

State of Nutrition Education & Promotion for Children & Adolescents



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Report

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EXECUTIVE SUMMARY

Promoting and teaching healthy eating is essential to addressing childhood obesity and other diet-related health problems. Recognizing the important role that a coordinated nutrition education and promotion effort can play in establishing life-long healthy eating habits, Congress authorized USDA's Team Nutrition Networks (TNN) in the 2004 Child Nutrition Reauthorization. However, adequate funds to carry out the provisions of the Act were never fully appropriated. The upcoming Child Nutrition Reauthorization provides an opportunity to strengthen and enhance the role of nutrition education and promotion in reducing childhood obesity and preventing the development of chronic diseases, such as diabetes and cardiovascular disease.

The goal of this report is to provide Congress and other policymakers specific recommendations about how to provide a consolidated and comprehensive TNN that is coordinated at the national level, administered at the State level, and implemented at the local level. In addition, SNE has outlined a strong rationale for the recommendations by: (1) highlighting critical gaps in pre-kindergarten through twelve grade nutrition education and promotion at the local, State, Tribal, and Federal levels; and (2) explaining the evidence-base emphasizing the need for effective nutrition education and promotion for children and adolescents.

Team Nutrition Networks

A well-funded TNN can strengthen nutrition education and promotion efforts in Child Nutrition programs and within schools and communities across the country by:

- Supporting a strong nutrition education program in every State
 - This program would include: training and technical assistance to local school districts; implementation and evaluation curricula; better utilization and dissemination of existing materials; improved coordination among nutrition education providers and programs; and enhanced communication within the State and among other States.
- Providing financial stability
 - Resources would go to State agencies to support nutrition education in schools and further integration of materials and training from USDA nutrition programs.
- Enabling efficient and effective collaboration in building multidisciplinary, integrated nutrition and health promotion partnerships
 - System would facilitate schools working with other schools within district, local childcare centers, communities, and other nutrition programs and settings.
- Allowing States and districts to address their own unique nutrition education needs.
- Funding qualified professionals to lead nutrition education and promotion efforts
 - Activities would take place in Child Nutrition programs across each State, including the National School Lunch Program (NSLP), the School Breakfast Program (SBP), the Summer Food Service Program (SFSP), and the Child and Adult Care Food Program (CACFP).
- Ensuring local wellness policies are implemented and evaluated.

Critical Gaps in Pre-Kindergarten through Twelve Grade Nutrition Education and Promotion at the Local, State, Tribal, and Federal Levels

The long-term lack of sufficient funding for nutrition education and promotion in Child Nutrition programs has resulted in a fragmented system making it difficult for innovative, evidence-based approaches to be developed and implemented using a comprehensive, sustainable approach. As a result:

- Nutrition education and promotion efforts are insufficient relative to the impact of nutrition on health.
 - Schools in most States are required to offer nutrition and physical activity instruction, but health teachers reported spending only 4-5 hours per year covering each topic.¹
 - Among elementary classes in which nutrition and dietary behavior were taught, the median number of hours of required instruction that teachers provided on nutrition and dietary behavior decreased from 4.6 in 2000 to 3.4 in 2006.²
- Many Child Nutrition programs include some nutrition education components; between the programs, however, there is limited or no coordination.
 - A 2004 GAO study recommended identifying ways to improve coordination efforts and to strengthen the linkages among nutrition education efforts.³
 - This GAO study also found that the National School Lunch Program (NSLP) and Child and Adult Care Food Program (CACFP) lack a formal administrative structure to systematically deliver nutrition education, to disseminate the nutrition education materials created by Team Nutrition, and to coordinate among the various nutrition and health programs across the State.
- Schools do not have adequate resources or necessary knowledge to prioritize nutrition education throughout the school environment.
 - Only 65% of school districts provide funding for or offer staff development on nutrition and dietary behavior.²

Nutrition Education & Promotion has a Solid Evidence-Base

Considerable research has been conducted in recent years to find effective strategies to improve the nutritional health of children and reduce the risk of chronic disease and obesity. Evidence⁴⁻⁸ indicates that nutrition education interventions are more likely to be effective in impacting behaviors if they do the following:

- Target specific behaviors or practices
- Focus on the interests and motivations of targeted youth
- Devote sufficient time and intensity
- Deliver coherent and clearly focused curricula
- Involve multiple components using a social ecological approach
- Provide professional development to staff

In order to be effective, nutrition education and promotion must include multiple components such as: environmental change, policy change, integrated initiatives, social marketing, as well as classroom nutrition education standards supporting sequential instruction emphasizing skill building and family involvement. Furthermore, Congress addressed the importance of establishing healthy habits

through behavior change and the need for a multi-pronged approach, as part of the 2008 Farm Bill discussion.⁹ Specifically, Congress stated that:

Expert organizations, such as the Institute of Medicine, indicate that dietary and physical activity behavior change is more likely to result from the combined application of public health approaches and education than from education alone.

Joint Explanatory Statement of the Committee of Conference, 2008 Farm Bill

Effective nutrition education and promotion efforts, delivered through a well-funded TNN initiative, go hand-in-hand with delivering nutritious foods and beverages through school meal and other nutrition assistance programs. While it is critical for all youth to have access to nutritious meals, for schools and other Child Nutrition programs to limit access to unhealthy foods and beverages, and for physical education and activity programs to be promoted, it is equally critical to provide learning opportunities that teach youth—in ways that instill life-long healthy behavior changes and habits—the importance of a nutritious diet, and to have the messages and initiatives coordinated and targeted, based on State and community needs.

References

- ¹Story, M, Kaphingst, KM, French, S. *The Role of Schools in Obesity Prevention*, Center for Health and Wellbeing Research Brief. Available at: http://weblamp.princeton.edu/chw/briefs/AA%20schools_12.14.06_FINAL.pdf. Accessed May 22, 2009.
- ²Centers for Disease Control and Prevention (CDC). *School Health Policy and Programs Study (SHPPS)*. Atlanta, GA: 2000 and 2006. Available at: <http://www.cdc.gov/HealthyYouth/shpps/index.htm>. Accessed May 22, 2009.
- ³Government Accountability Office (GAO). *Nutrition Education: USDA Provides Services through Multiple Programs, but Stronger Linkages among Efforts Are Needed*. Washington, DC: GAO, 2004. Accessed at: <http://www.gao.gov/new.items/d04528.pdf>. Accessed May 22, 2009.
- ⁴Luepker, RV, et al. Outcomes of a field trial to improve children's dietary patterns and physical activity. The Child and Adolescent Trial for Cardiovascular Health. CATCH Collaborative Group. *JAMA*. 1996; 275(10):768–776.
- ⁵Shaya FT, Flores D, Gbarayor CM, Wang J. School-based obesity interventions: A literature review. *J Sch Health*. 2008;Apr;78(4):189-196.
- ⁶Contento IR, Koch PA, Lee H, Sauberli W, Calabrese-Barton A. Enhancing personal agency and competence in eating and moving: formative evaluation of a middle school curriculum—Choice, Control, and Change. *J Nutr Educ Behav*. 2007;Sep-Oct;39(5 Suppl):S179-186.
- ⁷Walter HJ. Primary prevention of chronic disease among children: The school-based 'Know Your Body' intervention trials. *Health Educ Q*. 1989;16:201-214.
- ⁸Levine E, Olander C, Lefebvre RC, Cusick P, Biesiadecki L, McGoldrick D. The Nutrition Pilot Study: Lessons learned from implementing a comprehensive school-based intervention. *J Nutr Educ Behav*. 2002;34:109-116.
- ⁹Joint Explanatory Statement of the Committee of Conference, 2008 Farm Bill. Available at: http://agriculture.house.gov/inside/Legislation/110/FB/Conf/statement_of_managers.pdf. Accessed June 15, 2009.

