manner. Team Nutrition effects on the selection and consumption of fruits, vegetables and low fat milk were in the expected direction when averaged across districts but neither statistically significant nor the same across different districts.

The third approach to assessing TN impacts on students involved asking parents to describe the degree of any change in their children's nutrition awareness and eating behaviors. Based on parents' perceptions, Team Nutrition produced statistically significant increases in nutrition awareness and interest (Table 5). More specifically, parents of students from TN schools perceived that their fourth graders talked more about nutrition at home and showed a greater interest in food shopping. However perceived changes in eating behaviors were not significantly different compared to reports from parents of comparison students.

Table 5. Parents' Perception of Changes in Students

	Phase I	**Phase II**
Increase in Student Nutrition Awareness and Behavior Attributable to Team Nutrition	0.72**	0.49**

** $p<0.01$

This pattern of results is similar to the one associated with more direct outcome measures. That is, statistically significant TN impacts are more consistently observed for knowledge and motivation than for behavior changes.

Multiple Channels Strengthened Team Nutrition Effects

The evaluation also includes a preliminary analysis of what particular student, family and intervention characteristics either amplify or reduce the impacts of Team Nutrition. Student self-reports, i.e., usual food choices, choices in the last two weeks, and variety eaten yesterday, were the focus of this part of the analysis.

As a first step, multi-variate analyses examined the interaction of a variety of student and family variables with Team Nutrition on impacts. These variables included basic demographic characteristics such as, gender and household income, as well as social environment features that were hypothesized to be relevant to eating behavior. While several of these variables have statistically significant correlations with self-reported eating behavior at the posttest, there were no significant interactions with participation in Team Nutrition.

The second step compared TN impacts across different intervention experiences. The "uniform treatment" model defines Team Nutrition as a whole—that is, students either participated or did not. This is in contrast to the "discrete components" model, which considers the relative effectiveness of exposure to specific intervention elements:

- Student exposure to at least one TN public service message,
- Student receipt of TN classroom instruction,
- Student participation in TN cafeteria events,
- Student participation in TN community activities,
- Parent participation in Team Nutrition or any other nutrition events at school, and
- Parent participation in Team Nutrition or any other nutrition activities at home.

Finally, impacts were assessed by defining Team Nutrition in terms of the cumulative number of elements a student experienced; this is the "level of exposure" model.

In all three analyses, Team Nutrition had a small, but statistically significant and positive impact on fourth graders' self-reported eating behaviors. This holds only for impacts measured immediately after the intervention but not at the 6-month followup for Phase I students.

Comparatively, the level of exposure model offers the strongest impact predictions. As shown in Table 6, students' mean scores on the self-report scales increase fairly consistently with the number of TN channels in which they participated. Note that students from comparison schools may have seen the TN public service announcements, and may have also participated in TN community events.

Table 6. Level of Exposure Model: Mean Scores for All Students' Self-Reported Nutrition Behavior, by Number of Channels of Participation

Number of Channels Of Participation	Usual Food Choices		Choices in Last 2 Weeks		Variety of Food Choices Yesterday	
	Phase I	*Phase II*	*Phase I*	*Phase II*	*Phase I*	*Phase II*
0	4.3	4.0	4.4	3.9	3.1	3.0
1	4.5	4.5	4.8	4.7	3.3	3.3
2	4.7	4.6	5.3	5.3	3.4	3.0
3	4.8	4.7	5.5	5.5	3.5	3.3
4	5.4	5.5	5.4	5.6	3.7	3.7
5	5.6	5.9	5.6	6.4	4.0	3.9
6	5.1	6.6	5.9	6.7	4.3	3.8

This pattern of results fits the SLT and social marketing approach that underlie the design of Team Nutrition. Both perspectives view eating behavior as a complex activity that is most effectively influenced by reaching students through multiple channels and broad environmental changes. Thus, it makes sense that the analytic model that captures the collective impact of multiple channels is the one with the best predictive capacity.

What Does It All Mean?

Like some studies of nutrition education targeted to specific behavior changes (Perry, Mullis and Maile, 1985; Perry et al., 1998; Auld et al., 1998; Coates et al., 1981), Team Nutrition resulted in statistically significant improvements on at least selected measures of eating behavior. This is particularly striking given the relatively short time frame associated with the intervention. Other projects involving comparable strategies have had less successful behavioral outcomes (Parcel et al., 1989; and Domel et al., 1993).

The data suggest this success is due to the comprehensive nature of the intervention. Team Nutrition encompasses not just classroom instruction but a wide range of other promotional activities, along with changes to the School Lunch Program.

While this experience validates the nutrition education initiatives based on SLT and social marketing strategies, important questions remain. For example, how can improvements be increased in size? Equally important, how can we produce longer term effects? While the current data are not sufficient to answer such questions, they underscore the need to begin future research with broad, multiple channel nutrition education efforts.

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