

## **Determinants of Childhood Obesity**

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The project was funded as a bridge grant, which is designed to provide the research team with funds to fully develop the "Determinants of Childhood Obesity" proposal for funding; to develop partnerships with other universities skilled in childhood obesity research in minority populations; to recruit leading scientists in the field of childhood obesity to join the research team; and to allow the research team to network with scientists serving similar population groups throughout the county, and to gain additional expertise in childhood obesity through attendance at conferences, externships, and collecting baseline data.

The purpose of the project is to address the national need for greater comprehension of the factors influencing dietary behaviors of at-risk children and to test models of intervention in order to develop a model for education and extension programs to be implemented in the community.

The task objectives of the project consist of the following: 1) To identify exogenous behavioral factors and determinants of obesity among elementary school children; 2) To develop and implement a behavioral, research-based education model for inter-disciplinary teams to provide quality nutritional guidance to overweight children and their families; 3) To evaluate physical and behavioral changes in the subject population following nutrition intervention; and 4) To seek and provide publication of findings and recommendations in university research and scholarly journals; to disseminate guidelines to end-users in the local community network, and to develop a model science-based education program to educate the general public, obese children and their families.

Research investigations have been conducted and presented at the Federation for American Societies for Experimental Biology 2002 on "The Influences of Parental Weight/Height Status and Physical Activity on the Weight/Height Status of their Children". Findings from this research will be considered in the current project. In addition, new training in the use of motivational interviewing on the treatment of pediatric obesity has been acquired as participants of the PROS Healthy Lifestyle Study research team. This will be considered as the data becomes relevant to the goals of this project.

Currently new relationships are underway with the DC Department of Health, Maternal & Child Health, WIC State Agencies; University of the District of Columbia Departments of Biological Sciences, Psychology, and Sociology; Howard University, Department of Nutritional Sciences; District of Columbia Public Schools, Chartered Schools and Private Schools.

## **Environmental Influences on Children's Food Consumption**

**Sheryl Hughes**

The purpose of this NRI USDA grant was to evaluate the influence of caregiver's, both parents and teachers, on the food consumption of preschool children enrolled in Head Start. Valid measures were needed to assess behaviors and perceptions of caregivers, specifically with children of low-income minority families. Self-report and observational measures of feeding style behaviors (i.e., authoritarian, authoritative, permissive-indulgent, and permissive-uninvolved) and an interview format for assessing perceptions of children's body size using children's body silhouettes were developed. These measures were designed to be culturally sensitive to both African-American (AA) and Hispanic (H) populations. Self-report and interview data were collected on 231 parents (101 AA; 130 H) of children attending Head Start in a large, urban, southwestern city. Results showed that parental feeding style behaviors were associated with children's reported food consumption patterns and children's body mass index (BMI). Parental authoritarian behaviors were negatively associated with offering ( $p < .05$ ) and intake of vegetables ( $p < .01$ ) whereas parental authoritative behaviors were positively associated with offering ( $p < .01$ ) and intake of vegetables ( $p < .05$ ). Authoritative behaviors were also positively associated with offering of fruit ( $p < .0001$ ) and intake of dairy ( $p < .001$ ). A significant effect for parental feeding style was found with authoritarian parents having children with lower BMI and permissive-indulgent parents having children with higher BMI. Regarding parental perceptions of their children's body size, mean scores for their children's perceived current BMI ( $M = 15.0$ ) was significantly lower ( $p < .0001$ ) than their children's actual BMI ( $M = 16.7$ ) and ideal BMI ( $M = 15.4$ ). Therefore, parents perceived their children to be thinner than their actual weight and wanted their children to be heavier than their perceived current size.

To examine the impact of teacher's feeding style behaviors on Head Start children, teachers were observed during lunch in the Head Start centers and actual food consumption of the children was measured. Behavioral observations of 50 teachers (25 AA; 25 H) randomly selected from 142 teachers across 13 Head Start centers were conducted and food consumption of 549 Head Start children was measured at lunch. Results showed that permissive-indulgent feeding style behaviors of teachers were positively associated with preschool children's consumption of vegetables, dairy, entrees and starches; authoritative behaviors were positively associated with children's dairy consumption. This research provides initial support for the possible role that feeding style behaviors of both parents and teachers may play in the development of eating behaviors in minority children. Further, parental misperceptions of their children's body size may be a factor that needs further investigation when studying parental feeding behaviors in low-income minorities.

## Taste Genetics and Dietary Risk of Cardiovascular Disease

Valerie B. Duffy, PhD, RD

**Objectives:** Consumers state that taste and oral sensations from foods/beverages are primary determinants of what they eat. Since these sensations vary with genetics and exposure to taste-related pathology, the project objectives seeks to test how variation in taste affects the risk of CVD by influencing oral sensations from and dietary behaviors toward fat, sweet, vegetables, and alcohol. Specific objectives include studying the:

- relationship between taste genetic phenotype and oral sensations, dietary behaviors that increase CVD risk, and measures that suggest the development of CVD risk.
- interaction between taste genetics and taste-related pathology to influence dietary risk of CVD.
- ability of the gene-based taster groups to predict dietary behaviors and CVD risk.