STATE OF NUTRITION EDUCATION & PROMOTION REPORT

Problem Statement

Congress supported nutrition education and promotion by establishing the Team Nutrition Networks (TNN) in the Child Nutrition and Women, Infant, and Children (WIC) Reauthorization Act of 2004. The TNN authorized funds, however, have not been appropriated for the activities outlined in the legislation. Consequently, in the four years since the passage of this legislation, Congress' vision for nutrition education and promotion has not been implemented. The upcoming Child Nutrition Reauthorization provides an opportunity to strengthen and enhance the role of nutrition education and promotion in reducing childhood obesity and preventing the development of chronic diseases, such as diabetes and cardiovascular disease.

This report provides recommendations to promote a consolidated and comprehensive TNN that is coordinated at the national level, administered at the State level, and implemented at the local level. In addition, SNE has outlined a strong rationale for the recommendations by: (1) highlighting critical gaps in pre-kindergarten through twelve grade nutrition education and promotion at the local, State, Tribal, and Federal levels; and (2) providing the evidence-base emphasizing the need for effective nutrition education and promotion for children and adolescents.

An effective TNN aims to:

- Promote, through nutrition education and promotion programs and policies, the nutritional health of school children in the U.S. to decrease the prevalence of obesity and chronic diseases, as well as hunger and food insecurity;
- Coordinate and collaborate with other nutrition education and promotion efforts within States, in schools, and with other relevant Child Nutrition programs to leverage and maximize resources and ensure effective and coordinated program delivery; and
- Help bridge together local, State, Tribal, and Federal programs and initiatives working with children, as well as their families and communities.

SNE's Recommendations

I. Improve Nutrition Education & Promotion in Child Nutrition Programs

SNE proposes that Congress streamline and consolidate Section 5 of the Richard B. Russell National School Lunch Act (NSLA), Nutrition Promotion, and Section 19 of the Child Nutrition Act of 1966 (CNA), Team Nutrition Network (TNN) to not only develop a seamless and comprehensive TNN but also provide sustainable and secure resources through mandatory funding. Making these revisions will also clarify and refocus actions to improve nutrition education and promotion.

TNN, within and across USDA's Child Nutrition programs, should be coordinated at the national level within USDA's Food and Nutrition Service, administered at the State level to meet unique State needs, and implemented at the local level based on prioritized community needs, as outlined below:

USDA Food and Nutrition Service Responsibilities

Federal funding will be used by USDA to develop a comprehensive and integrated national nutrition education and promotion program and provide assistance to States and localities. Federal activities can include:

- Developing Team Nutrition materials;
- Providing regular communication, training, technical assistance, materials, and messages on topics, such as effective strategies to promote healthy eating, physical activity, and positive behavior changes;
- Developing, maintaining, and updating a clearinghouse of best practices/effective strategies for promoting healthy eating and developing and implementing local wellness policies. The clearinghouse should include a hotline, website, and other assistance, information, and online training;
- Training for teachers, administrators, child nutrition professionals, school nurses, health clinic professionals, and others conducting nutrition education and promotion programs and activities;
- Identifying and disseminating policies and programs to improve school nutrition environments;
- Supporting the development, implementation, and assessment of local school wellness policies;
- Improving the nutritional quality of school meals, including the healthfulness of USDA Foods (commodities), and foods provided outside of school meals, such as through vending, a la carte, fundraisers, school celebrations, and food rewards;
- Increasing participation in school meals;
- Identification and dissemination of effective evaluation techniques;
- Coordinating with other national and State nutrition education efforts that model a systems and processes approach; and
- Supporting needs assessments in States.

State Responsibilities

State funding will be used to effectively administer TNN. State funding will be used to staff a State level Team Nutrition Coordinator. A TNN Coordinator is critical for the delivery of effective, ongoing nutrition education and promotion. The TNN Coordinator will be responsible for:

- Establishing a comprehensive, integrated, and coordinated nutrition education and promotion program for children and adolescents within their State;
- Coordinating and collaborating with other nutrition education and promotion efforts (such as SNAP-ED, Cooperative Extension, and Coordinated School Health) across the State to leverage resources and ensure children are receiving effective and consistent messages regarding healthy eating and active living;
- Conducting trainings and provide technical assistance for local education agencies (LEAs) and other Child Nutrition program sponsors, schools, teachers, administrators, school food service professionals, and child nutrition, health, and nutrition education personnel on effective nutrition education and promotion policies and programs to promote and support dietary behaviors consistent with the *Dietary Guidelines for Americans*, improve school nutrition environments, support development, implementation, and assessment of local school wellness policies, improve the nutritional quality of school meals, including the healthfulness of USDA Foods (commodities), and foods provided outside of school meals, such as through vending, a la carte, fundraisers, school celebrations, and food rewards, increase participation in school meals, and carry out and disseminate effective evaluation techniques;
- Facilitating networking and information sharing within a State; and

- Making available and accessible, and actively disseminate materials, trainings, programs, model policies and other promising practices developed by the Secretary, State TNN Coordinator, and/or other best practices that encourage children to eat healthfully and live an active lifestyle.