**Methods:** To address the project goals/objectives, the database of 35 females, established with the Seed Grant, will be expanded to 180 and includes phenotypical measures of taste genetics (perceived bitterness of 6-n-propylthiouracil or PROP, number of taste papilla on the tongue tip), genotyping for taste genes, sensory analysis, and assessment of food/beverage preference and intake as well as heart disease risk (eg, blood cholesterol, blood pressure, body fat). Incorporating measures of taste phenotype into a health risk appraisal has also provided data to test the study objectives. Our studies employ advances in characterizing taste genetic phenotype (1).

**Results:** Our preliminary findings support that nontasters, those tasting PROP as least bitter and having lowest number of taste papillae, show the highest dietary risk of CVD related to intakes of alcohol, added sugars, and dietary fat. Regarding alcohol, those who taste PROP as least bitter find an alcohol least irritating (2) or bitter (3) but more sweet (3) and consume alcoholic beverage least frequently (2, 4). Those who are nontasters according to genotype also consume alcoholic beverages most frequently (5). While some alcohol intake benefits CVD risk, alcohol intake associates with abdominal obesity and excessive alcohol increases risk of hypertension. Adults who taste PROP as least bitter and had a pattern of taste perception related to exposure to taste-related pathology, reported the most preference for and intake of added sugars (6). Although sweet foods in themselves do not increase risk of obesity, excessive intakes of additive sugars decrease dietary quality and may increase risk of hypertriglyceridemia. Individuals who taste PROP as least bitter also perceive less creamy or tactile sensations from fat, like fat foods more and, according to preliminary findings, report highest intakes of high-fat foods (4,7). In non-obese individuals, those who taste PROP as least bitter and have the highest body mass indices (4, 7). Those who taste PROP as least bitter have dietary behaviors that could decrease their dietary risk of CVD and an elevated BMI. Nontasters they report consuming vegetables most frequently, an effect found with taste genetic phenotype and genotype (8).

**Potential Impact:** Dietary behaviors appear to vary with variation in taste and oral sensation related to genetics and exposure to taste-related pathologies, which can increase the risk of CVD and elevated BMI. The preliminary findings could suggest food-based interventions to maintain enjoyment of eating while decrease dietary risk of CVD and elevated BMI.

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4. Duffy VB. Associations between Oral Sensation, Dietary Behaviors and Risk of Cardiovascular Disease (CVD). *Appetite*, 2004;43(1); pp 5-9.
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8. Duffy VB, Davidson A, Bartoshuk L, Kidd J, Kidd K. Revealing associations between PTC/PROP gene, 6-n-propylthiouracil (PROP) bitterness and vegetable intake. Presented at *Experimental Biology 2004*, Washington, DC, April 17-21, 2004. Submitted as a full-length paper to the *American Journal of Clinical Nutrition*

## **Adherence to the Food Guide Pyramid Recommendations Among Five Ethnic Groups**

**Sangita Sharma, PhD**

**Background:** Diet-related chronic disease has a high prevalence in certain ethnic groups who may benefit extensively from dietary intervention. There have been few large studies assessing long-term dietary intake in representative population samples of the ethnic minority groups. National dietary data have been collected on adherence to the Food Guide Pyramid (FGP) recommendations in African American and Latinos, but the sample size was relatively small. A substantial proportion of the US population are African Americans, Latinos, Asians or Pacific Islanders, however, no dietary data from the national survey are available for Asians or Pacific Islanders on the adherence to FGP recommendations. The Cancer Research Center of Hawaii has dietary data not only for a large number of African Americans and Latinos but also for Japanese Americans, Native Hawaiians and Caucasians (n= 215,000 who are part of the Multiethnic cohort).

**Objectives:** The objectives of this research are to evaluate food choices relative to the FGP and evaluate dietary adequacy relative to the Dietary Reference Intakes. We will determine the sources of nutrients in each ethnic group and make ethnic specific recommendations for updating the FGP in each ethnic group

**Methods:** We used dietary data collected by a 17 page quantitative food frequency questionnaire (QFFQ) from a representative sample of five ethnic groups, aged 45-75 years in 1993-1996 in Hawaii and Los Angeles to examine the degree of adherence to the FGP recommendations among African Americans, Japanese Americans, Native Hawaiians, Latinos born in Mexico or Central and South America, Latinos born in the US and Caucasians.

**Results:** A high percentage of all the ethnic groups did not adhere to the recommendations in the FGP, particularly to the dairy group recommendations. Between 61% and 100% of all ethnic groups did not meet the dairy product recommendations, with the Japanese American and African Americans showing the lowest intakes. Based on energy intake between 23% and 70% of African Americans did not adhere to the vegetable recommendations. In the Multiethnic Cohort, African Americans are the least likely to meet any of the FGP recommendations with less than half meeting any but the fruit recommendations. The percentage of Latinos born in the US who were not adhering to the dietary recommendations was greater for all food groups than the Latinos born in Mexico or Central and South America.

The results of this research will help to make ethnic specific recommendations for improving dietary quality and preventing chronic disease.