Local Responsibilities

The State TN Coordinator will be responsible for allocating grants to local education agencies, schools, and other institutions implementing Child Nutrition programs to support nutrition education and promotion. Grant award and allocation will be determined by an interdisciplinary team chaired by the TN coordinator and include representation from education and health professionals. Grant submissions for local school districts or other child nutrition entities shall include programs, policies, or initiatives to increase participation in and student acceptance of school meals and to support local wellness policy goals. Local agencies are encouraged to address one or more of the following in their grant application:

- Improve the nutritional quality of school meals, including the healthfulness of USDA Foods (commodities);
- Improve the nutritional quality of foods provided outside of school meals, such as through vending, a la carte, fundraisers, school celebrations, and food rewards;
- Implement USDA HealthierUS School Challenge Criteria or a comparable program for middle and high schools;
- Increase the quality and quantity of physical education and physical activity during the school day;
- Develop and implement nutrition education, physical education, and physical activity programs;
- Implement model elementary and secondary school curricula, including those developed by Team Nutrition or other best practices;
- Implement State guidelines in health (including nutrition education and physical education guidelines) and to increase regular physical activity before, during, or after school;
- Collaborate with public and private organizations, including community-based organizations, State medical and nutrition associations, public health groups, Coordinated School Health efforts, and SNAP-ED initiatives to promote and support healthy eating;
- Improve access to local foods through farm-to-cafeteria activities that may include the acquisition of food and the provision of training and education; and
- Expand or enhance the Fruit and Vegetable program.

Funding:

The total amount of funds available for each fiscal year shall be equal to the product obtained by multiplying one cent by the number of meals reimbursed in the NSLP (National School Lunch Program), the CACFP (Child and Adult Care Food Program), and the SFSP (Summer Food Service Program), during the preceding fiscal year in schools, institutions, and service institutions that participate in the Child Nutrition programs. Funds will be allocated as follows:

USDA FNS TNN activities as describe above: 20%

Note: An incentive based funding strategy should be considered after the first three years of the program to allocate a percentage of USDA TNN funds to States on a competitive basis contingent upon each State's demonstrated progress towards meeting defined goals and outcomes as stated in section.

State TNN activities as described above: 80%

Note: 30% will be used to establish and maintain State infrastructure including funding the TN Coordinator; 50% of the State allocation will be used for competitive grants to local education agencies, schools, and other institutions implementing Child Nutrition programs to support nutrition education and promotion as described above.

Reporting & Evaluation Requirements:

USDA FNS Reporting and Evaluation Requirements:

USDA must conduct an evaluation of TNN by January 1, 2013. The report should provide an overview of:

- State nutrition education and promotion activities including methods used to determine State priorities;
- Major State activities and initiatives;
- Activities by local agencies;
- Coordination and collaboration efforts within States that support a systems approach to providing nutrition education and promotion within a State;
- Identification of best practices for improving healthy eating by students;
- Improvements to school nutrition environments;
- Physical activity promotion efforts; and
- Enhancements and strengthening of local wellness policies.

State TN Coordinator Reporting and Evaluation Requirements:

Each State TN Coordinator shall submit to USDA a report after the first year that includes:

- Actions planned to fulfill TNN goals;
- Actions planned to coordinate and collaborate with other State nutrition education and active living programs that share similar goals and purposes (eg., SNAP-ED, Cooperative Extension, EFNEP, and Coordinated School Health);
- A State needs assessment for child nutrition education and promotion throughout the State (this needs assessment may be compiled from already completed State needs assessment(s) or data, if available or coordinated with other health departments and education needs assessments); and
- Other measures deemed appropriate by the Secretary.

Each State shall also conduct an evaluation after three years and every three years thereafter that includes:

- Actions implemented and future plans to fulfill TNN goals;
- Actions implemented and future plans to coordinate and collaborate with other State nutrition education and active living programs that share similar goals and purposes (eg., SNAP-ED, Cooperative Extension, EFNEP, and Coordinated School Health);
- Description of LEAs progress in meeting goals; and
- Other measures deemed appropriate by the Secretary.

LEAs, schools, and others that receive grants shall submit annually to the State TNN Coordinator a report that shows progress towards meeting the activities and outcomes of the grant.

II. Addressing Critical Gaps in Nutrition Education & Promotion while Building on a Solid Evidence-Base—SNE’s Two-Fold Rationale

The childhood obesity epidemic, along with increased rates of chronic diseases in children and skyrocketing healthcare costs, demonstrate the need for a more comprehensive and science-based nutrition education and promotion effort, coordinated within and across Child Nutrition programs (NSLP, SBP, CACFP, and SFSP) (1). In order to reverse the current trends, children and families must learn the skills necessary to make healthy choices and navigate a variety of food and physical activity environments. Equally as important, the following two sections illustrate that Child Nutrition programs must: (1) *Address critical gaps in pre-kindergarten through twelve grade nutrition education and promotion at the local, State, Tribal, and Federal levels; and (2) Build on the solid nutrition education and promotion for children and adolescents evidence-base.*

(1) Gaps in Nutrition Education and Promotion for Children & Adolescents

Local Level

Hours of Nutrition Education Children Receive Below Suggested Minimum & Delivery is Fragmented

Fifty hours of nutrition education is the minimum amount necessary for facilitating behavior change (2). Research demonstrates that the majority of American students are receiving significantly less nutrition education and promotion than the amount needed to facilitate positive changes in their eating behaviors. Indeed, several studies indicate schools have decreased the amount of time spent on nutrition education and promotion (3-7). For example, the US Department of Education (DoE) reported in 2000 that the mean number of hours spent in a school year on nutrition education by elementary school teachers who taught nutrition was only thirteen (4).

Reports from Connecticut and Colorado in 2004 and 2006, respectively, indicated that the number of hours spent on classroom nutrition education decreased to five or six hours per year (5-6). Both States found that the amount of nutrition education students received varied greatly across schools at the same school within the same grade level. On average, elementary students received five hours of nutrition education per year, middle school students received six hours per year, and high school students received around four hours per year. Few schools had specific requirements regarding the amount of nutrition education their students should receive. The schools that had requirements typically had standards for health, of which nutrition was just one part. Only a small number of schools participating in these studies had school-wide coordination or integration of health and wellness programs. Nutrition education outside of the classroom was lacking at most of the schools. Collaboration among staff to provide nutrition education occurred infrequently or not at all.

Even though the hours had decreased in the Connecticut and Colorado studies, the lack of coordination across and within grade levels was similar to what was reported in the DoE 2000 study (4). This study found that even when nutrition education was provided, too many inconsistencies occurred in what was taught at different grade levels and within grade levels. The majority of teachers reported teaching some nutrition education, but it was taught more consistently in grades K-2 than in grades 3-5. Some teachers who taught nutrition taught it as a separate subject while others integrated nutrition lessons into health, physical education, and science courses. Likewise, the School Health Program and Policy Study (SHPPS) reported that the median number of required instruction hours of nutrition education elementary teachers provided decreased from 4.6 in 2000 to

3.4 in 2006 (7). Thus, today's children and adolescent are not exposed to a sufficient amount of coordinated and sequential nutrition education and promotion to facilitate positive changes in their eating habits.