1. **Sharma S**, Murphy S, Wilkens L, Shen L, Hankin J, Monroe K, Henderson B, Kolonel L. Adherence to the Food Guide Pyramid Recommendations Among African Americans, Latinos born in Mexico and Latinos born in the US: Results from the Multiethnic Cohort. *Journal of the American Dietetic Association*. 2004. (In press)

2. **Sharma S**, Murphy S, Wilkens L, Hankin J, Henderson B and Kolonel L. Adherence to the Food Guide Pyramid recommendations among Japanese Americans, Native Hawaiians and Caucasians: Results from the Multiethnic Cohort. *Journal of the American Dietetic Association*. 2003;109(9):1195-1198

## **Alternative Strategies of Nutrition for Low-Income Hispanics**

**J. E. Anderson, Performing Institution: Department of Food Science & Human Nutrition, Colorado State University, Fort Collins, Colorado 80523**

**Non-Technical Summary:** This project enhanced the development of a bilingual nutrition education program using computer technology to educate low-income, Hispanic, and migrant workers regardless of literacy level. Interactive multimedia (IMM) also acts as a reliable, cost-effective strategy.

**Objectives:** (1) to improve the existing bilingual interactive multimedia nutrition education program by documenting and carefully integrating the Processes of Change identified by Prochaska; (2) to develop a 24-hour food recall tool that can be incorporated into interactive multimedia used in community based interventions; and (3) to adapt a current data management system that will measure outcomes to determine knowledge, attitude, and behavioral impacts and that will accommodate the needs of food and nutrition assistance programs.

**Project Summary:** (1) Completed and implemented the *La Cocina Saludable* bilingual interactive multimedia nutrition education program based on the Prochaska's Transtheoretical (Stages of Change) model of behavior. (2) Utilizing advancements in computer technology, a bilingual interactive multimedia (IMM) dietary assessment tool that mimics a 24-hour diet recall has been developed. Food choices were determined by examining 191 individual 24-hour recalls from Colorado Expanded Food and Nutrition Education Program participants and from the 1982-1984 Hispanics National Health and Nutrition Examination Survey. In the final format, the bilingual IMM recall represents a multiple-pass method in which users first report food choices from 172 foods represented through quality photographs. Then, options to choose food variety, cooking techniques and portion sizes are displayed. Lastly, users are provided the opportunity to add and delete foods. The corresponding database generates a nutrient profile for each user comprised of 20 dietary constituent. A two-period cross over study design with repeated measures was employed to test the validity of this food recall. Means for the IMM recall dietary constituent variables were compared to both the Food Intake Analysis System (FIAS) and the EFNEP Reporting System (ERS). The only significant method effect was for vitamin C ( $p=0.025$ ). The correlations between the IMM recall and FIAS were around 0.5, and correlations between the IMM recall and ERS were around 0.6. The majority of participants, 55%, preferred to use the touch-screen computer/IMM recall to report food intake. Feedback received from the nutrition educators at testing sites was extremely favorable. (3) An Access™ database was developed to allow for easier management of data collected from the *La Cocina Saludable* IMM program by food and nutrition assistance programs.

**Long Term Effects:** Bilingual IMM allows for nutrition education to be delivered directly to low-income consumers, at agencies that serve this population, without the barriers of language, educator availability, and time of day. A bilingual IMM food recall further supports these efforts and allows for easier data collection from this high-risk audience.

### **Related Publications:**

- Gould SM, Anderson J. (2000) Using interactive multimedia nutrition education to reach low-income Persons: An effectiveness evaluation. *Journal of Nutrition Education*; 32:204-213.
- Jantz C, Anderson J, Gould SM. (2002) Using computer-based assessments to evaluate interactive multimedia among low-income, predominantly Hispanic participants. *Journal of Nutrition Education and Behavior*; 34(5):252-260.
- Gould SM, Anderson J. (2002) An economic analysis of bilingual interactive multimedia nutrition education. *Journal of Nutrition Education and Behavior*. 34(5):273-278.

- Gould SM, Anderson J. (submitted 2003). Use of interactive multimedia: Views from low-income and Hispanic persons. *Educational Technology Research and Development*.
- Gould SM, Anderson, J. (submitted 2004). Development and evaluation of *La Cocina Saludable*: A bilingual interactive multimedia nutrition education program for low-income audiences. *Educational Technology Research and Development*.
- Zoellner J, Anderson J, Gould SM. (submitted 2004). Development and formative evaluation of a bilingual interactive multimedia dietary assessment tool. *Journal of Applied Communications*.
- Zoellner J, Anderson J, Gould SM. (submitted 2004). Comparative validation of a bilingual interactive multimedia dietary assessment tool. *Journal of the American Dietetic Association*.