Nutrition Education is Not a Priority for Teachers & School Administrators

Weak administrative and teacher support for nutrition education and promotion is a barrier to implementing a comprehensive, sequential PreK-12 nutrition education and promotion program (4,8-9). For example, teachers were cited by school nutrition professionals in a survey on the USDA local school wellness policies as the reason why nutrition education goals were not being accomplished in the classroom. School nutrition professionals felt that nutrition education goals were not a priority for teachers. In addition, school nutrition professionals believed that teachers and administrators do not view students' health and wellness as part of a school's core mission.

Teacher training and administrative support have been shown to have positive impacts on nutrition education and promotion in the classroom (4). Specifically, teachers of grades K-2, with higher levels of administrative support for nutrition education from their schools, and with college training in nutrition education were all more likely to use some active learning strategies to a moderate or great extent in their nutrition instruction. Teachers with in-service nutrition education training were also more likely than teachers with no such training to use instructional materials that were up-to-date and age appropriate. While teachers have reported high availability of resources in support of nutrition education, including healthy cafeteria meals, reference materials, support for use of instructional time, and written policies or guidelines, some teachers noted that the availability of high quality in-service training in nutrition education was low. Further work is needed to more effectively support schools and teachers in their nutrition education and promotion endeavors.

Classroom Curriculum Needs to More Effectively Connect with the Cafeteria

The cafeteria should be an important learning laboratory where students can practice skills to meet their individual nutrition needs (9). Yet, few PreK-12 classroom curricula integrate the cafeteria with nutrition education and promotion. Teachers reported several barriers to cooperating with their school food service staff in providing nutrition education: lack of instructional time; limited food service staff time to devote to classroom curriculum; uncertainty on what activities were possible; and difficulty of schedule coordination between teachers and food service staff.

The cornucopia of nutrition education curricula currently available from USDA Food and Nutrition Information Center, commodity groups, such as Dairy Council, Produce for Better Health, and the food industry can overwhelm local school districts and teachers. Unfortunately, too many of these curriculums have not been evaluated for effectiveness or sustainability. USDA Team Nutrition curricula and promotion materials have been developed for use in the school and childcare settings. Although some of the Federal nutrition programs recommend using these materials when working with schools or childcare, these materials are not required. Infrastructural support and integrated government initiatives are needed to more effectively connect Federal investments in the classroom and cafeteria.

Training Food Service Staff in Nutrition Education & Promotion is Inadequate

Training on nutrition and nutrition education for food service staff is left up to the individual school district or childcare director. While food service training has been developed by Federal, State, and local agencies, no model curriculum to train food service staff on nutrition or nutrition education exists (7). Research indicated that 4.1% of the reviewed school food service personnel had not completed high school and 49.3% had no more than a high school diploma or GED. These statistics make it difficult for individual schools to develop appropriate training materials. Another challenge is only a few “best practices” have emerged instructing food service staff on how to coordinate and collaborate with teachers to provide nutrition education and promotion to students and parents. Besides developing model curriculum and other training resources, certification processes for food service staff may improve the quantity and quality of nutrition education and promotion in the cafeteria and in the classroom. Fewer than 30% of States offer school nutrition directors and food service managers State licensure, certification, or endorsement. Therefore, systematic and sustainable training materials and accessible technical assistance at the local, State, and Federal levels for food service staff can enhance their abilities to promote healthy eating in school children.

School-Home Partnerships Lacking in Nutrition Education & Promotion

Obesity prevention and control requires a combination of individual-, family-, school-, and community-based multi-component intervention strategies (10). Nonetheless, the Action for Healthy Kids *Progress or Promises* report found that parents, school health professionals, and community health providers all feel that schools are not providing adequate information to parents on the importance of sound nutrition (8). A majority of teachers reported that they and/or their schools used little effort and minimal strategies to involve parents. The exception to this was asking parents to provide healthy snacks. Teachers with administrative support from their schools and with college training in nutrition education utilized a greater number of family involvement strategies for nutrition education. These teachers were also more likely to include parents in nutrition homework assignments compared to teachers with no nutrition education training (4). To more effectively fight childhood obesity and ensure healthy eating in tomorrow’s adults, more coordinated work and a systems and processes approach is needed to connect the lessons an individual child is learning at school with what she is learning from and exposed to within her home and community.

State Level

Nutrition Education in Child Nutrition Programs Varies by State

The support for the nutrition education component of USDA Child Nutrition programs varies by State (11). Currently, USDA’s Team Nutrition program consists of two components: (1) development of training and education materials, as well as some technical assistance and maintenance of a resource database; and (2) the Team Nutrition Training State competitive grants to help implement USDA’s school meal standards. Competitive grant funds are also supposed to be used by States to establish or enhance sustainable infrastructures for implementing Team Nutrition.

While the two parts of Team Nutrition are worthwhile, gaps exist. The training grants provide a small amount of money for a short period of time. For example, over the last eight years, or funding cycles, New York has received funds for three of the eight years, and Pennsylvania has received funds for four of the past eight years. The average grant amount is around \$200,000, and States often further divide funding into mini-grants for districts or individual schools.

The receipt of USDA Team Nutrition grant funds may provide funds to enlist a person who can temporarily help coordinate and collaborate on nutrition education efforts during the grant period. Support for this person ends once the grant period ends or if the State fails to secure another Team Nutrition grant. If a Team Nutrition grant was secured to develop training or curricula, there is often no research or documentation as to the effectiveness of the curricula. Funds are typically not available from Team Nutrition grants to continue to provide in-service training or facilitate any necessary modifications to sustain the curriculum.

Team Nutrition grants are distributed on a competitive process. Not all States receive grants. Funded grants may or may not have a classroom nutrition education component. States receiving grants are required to commit 50% of one FTE time to administration of the grant. This may or may not happen. It may simply be an additional responsibility for that staff person to assume. State Child Nutrition program agency level of support for coordination with the State Coordinated School Health program and staff is inconsistent.

In sum, the current TN training grants provide a small infusion of funds for a short period of time. While State and local efforts are well-intentioned, the lack of sustained coordination and evaluation, coupled with the limited reach, results in a fragmented approach to nutrition education and promotion. Moreover, a lack of adequate funding at the Federal level does not allow for the most effective means of communicating best practices nor does it include needs assessments and evaluations to better target funds. Evidence suggests that nutrition-education program funding at the State level is associated with reductions in Body Mass Index (BMI) and the probability of an individual being overweight (12).

Tribal Level

Access and the opportunity to participate in some of the USDA Food Assistance Programs, such as the Summer Food Service Program (SFSP) or the Farmer's Market programs have been barriers for some American Indian communities (13). Likewise, access to nutrition education through the Food Stamp Nutrition Education program is sometimes difficult. Access to needs based and culturally appropriate nutrition education is usually not available to individual Tribal communities.

Federal Level

Lack of Coordination & Collaboration Hinders the Effective Delivery of Consistent Nutrition Messages

Numerous Federal programs and a number of national foundations provide nutrition education initiatives and resources in the form of materials, personnel, research intervention projects, or as grants to schools. This volume and variety of resources can be problematic, especially when there is a lack of coordination across agencies to ensure the effective delivery of consistent nutrition messages. The USDA has recently attempted to address this issue by developing a list of USDA core messages (14).

Aside from inconsistent messages and materials, a lack of coordination and collaboration across the various nutrition education resources fails to ensure that nutrition education is delivered sequentially from PreK-12. That is, the 2004 Government Accountability Organization (GAO) determined that lack of coordination and linkages exist within USDA Food Assistance Programs (15). Illustrative of these differences are the varying guidance, reporting, and evaluation requirements between Federal

programs. In essence, the Team Nutrition program, NSLP, CACFP, Supplemental Nutrition Assistance Program (SNAP), Expanded Food and Nutrition Education Program (EFNEP), and Centers for Disease Control (CDC) Coordinated School Health (CSH) all have different methods to apply and evaluate nutrition education.

The School Nutrition Dietary Assessment III report highlighted the need for a more comprehensive, coordinated Team Nutrition program across all States and urged that a more effective infrastructure at the national, State, and local levels be implemented to promote nutrition and nutrition education within Child Nutrition programs (16). The USDA Food and Nutrition Service (FNS) State nutrition action plan initiative has been an attempt to increase coordination and collaboration across FNS nutrition programs. These efforts are unfunded and rely primarily on time contributed from volunteers within State Agencies. States that have implemented comprehensive FNS State nutrition action plans report success in eliminating duplication and maximizing nutrition messages, particularly in youth-based programming (15).

For example, California Nutrition Network was cited in the SNAP-ED systems report as a Network that coordinated well across agencies and programs (17-18). Representatives from FNS-funded programs (e.g. SNAP and Child Nutrition programs, including WIC, NSLP, SFSP, and CACFP) have worked together via both the *Network for a Healthy California*, one of the State's two SNAP-ED Implementing Agencies, as well as the FNS State Nutrition Action Plan initiative. The *Network* coordinates promotion of nutrition and physical activity among a diverse group of State and local partners working with low-income families, including schools, afterschool programs, WIC offices, and food distribution programs. Over the past fourteen years, the *Network* has provided partners with training, materials, and ongoing technical assistance in order to support consistent and effective nutrition education messaging across participating FNS programs and other collaborators. The establishment of California's State Nutrition Action Plan in 2003 has further supported the coordination of nutrition efforts between FNS programs. Focusing on the common goal of promoting fruit and vegetable consumption, the FNS State Agencies have undertaken a number of collaborative projects in areas such as farm-to-school, nutrition education at farmers' markets, promotion of the new WIC food package, evaluation of nutrition education programming, and outreach for the three primary FNS programs (e.g. SNAP, WIC, and NSLP). The State Nutrition Action Plan team continues to meet regularly throughout the year to share resources and strategize around future opportunities for coordination.

Coordination among three Federal agencies—USDA, HHS, and DoE—was recommended in 2002 by the Bush Administration as a strategy for reducing child obesity. This tri-agency coordinated strategy was formalized by a Memorandum of Understanding (MOU) (19). Despite DoE inclusion in this endeavor, health and nutrition education were not a part of the 2002 No Child Left Behind Legislation. This legislation and other national initiatives have emphasized the standardization and implementation of evidenced-based curriculum that teaches to national standards for core subject areas. No DoE national standards or framework for PreK-12 nutrition education and promotion exists. The National Association for State Boards of Education supports the provision of comprehensive, standards-based nutrition education that is integrated throughout the school curriculum (20).

The Health & Academic Impacts of Coordinated Efforts

Dr. Pat Cooper, the Superintendent of the McComb, Mississippi school district, used a coordinated health and safety systems approach to nutrition education and promotion (21). The outcomes of this

approach included: higher test scores, improved average attendance, increased graduation rates, and decreased discipline referrals, in-school detentions, and out-of-school suspensions. The increased focus on the nutritional health and physical well-being of the McComb students and staff, as well as an administrator, who recognized and supported the need for both, was central to these achievements. Superintendent Cooper credits his success with his knowledge of the different education, nutrition and health systems, and their funding streams, along with the coordination and collaboration of these programs within the school setting. This coordinated approach is also seen at the State level. For instance, Mississippi created the Office of Health and Safety within their department of education, which houses the State administrators of all health-related funded programs. Funding sources include: USDA SNAP-ED, DOE, and HHS CDC. Using a systems approach, nutrition education is a component of the State's health education curriculum Framework (22). Therefore, collaborative efforts that are well-coordinated can not only address critical gaps in pre-K through twelve grade nutrition education and promotion, but more importantly, generate positive health and academic outcomes.

(2) Solid Nutrition Education & Promotion for Children and Adolescents Evidence-Base

Considerable research has been conducted in recent years to find effective strategies to improve the nutritional health of children and reduce the risk of chronic disease and obesity. These studies have addressed related behaviors while assuring nutritional adequacy. Congress also addressed the importance of establishing healthy habits through behavior change and the need for a multi-pronged approach, as part of the 2008 Farm Bill discussion (23). Specifically, Congress stated that:

Expert organizations, such as the Institute of Medicine, indicate that dietary and physical activity behavior change is more likely to result from the combined application of public health approaches and education than from education alone.

Joint Explanatory Statement of the Committee of Conference, 2008 Farm Bill

This section summarizes the evidence-base of nutrition education and promotion for children and adolescents and strives to highlight key components of effective nutrition education and promotion activities.

Nutrition education interventions are more likely to be effective if they do the following:

Target Specific Behaviors or Practices

The Childhood and Adolescent Trial for Cardiovascular Health (CATCH), a multi-component intervention, resulted in decreased fat intake and increased physical activity, and in various predisposing psychosocial factors, even though it did not change children's physiological parameters (24). CATCH was also effective in achieving targeted school environment changes. Several carefully controlled studies of educational strategies designed to increase fruit and vegetable intakes have been shown to be effective (25-28). While not all studies designed to reduce excessive weight gain in children have been effective, some have resulted in improvements in one weight-related measure or another, such as Body Mass Index (BMI) or skin fold measures (29). One review of intervention

studies found that 17 of 25 were effective in improving weight related parameters (30) and another review found that 40 out of 51 interventions were effective (31). Therefore, several school-based intervention studies have been effective when they focused on specific behaviors. These behaviors and practices should contribute to the child's nutritional status and employ educational strategies that are directly relevant to the behavioral focus. Behaviors should also be derived from appropriate theory and based on strong research.