## **El Regalo De Salud (The Gift of Health): A Radio Obesity Education Campaign Targeting Latino Parents**

**Martha Archuleta, New Mexico State University**

Childhood obesity is more prevalent among Hispanic children than among youngsters of any other ethnic group in the United States. Currently, over one in five Latino children is either overweight or obese. The Regalo de Salud campaign aims to raise awareness in the Hispanic community of the problem of obesity and overweight among Latino youth and to provide Latino parents with concrete steps that they can take to improve the health of their children such as:

- decreasing their children's consumption of soft drinks and other sweetened beverages,
- decreasing consumption of high-fat foods,
- decreasing their children's television viewing,
- increasing their children's fruit and vegetable consumption,
- increasing active play, and
- increasing participation in family mealtimes.

To promote these messages, *Regalo de Salud* will develop a series of 100, one-minute Spanish-language informational radio capsules to be broadcast across Hispanic Radio Network, the largest network of educational Spanish-language radio programming in the United States. Additionally, the campaign will develop a series of culturally-tailored, Spanish-language fact-sheets on nutrition and obesity for parents. Each radio capsule will encourage listeners to call a toll-free bilingual help-line where they can receive further information on how better to give their children "the gift of health." Help-line callers will then be provided with fact-sheets as well as with referrals to local health, nutrition, and recreational organizations in their areas. Pilot materials will be pre-tested in six sites across the country. Summative evaluation will be conducted to determine campaign effectiveness.

## **Factors Affecting Intake and Body Mass Index of Rural Preschool Children**

**Cindy Fitch, West Virginia University**

**Background:** Dietary patterns formed in childhood often persist into adolescence and influence the risk of developing chronic conditions. Nutritional concerns that have been identified in childhood include epidemic rates of obesity, excessive energy intake, and inadequate intake of fruits, vegetables, and dairy products. Because dietary habits are formed during preschool years, there is a compelling need to identify factors that affect dietary patterns, growth, and body mass index of preschool aged children.

**Objectives:** The specific objectives of this project are to:

- Determine the prevalence of underweight, normal weight, at risk for overweight and overweight children in a population of 3 to 5 year olds in rural West Virginia
- Describe diet quality (using the Healthy Eating Index) and energy intake and compare them among underweight, normal weight, at risk for overweight, and overweight preschoolers
- Identify familial and environmental factors that influence dietary intake and body mass index.

**Methods:** Children aged three to five years and a parent will be recruited through the West Virginia University Extension Family Nutrition Program and community advertisements in two counties in West Virginia. The counties were chosen for their strong Family Nutrition Program and because they have a particularly high rate of obesity among adults. Ages three to five years were selected because of NHANES III data indicate that the prevalence of overweight children increases from 3.4% of children aged 2 to 3 years to 7.9% of 4- and 5-year-olds. Parents will be asked to complete a multiple-choice, 24-hour intake for their preschool children and will fill out a packet of surveys. The surveys will elicit information on demographics, self-reported parental height and weight, food insecurity, and mother's knowledge and attitudes regarding health, nutrition, and child feeding.

**Expected Results:** This study is expected to provide a description of the dietary intake and growth parameters of a groups of preschool children in rural Appalachia and an analytical description of familial and environmental factors that influence intake and body mass index.

**Potential Impact:** Data from this project will be used to identify obstacles to adopting healthful food habits among preschool children and to develop appropriate outreach and education programs for parents of young children. In addition, this project, which was funded as a seed grant, will provide preliminary data in preparation for a longitudinal study of dietary intake and weight change during the transition from preschool to school age.

## **Food Store-Based Program to Reduce Risk of Chronic Disease in the White Mountain and San Carlos Apache Reservations**

**Joel Gittelsohn**

### **Objectives:**

1. To develop and successfully implement a food store-centered environmental intervention in the White Mountain and San Carlos Apache reservations with the full support of the local communities, tribal government and owner/managers of local stores.
2. To improve psychosocial factors (knowledge, self-efficacy, intentions) associated with making healthy decisions regarding food choices, preparation methods and patterns of consumption.
3. To increase healthy food purchasing, preparation and diet among local consumers.
4. To increase sales of healthy foods on the two reservations in intervention stores.

**Methods:** The Apache Healthy Stores (AHS) program ran from June 2003-June 2004 and used in-store and mass media strategies to increase the availability of healthy food on the two Apache reservations and to promote healthier food choices and cooking methods. Intervention stores stocked and promoted healthier alternatives to commonly consumed foods that are high in fat and/or sugar and low in fiber. Consumers were provided with skills and knowledge for healthy food selection, preparation, and service. AHS was evaluated through a quasi-experimental design, where the two reservations were divided into intervention and comparison areas. Baseline data (n=270 hhs) were gathered from March-June 2003. A QFFQ was administered to 225/270 respondents. We will gather post-intervention data starting from July-September 2004.

**Results:** On the two American Indian reservations, moderate levels of knowledge and self-efficacy for making healthy food choices translated into low intentions for purchasing, preparing or consuming healthy foods. Older respondents consumed vegetables, fruit, and low fat milk significantly more frequently than younger respondents. Younger respondents consumed soda, kool aid and chips more frequently than the elderly. Higher frequency of vegetable consumption was associated with higher education and SES. Process data were collected to document program implementation. At the store (institutional) level the program was implemented with a high level of dose and reach and a moderate to high level of fidelity. At the customer (individual) level, the cooking demonstrations and taste tests reached many community members with a high dose. At the mass media (community) level, the AHS program was implemented with a moderate degree of fidelity and dose. Preliminary analyses of Bashas sales data indicate an overall positive trend in sales of key promoted foods, associated with the intervention (including cooking spray, pretzels and high fiber cereals).