Focus on the Interests and Motivations of Targeted Youth

Recent research suggests that it is important to identify the appropriate motivations, usually referred to as determinants or mediators of change, for a given audience and to develop appropriate strategies based on these mediators. These mediators will differ by cognitive development. For instance, in early elementary school children, the primary motivators are preference and availability (32). This means nutrition education needs to help children become familiar with healthful foods in order for children to come to like them, through taste experiences in the classroom and in the school cafeteria, and families and schools need to provide them. Other motivators have also been examined such as self-efficacy and perceived benefits (27), or concern for the environment (33). As children become older, additional mediators of behavior change become important and need to be identified and addressed, such as: peer influences, behavioral choices, ability to set goals (34, 35), sense of competence and autonomy (36) or decision-making in social and environmental context. Self-assessment compared to recommendations has been found to be useful at all ages (37). Thus, nutrition education content should strategically integrate key motivators of the targeted youth, not simply provide knowledge.

Devote Sufficient Time and Intensity

Interventions with longer durations and more contact hours have resulted in more positive results. A notable illustration is the "Know Your Body" program, which was designed to reduce cardiovascular risk. This program involved 30-50 hours a year for three years and achieved improvements in serum cholesterol and blood pressure as well as diet (38, 39). The conceptually similar intervention, CATCH involved 15- 20 hours a year over three years (3rd through 5th grade) and, as previously noted, resulted in behavior changes, though not in physiological parameters (24). These behavioral changes were still in evidence in the 8th grade (40). Furthermore, many obesity prevention studies found that longer duration was important for effectiveness (29). A large-scale evaluation of health education programs found that while large effect sizes could be achieved in program specific knowledge in 8-10 hours and general knowledge in 20-25 hours, only moderate effect sizes could be achieved in attitudes and behaviors even after 35-50 hours (2). An early pilot of Team Nutrition found that 12-33 hours of classroom curricula plus the opportunity to participate in 4-10 school and community activities, resulted in modest but significant improvements in student knowledge, motivation, and behavior outcomes (41). Obesity prevention studies have often been six months to two years long and even then have not achieved all the weight-related outcomes targeted (29, 30). Some nutrition studies were able to achieve positive changes in behavior in fewer hours when the intervention was taught by the researchers themselves, were highly focused, and lesson completion rates were high (42).

Deliver Coherent and Clearly Focused Curricula

With limited time available in the school setting, nutrition education needs to focus on specific behaviors that are actionable by youth. Using theory-based activities that build sequentially on each

other in orderly fashion is essential. For example, curriculum could include motivational activities followed by opportunities for youth to set and achieve nutrition and physical activity goals, as well as develop critical thinking and problem-solving skills (24, 28, 35-37). One study used this approach in an intervention targeting fruit and vegetable intakes by integrating 16-24 lessons on relevant fruit and vegetable motivational activities and skill building (26). Random lessons taught in many subject areas, even if interesting and informative, are unlikely to lead to the coherent set of understandings, attitudes, and skills that are needed for considered changes in behaviors and practices.

Involve Multiple Components Using a Social Ecological Approach

Well-coordinated, multi-faceted interventions were shown to be more effective when they addressed several components of a child's environment, including classroom curriculum. CATCH, for example, included two school level components in addition to the classroom curriculum: modifications of school meals to make them lower in fat and sodium, and increased moderate to vigorous activity within physical education classes (43, 44). Half of the intervention schools also included a home component (45). Furthermore, many of the studies directed at increasing fruit and vegetable intakes included a school meals intervention and a family component (26-28). Others focused on the school environment, such as increasing the availability, attractiveness, and encouragement for fruits and vegetables and special events (46). Some studies used various marketing strategies while others examined the impact of differential pricing policies on food choices (47).

An early pilot study of Team Nutrition (TN), involving 18 schools in 7 districts, consisted of 8-9 classroom lessons, cafeteria, chef, and parent, and district-wide community and media events (41). The study resulted in significant improvement, compared to controls, in knowledge and motivation and small, though significant, improvements in some self-reported and observed behaviors. These improvements were directly related to the number of channels through which students participated in TN. The main lesson learned from this study was that there needed to be a high degree of coordination to support and create bridges between the various stakeholders. Moreover, a recent study examined the impact of wellness policy-mandated activities on obesity prevention—making changes in all aspects of the school food environment as well as classroom curriculum—school stores, food for fund-raising, etc. (48) and had positive results. Using multiple components is therefore one way that children can receive the 50 or more hours of nutrition education needed for impact on behaviors and health and this approach also addresses all domains of learning—cognitive, affective, and behavioral.

Provide Professional Development to Staff

Intervention studies found that providing extensive professional development for teachers, school service personnel, and others who would be involved in actual implementation of the nutrition education programs is essential to ensure fidelity to the program (49). Even the best designed nutrition education will not be effective if it is not delivered as designed and tested by intervention research staff. Staff training was also found to be an important factor in achieving institutionalization of CATCH (50). These findings are consistent with reports discussed earlier on what was happening at the local level in nutrition education: Teachers who had received training in nutrition education were more apt to coordinate nutrition education with parents.

Conclusion

Promoting and teaching healthy eating is essential to addressing childhood obesity and other diet-related health problems. Congress supported nutrition education and promotion by authorizing USDA's Team Nutrition Network (TNN) in the 2004 Child Nutrition Reauthorization. However, funds have not been appropriated to carry out many of the key provisions.

TNN is a necessary ingredient to improving Child Nutrition programs. TNN can coordinate sustainable nutrition education and promotion in schools and childcare centers to ensure all children are receiving consistent messages regarding healthy eating and active living. Streamlining efforts to assess and evaluate outcomes, TNN can help bridge together local, State, Tribal, and Federal programs and initiatives working with children and their families to promote healthy lifestyles and academic achievement. The proposed approach to TNN will also:

- Enable the efficient and effective collaboration in building multidisciplinary, integrated, nutrition and health promoting partnerships among schools, childcare centers, other child nutrition settings, and communities;
- Provide financial stability to State agencies to support nutrition education in schools and further integration of materials and training from USDA nutrition programs;
- Establish a TNN or State level infrastructure in every State to provide training and technical assistance to local school districts, implementation and evaluation curricula, better utilization and dissemination of existing materials, improved coordination among nutrition education providers and programs, and enhanced communicating within the State and among other States;
- Allow each State to address its own unique nutrition education needs;
- Fund qualified professionals within each State Child Nutrition agency to lead nutrition education and promotion efforts across the State in Child Nutrition programs (i.e., NSLP, SBP, SFSP, and CACFP); and
- Ensure local wellness policies are implemented and evaluated.