**Potential Impact:** The AHS program was successfully implemented and is associated with increases in sales of healthy foods. Further analyses after the post-intervention evaluations should confirm and expand on these findings. Working with food stores has the potential to reach large numbers of people. The results of this intervention trial may be directly extended to other reservation-based American Indian tribes in the United States. We plan to make our store-centered intervention materials available to other tribes throughout the country to modify and apply to their settings, by posting the materials on the internet.

### **Publications:**

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## **Healthy Living in the Pacific Islands- Healthy Pacific Child Program**

**Rachel Novotny, University of Hawaii**

The HLPI (Healthy Living in the Pacific Islands) initiative is coordinated from the Department of Human Nutrition, Food and Animal Sciences at University of Hawai'i – Manoa, under the leadership of Dr. Rachel Novotny (PhD, RD). Our partners in the U.S. affiliated Pacific are from the Community College's in the islands of American Samoa, Micronesia (Chuuk), Palau, Northern Marianas, the University of Guam, the Ministry of Health & Environment - Marshall Islands, and the Learning Center at Ka'ala Farms, Hawai'i. The goal of the HLPI initiative is to reduce the disparity in prevalence of chronic diseases by respecting cultural values using community based, holistic, collaborative, sustainable approaches in Pacific Island communities.

The HLPI group completed qualitative needs assessment by conducting focus groups at each site to identify key health problems in the community, and the cultural view of those problems. As a result of this process a set of three objectives was identified:

1. To increase production and consumption of healthy locally produced food.
2. To increase knowledge about health and nutrition
3. To increase physical activity

Nutritional assessment was done in American Samoa, using 2-stage cluster sampling, 209 children from American Samoa, ages 5 to 10 years, from 25 villages in June 2003. Blood lipids were analyzed by reflectance photometry (CardioCheck P.A.). Prevalence of obesity and elevated cholesterol (CHOL), LDL, and triglycerides (TG) were: 30%, 87%, 58%, and 31%, respectively. High TG ( $P=.001$ ) and number of risk factors ( $P=.02$ ) were significantly associated with BMI >95th percentile but total CHOL and LDL were not. Obesity and abnormal lipid levels in children living in American Samoa are major health concerns.

The Healthy Living in the Pacific- Healthy Pacific Child Program (HLPI-HPCP) is a 4 year multi-state (state of Hawaii, 2 territories and 4 US affiliated independent nations), multi-institutional (Universities, community colleges, departments of health and non-profit agencies), multi-disciplinary (nutrition, public health, epidemiology, anthropology) program involving research, extension and education concerning the food system and it's impact on human nutrition, obesity and chronic diseases among Pacific Islanders. The project will identify physical activity, dietary, educational, economic, food assistance and agricultural elements influencing weight in the Pacific region that will be used to develop nutrition intervention programs with Land Grant colleges, health departments, food stores, schools and community-based food and nutrition education programs throughout the Pacific region. The goals of the HLPI-HPCP are to improve nutritional status and to prevent overweight among children in the US- affiliated Pacific Islands. Specific objectives of HLPI-HPCP are to 1) Determine the prevalence of underweight, overweight and abnormal micronutrient, lipid and glucose parameters among Pacific Island children, ages 1-10 yrs of age and identify determinants of them. 2) Design and test dietary assessment instruments to be used to target, develop and evaluate nutrition related intervention programs for children. 3) Develop and test a Healthy Foods intervention program centered on food stores and local food systems to improve production, preparation, sales and consumption of healthy foods by Pacific Islander children and their families.

Thursday, April 22, 2004

## **Nutrition of Puerto Rican School Children; Importance of the Federal Breakfast and Lunch Programs**

**Alan M. Preston, Ph.D. University of Puerto Rico Medical Sciences Campus, San Juan PR**

USDA-sponsored School Breakfast and Lunch Programs have been providing Puerto Rican children with inexpensive and nutritious meals for the past few decades. However, due to its remoteness from the mainland, Puerto Rico has not been included in the periodic assessment studies. The overall objective of this proposal is to determine the importance of the Breakfast and Lunch programs served in the school system to the total nutrition of Puerto Rican children. To accomplish this objective, we will utilize 24 hr recall questionnaires to compare compositions of breakfasts and lunches of children, participating or not participating in these meals programs, on the basis of adequacy of selected nutrients, compliance with US Dietary Guidelines and on Healthy Eating Index. Nutrients in foods will be determined using the Minnesota Nutritional Data System. Evaluation will be carried out in representative public schools at the elementary, intermediate and high school levels. Total population sampled will be 576 children. Data gathered could be useful in providing information on which decisions could be made to modify and improve these programs as has been done on the US mainland.

Field work had begun 01/04. Data being is currently being collected.

## **Relation of Family Meals and Lifestyle Factors to Diet Quality and Obesity of Children**

**Sharon L. Hoerr RD, PhD, Professor, Dept Food Science & Human Nutrition, Michigan State University, East Lansing, MI 48824 [hoerrs@msu.edu](mailto:hoerrs@msu.edu)**

To slow the rising rates of childhood obesity in the U.S. within the next 5-10 years, USDA research and interventions should focus research and intervention towards food environments and food behaviors. Nutri-genomics can provide foundational information about human health, but cannot result in societal, health changes in the short-term. The human genome has not changed in recent years, but dietary behaviors, food environments and food policies have. Community Nutrition Graduate Programs in Land Grant Colleges are especially well positioned to do this, because they focus on individuals, families, and communities as units of analysis from a multi-disciplinary perspective, bridging the biological to social sciences in relation to foods and nutrition.

Recent research by community nutrition faculty illustrates this perspective in several studies involving investigators from foods and nutrition, Extension's EFNEP and FSNEP, nursing, sociology, developmental psychology, and local Head Start. Findings from four different studies are briefly reported here.

The first two studies targeted the limited income families in Head Start. First, ~200 mother child pairs in Early Head Start were assessed using 24 hr dietary recalls at yearly intervals starting when the infant was ~6mo. Most families (88%) were on WIC and Medicaid, but only 58%, on Food Stamps. At age 2 yr, the children were twice as likely as the mothers to consume a fruit and 1.5 times more likely to consume a dairy food [13]. The most frequently consumed vegetables were potatoes comprising over half the vegetables [17]. Although 2 yr olds on average drank 12 fl oz of milk, juice was 9 fl oz (half again as much as that recommended) and soft drinks, 7 fl oz [18]. Over half of the 2 yr olds (58%) had soft drinks the previous day, and 14% consumed over 12 fl oz. The mother's beverage intake correlated significantly with that of her child for all beverages except coffee [15]. By age 3 yr, the child's fruit and vegetable intakes had declined and paralleled their mothers. The children of mothers who were permissive (Nursing Child Assessment Teaching Scaled) consumed the most soft drinks [16]. While most children were seated in the kitchen or dining room during mealtimes, most were not while consuming snacks, especially those in the evening [14]. The diet quality of children who ate a table and who engaged in mealtime conversation was better than for those 2 year olds who did not. Findings from 4 focus groups of Head Start parents of 4 year olds (n=30), revealed that most valued evening meals as family time and knew to offer new foods more than once, but failed to offer new foods more than three times [25,29]. Negative factors associated with family meals in this group was that most Head Start parents reported that the TV was on during meals, that their children often ate while playing, that they used food as a reward, and that their four year old children often determined the dinner menu.

Two studies focused on other aspects of parent-child relationships and health. A study on medical charts of ~1900 diabetic children in Michigan found that children with type 2 diabetes were twice as likely to live with one parent (71%) compared to those children with type 1 (38%) [10]. A random digit dial phone survey of 1000 Michigan parents found that most were concerned about childhood obesity and expected the schools to address it via nutrition education and recess, but only half favored banning school vending machines. Most parents opposed taxes on foods to help fight obesity, perhaps because most still viewed obesity as a lack of personal willpower and not a public health problem [19, 23,24].

These findings and those from other investigators support a relationship between family meals and diet quality of children, but do not clarify what is really going on with family meals and diet quality and association to obesity. Large samples are necessary for adequate power and our national surveys do not

capture enough days of food intake, along with health and anthropometric data, and behavioral and environmental variables to adequately answer the question. Multidisciplinary teams of researchers from human nutrition, survey research, child development and family relations are needed to investigate the relation of family meals to obesity in children.

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## **Research-centered Web-based Student Communities: Multidisciplinary Approach for Adolescent Obesity Prevention**

**Carol J. Boushey, PhD, MPH, RD**

An intervention designed to promote healthy weights among young adolescents, thus reducing their risk for adolescent and adult obesity will be presented. We will build upon our previously developed behavioral intervention among 6th graders that aligns with educational standards. This allows our health goals and the school systems' priorities of academic achievement to be realized simultaneously. The social ecology model has been successfully used to guide the design of interventions among middle-school children, however the constructivist framework for designing the learning environment for health interventions has not been established. Constructivism posits that students build their understanding of the world and themselves out of an active-learning experience. The development of an interactive web-based learning community based on the social ecology model and guided by constructivism will provide a multidimensional intervention for 6th graders. The content will revolve around five themes: physical activity, nutrition and food, environment, behavioral patterns, and growth and development. Within each theme, students will be examining the social and environmental factors that have an impact on achieving healthy weight. Eight schools in Indiana and Arizona will be randomized to intervention or control status. The effectiveness of this technology-based intervention program will be established as measured by achievement of the objectives. The primary outcome reads: Exposure among children starting at 11-12 years old to a cognitive/behavioral intervention program delivered on the web will result in a reduction in body mass index (BMI) compared to a control group who do not receive the intervention. Supporting objectives outline that the intervention will: 1) alter dietary behaviors conducive to healthy body weights, including use of low-fat milk, increased fruit, and vegetable intake, decreased consumption of high-energy snack foods, increased calcium intake compared to a control group; 2) increase physical activity compared to a control group; 3) decrease sedentary activity compared to a control group; and 4) decrease body fat and intraabdominal fat and increase lean mass compared to a control group.