Tom Vilsack, Secretary of Agriculture, stated in his confirmation hearings he would put "nutrition at the center of all food assistance programs." To put nutrition at center in the Child Nutrition programs will require more than improving the quality of school meals or getting rid of junk food in vending machines. Evidence demonstrates that even if schools serve more nutritious foods, students may not eat them. Moreover, research illustrates that using a variety of delivery points and communication tools to get the message out about healthy eating increases the likelihood of success. This means: (1) teaching children and adolescents about nutrition in the classroom and beyond; (2) using the cafeteria as a learning lab; (3) developing effective media campaigns at the school, district, State, Tribal, and Federal levels; and (4) working to further these messages within the community and across other nutrition assistance programs. This evidence-based, collaborative approach can only come about with a well-funded and comprehensive nutrition education and promotion platform. SNE

stands ready to assist policymakers and others to advance this platform and help pave the way for a healthier tomorrow.

References

1. Story M, Nannery MS, Schwartz MB. Schools and obesity prevention: Creating school environments and policies to promote healthy eating and physical activity. *The Millbank Quarterly*. 2009;87(1):71-100.
2. Connell DB, Turner RR, Mason EF. Summary of findings of the school health education evaluation: Health promotion effectiveness, implementation, and costs. *J School Health*. 1985;55(8):316-321.
3. Carpenter J. *Nutrition Education in Public Elementary and Secondary Schools*. 1996. National Center for Educational Statistics, #96852. Available at: <http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=96852>. Accessed April 20, 2009.
4. Celebuski C, Farris E. *Nutrition Education in Public Elementary School Classrooms, K-5*. 2000. National Center for Educational Statistics, #2000040. Available at: <http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2000040>. Accessed April 20, 2009.
5. Henderson CC. *The State of Nutrition and Physical Activity in Our Schools (Connecticut)*, Environmental and Human Health, Inc. 2004. Available at: http://www.ehhi.org/reports/obesity/obesity_report04.pdf. Accessed April 20, 2009.
6. Henderson CC. *The State of Nutrition and Physical Activity in Our Schools (Colorado) Children's' Health Foundation*. 2006. Available at: <http://www.childrenshealthfoundation.net/PDF/CHF-The-State-of-Nutrition-and-Physical-Activity-in-Colorado-Schools.pdf>. Accessed April 20, 2009.
7. Kann L, Brener ND, Wechsler H. Overview and summary: School health policies and programs study 2006. *J School Health*. 2007;77(8):385-397. Available at: <http://www.cdc.gov/healthyyouth/shpps/josh.htm>. Accessed April 20, 2009.
8. Action for Healthy Kids (AFHK). *Progress or Promises: What's working for and against healthy schools*. Fall 2008. Available at: <http://www.ActionForHealthyKids.org>. Accessed April 20, 2009.
9. School Nutrition Association (SNA). *From Cupcakes to Carrots: Local Wellness Policies One Year Later*. Washington, DC; 2007.
10. Position of the American Dietetic Association. Individual-, family-, school-, and community-based interventions for pediatric overweight. *J Am Diet Assoc*. 2006;106(6):925-945.
11. US Department of Agriculture Food and Nutrition Service. Team Nutrition. Available at: <http://www.fns.usda.gov/tn/>. Accessed May 26, 2009.
12. McGeary K. The impact of state-level nutrition-education program funding on BMI: Evidence from the Behavioral Risk Factor Surveillance System. National Bureau of Economic Research. Working Paper 15001. May 2009.
13. Finegold K, et al.; of The Urban Institute. *Background Report on the Use and Impact of Food Assistance Programs on Indian Reservations*. Washington, DC: USDA Contractor and Cooperator Report No. 4, January 2005.
14. US Department of Agriculture Food and Nutrition Service. Core Nutrition Messages. Available at: <http://www.fns.usda.gov/fns/corenutritionmessages/default.html>. Accessed May 26, 2009.
15. Government Accounting Office (GAO). *Nutrition Education Report to the Senate Committee on Agriculture, Nutrition and Forestry*. 2004. Available at: <http://www.gao.gov/new.items/d04528.pdf>. Accessed April 20, 2009.
16. Miller CH. A practice perspective on the Third School Nutrition Dietary Assessment Study. *J Am Diet Assoc*. 2009;109(2):S14-S17.

17. United States Department of Agriculture Food and Nutrition Service Office of Analysis, Nutrition, and Evaluation, prepared by Abt Associates, Inc. *Food Stamp Nutrition Education Systems Review: Final Report*, September 2006. Available at: <http://www.fns.usda.gov/ora/MENU/published/NutritionEducation/Files/FSNESystemsReview.pdf>. Accessed May 20, 2009.
18. Network for a Healthy California, About Us. Available at: <http://www.cdph.ca.gov/programs/cpns/Pages/AboutUs.aspx>. Accessed June 15, 2009.
19. United States Departments of Agriculture (USDA), Education (DoE) and Health and Human Services (HHS). Memorandum of Understanding youth. 2002 and 2005. Available at: <http://www.fda.gov/oc/mous/domestic/USDA-FDA-OBESITY.html>. Accessed April 20, 2009.
20. Pekruhn C. for the Center for Safe and Healthy Schools and the National School Association of State Boards of Education, *Preventing Childhood Obesity: A School Health Policy Guide*. 2009.
21. Cooper P. *Our Journey to School Health*. The School Administrator. January 2003. Available at: <http://www.aasa.org/publications/saarticledetail.cfm?ItemNumber=1820#top>. Accessed April 20, 2009.
22. Mississippi Office of Health and Safety. Available at: <http://www.healthyschoolsms.org/index.html>. Accessed May 31, 2009.
23. Joint Explanatory Statement of the Committee of Conference, 2008 Farm Bill. Available at: http://agriculture.house.gov/inside/Legislation/110/FB/Conf/statement_of_managers.pdf. Accessed June 15, 2009.
24. Luepker RV, et al. Outcomes of a field trial to improve children's dietary patterns and physical activity. The Child and Adolescent Trial for Cardiovascular Health. CATCH Collaborative Group. *JAMA*. 1996; 275(10):768–776.
25. Howerton MW, Bell BS, Dodd KW, Berrigan D, Stolzenberg-Solomon R, Nebeling L. School-based nutrition programs produced a moderate increase in fruit and vegetable consumption: Meta and pooling analyses from 7 studies. *J Nutr Educ Behav*. 2007;Jul-Aug;39(4):186-196.
26. Stables GJ, Young EM, Howerton MW, Yaroch AL, Kuester S, Solera MK, Cobb K, Nebeling L. Small school-based effectiveness trials increase vegetable and fruit consumption among youth. *J Am Diet Assoc*. 2005;Feb;105(2):252-256.
27. Reynolds KD, Franklin FA, Binkley D, Raczynski JM, Harrington KF, Kirk KA, Person S. Increasing the fruit and vegetable consumption of fourth-graders: results from the high 5 project. *Prev Med*. 2000;Apr;30(4):309-319.
28. Perry CL, Bishop DB, Taylor G, Murray DM, Mays RW, Dudovitz BS, Smyth M, Story M. Changing fruit and vegetable consumption among children: the 5-a-Day Power Plus program in St. Paul, Minnesota. *Am J Public Health*. 1998;Apr;88(4):603-609.
29. Summerbell CD, Waters E, Edmunds L, Kelly SAM, Brown T, Campbell KJ. Interventions for preventing obesity in children. *Cochrane Database of Systematic Reviews* 2005, Issue 3. Art. No.: CD001871. DOI: 10.1002/14651858.CD001871.pub2.
30. Doak CM, Visscher TL, Renders CM, Seidell JC. The prevention of overweight and obesity in children and adolescents: a review of interventions and programmes. *Obes Rev*. 2006; Feb;7(1):111-136.
31. Shaya FT, Flores D, Gbarayor CM, Wang J. School-based obesity interventions: A literature review. *J Sch Health*. 2008;Apr;78(4):189-196.
32. Cullen KW, Baranowski T, Owens E, Marsh T, Rittenberry L, de Moor C. Availability, accessibility, and preferences for fruit, 100% fruit juice, and vegetables influence children's dietary behavior. *Health Educ Behav*. 2003;Oct;30(5):615-626.