## **Seven Generations of Health: A Transgenerational Approach to Human Nutrition and Obesity Interventions in Indian Country**

### **B. Joan Goodman**

“Seven Generations of Health: A Transgenerational Approach to Human Nutrition and Obesity Intervention in Indian Country” is a collaborative effort among Southwestern Indian Polytechnic Institute, Centers for Disease Control, Indian Health Service, American Indian Research and Education Center at the University of Nevada, Las Vegas, and the Office of Native American Diabetes Program at the University of New Mexico. The project has two primary goals: 1) To develop and disseminate accurate, culturally relevant information about nutrition, exercise and obesity prevention throughout Indian Country as a means to eliminate health disparities; 2) To establish community-based infrastructure for life-long healthy lifestyles in four Native American communities.

The four-year program includes a comprehensive curriculum evaluation and modification component that will result in scientifically accurate curriculum modules that reflect Native American values and lifestyles to be used in community-based health programs implemented by Native American peer-educators. The peer-educators, trained through a “Train the Trainer Institute” at Southwestern Indian Polytechnic Institute will facilitate “Healthy Lifestyle Clubs” at each of the sites. The Clubs will provide support for community members through a variety of activities that reflect the needs of the individual sites.

“Seven Generations of Health: A Transgenerational Approach to Human Nutrition and Obesity Intervention” is relevant to the USDA objectives of the Human Nutrition and Obesity focus area. The project integrates research, education and extension as a means to unify and modify existing health programs and curricula into an effective model for community-based “Healthy Lifestyle Clubs” in Native American communities. The scope of the intervention crosses all ages of community members and for this reason is flexible in its use. The extensive collaboration among Native American communities, institutions of higher learning, health agencies, health educators, curriculum specialists and community peer educators assures content accuracy and cultural relevance. The project investigates the effectiveness of community-based support groups in the intervention of obesity on a wide scale. Cultural and social values and practices, as well as food resources play a role in the eating and exercise habits of community members. The use of Native American peer-educators in all phases of the project increases the appropriateness of content and delivery.

## **Tween POWER**

**Jean Anliker and Elena Carbone**

No studies have examined contributions of personal expenditures by youth and the foods and beverages purchased with these monies to the problem of obesity. Marketers capitalize on opportunities to target this population. We need to look at how “tweens” (11-14-year-olds) respond to marketing strategies and use these strategies to educate this audience who is at high risk of obesity and is emerging as a powerful consumer group.

Through this project, UMass Nutrition Education Programs, in cooperation with the Universities of CT and MD, and partners in resource economics and marketing, will design and test a theory-informed, multi-state intervention to assess and build consumer information processing awareness, knowledge, and skills among low-income Hispanic and Caucasian tweens. This integrative approach incorporates: 1) research on consumer spending practices, 2) Extension education through development and testing of educational materials and survey questions, and 3) education of adolescents, family and youth programs, school personnel, and health professionals through dissemination of educational materials.

A four-phase approach will employ both quantitative and qualitative methods. In Phase I, qualitative data will be collected to understand why tweens shop as they do, and to inform the development of surveys, interventions, and materials. In Phase II, these surveys and materials will be pilot tested in Extension youth and family programs. Phase III will involve a randomized control test of the intervention in schools. The final phase will involve synthesis of data and sharing with participating communities. Advisory committees will provide input for each phase.

In contrast with traditional food-based approaches that ask tweens to limit foods, the proposed intervention uses POWER as a motivator for change to learn what marketers do to get tweens’ money, and how to redirect their spending. The innovative multi-disciplinary approach proposed will foster greater understanding of nutrition and enhance consumer practices.

## **Woodlands Wisdom Nutrition Project**

**Patricia Gailfus and Holly Youngbear Tibbits**

Woodlands Wisdom is a confederation of six 1994 Land Grant Institutions and one 1862 Land Grant University. The six tribal colleges, Fond du Lac (Minnesota), Leech Lake (Minnesota), and White Earth (Minnesota) College of Menominee Nation (Wisconsin) Lac Courte Oriettes (Wisconsin) Turtle Mountain (North Dakota) invited the University of Minnesota to partner with them in 1999.

The goal of Woodlands Wisdom is to improve the overall health of Native American people by enhancing regional community consciousness around how food and nutrition impact health and well being. Four objectives have been identified in order to reach this goal. They are; 1) to increase the number of Native American practitioners in Nutrition and Food Science; 2) improve research on the incidence of diet related chronic diseases and the relationship of traditional food use to health; and 4) to create a mechanism to network throughout the region.

Funded by USDA/CSREES/IFAS September 14, 2001, with \$2,000,000. The seven institutions had submitted a five year plan for \$5,000,00., however, funded with a lesser amount, and partner institutions agreed to a two year activity. Some of the colleges soon realized difficulty locating professionals to teach Food Science and Nutrition. This created a delay which extended the project to September 2004.