33. Liquori T, Koch PD, Contento IR, Castle J. The Cookshop Program: Outcome evaluation of a nutrition education program linking lunchroom food experiences with classroom cooking experiences. *J Nutr Educ*. 1998;30(5):302.
34. Lytle, L.A., D.M. Murray, C.L. Perry, et al. School-based approaches to affect adolescents' diets: Results from the TEENS study. *Health Educ & Res*. 2004;31:270–287.
35. Gortmaker SL, Peterson K, Wiecha J, Sobol AM, Dixit S, Fox MK, Laird N. Reducing obesity via a school-based interdisciplinary intervention among youth: Planet Health. *Arch Pediatr Adolesc Med*. 1999;Apr;153(4):409-18.
36. Contento IR, Koch PA, Lee H, Sauberli W, Calabrese-Barton A. Enhancing personal agency and competence in eating and moving: formative evaluation of a middle school curriculum--Choice, Control, and Change. *J Nutr Educ Behav*. 2007;Sep-Oct;39(5 Suppl):S179-186.
37. Contento IR, Senior author. The effectiveness of nutrition education and implications for nutrition education policy, programs and research. A review of research. *J Nutr Educ*. 1995;27:279-418.
38. Walter HJ. Primary prevention of chronic disease among children: The school-based 'Know Your Body' intervention trials. *Health Educ Q*. 1989;16:201-214.
39. Resnicow K, Cohen L, Reinhardt J, et al. A three-year evaluation of the Know Your Body program in inner-city schoolchildren. *Health Educ Q*. 1992;19:463-480.
40. Nader PR, Stone EJ, Lytle LA, Perry CL, Osganian SK, Kelder S, Webber LS, Elder JP, Montgomery D, Feldman HA, Wu M, Johnson C, Parcel GS, Luepker RV. Three-year maintenance of improved diet and physical activity: the CATCH cohort. Child and Adolescent Trial for Cardiovascular Health. *Arch Pediatr Adolesc Med*. 1999;Jul;153(7):695-704.
41. Lefebvre RC, Olander C, Levine E. The impact of multiple channel delivery of nutrition messages on student knowledge, motivation, and behavior: Results from the Team Nutrition Pilot Study. *Social Marketing Quarterly*. 1999;5:90-98.
42. Rosenbaum M, Nonas C, Weil R, Horlick M, Fennoy I, Vargas I, Kringas P; El Camino Diabetes Prevention Group. School-based intervention acutely improves insulin sensitivity and decreases inflammatory markers and body fatness in junior high school students. *J Clin Endocrinol Metab*. 2007;Feb;92(2):504-508.
43. Osganian SK, Ebzery MK, Montgomery DH, Nicklas TA, Evans MA, Mitchell PD, Lytle LA, Snyder MP, Stone EJ, Zive MM, Bachman KJ, Rice R, Parcel GS. Changes in the nutrient content of school lunches: results from the CATCH Eat Smart Food service Intervention. *Prev Med*. 1996;Jul-Aug;25(4):400-412.
44. McKenzie TL, Nader PR, Strikmiller PK, Yang M, Stone EJ, Perry CL, Taylor WC, Epping JN, Feldman HA, Luepker RV, Kelder SH. School physical education: effect of the Child and Adolescent Trial for Cardiovascular Health. *Prev Med*. 1996;Jul-Aug;25(4):423-431.
45. Nader PR, Sellers DE, Johnson CC, Perry CL, Stone EJ, Cook KC, Bebchuk J, Luepker RV. The effect of adult participation in a school-based family intervention to improve Children's diet and physical activity: the Child and Adolescent Trial for Cardiovascular Health. *Prev Med*. 1996; Jul-Aug;25(4):455-464.
46. Perry CL, Bishop DB, Taylor GL, Davis M, Story M, Gray C, Bishop SC, Mays RA, Lytle LA, Harnack L. A randomized school trial of environmental strategies to encourage fruit and vegetable consumption among children. *Health Educ Behav*. 2004;Feb;31(1):65-76.
47. French SA, Stables G. Environmental interventions to promote vegetable and fruit consumption among youth in school settings. *Prev Med*. 2003;Dec;37(6 Pt 1):593-610.
48. Foster GD, Sherman S, Borradaile KE, Grundy KM, Vander Veur SS, Nachmani J, Karpyn A, Kumanyika S, Shults J. A policy-based school intervention to prevent overweight and obesity. *Pediatrics*. 2008;Apr;121(4):e794-802.

49. Baranowski T, Stables G. Process evaluations of the 5-a-day projects. *Health Educ Behav.* 2000 Apr;27(2):157-166.
50. Hoelscher DM, Feldman HA, Johnson CC, Lytle LA, Osganian SK, Parcel GS, Kelder SH, Stone EJ, Nader PR. School-based health education programs can be maintained over time: results from the CATCH Institutionalization study. *Prev Med.* 2004;May;38(5):594-606.

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