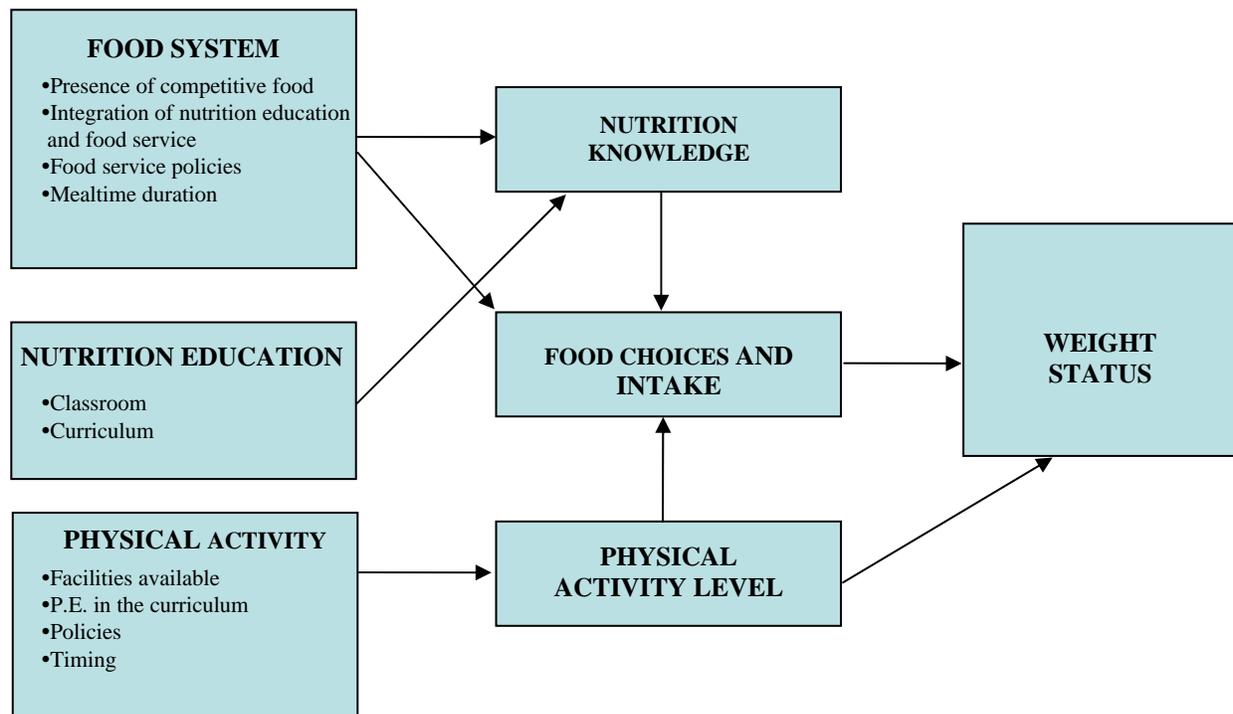
The six tribal colleges offer Food Science and Nutrition degrees, articulating to Universities of the student's choice. Each college has incorporated their own tribal traditions and culture into the curriculum. All colleges have developed community education conferences, attended by large groups of tribal members, up to six hundred in some cases. Various student/faculty research activities are taking place at the tribal colleges. Finally, the project has been invited to share the model with the tribal colleges in the state of Montana.

## Assess the Effect of the School Environment and Food System on Nutrition Knowledge, Food Choices, Physical Activity, and Weight Status Among School-aged Children

Mary Murimi Ph.D., RD. LDN.

The purpose of this one-year pilot project is to implement a multidisciplinary research to assess the effect of the school environment and food system on students' nutrition knowledge, food choices, physical activity, and weight status within eight randomly selected Louisiana schools. An innovative methodology of collecting point of sale/consumption data that utilizes handheld computers will assess the students' nutrition knowledge and food choices. The project will target 7th grade students as a vulnerable population. A web-based questionnaire will be administered to the administrators to assess the school environment and food system and policies in relation to: physical education, integration of nutrition education in the classroom and cafeteria, and competitive foods. Anthropometric data will be used to assess students' weight status. Critical to the proposed research design is the engagement of a diverse network of stakeholders involved in designing the school environment. This will include school administrators, classroom teachers, and the foodservice staff. Input from stakeholders will contribute to the implementation process and formative and summative project evaluation. Collaborative relationships with stakeholders formed during the research process will be used to develop and maintain a network that will facilitate sharing of information between the researchers and the stakeholders with the overall purpose of improving the school environment and food system in Louisiana schools. Furthermore, methodologies and results of the proposed project will provide a model that could be adapted by other states and researchers in an effort to combat childhood obesity in school-aged children.

**Figure 1. School Environment and Food System as They Affect Student Weight Status**



## **WIN the Rockies: A Food & Nutrition-Related Behavior Change Consortium Project in WY, MT, & ID**

**Sylvia A. Moore, PhD, RD, Professor/Director, Division of Medical Education and Public Health University of Wyoming**

**Project Description:** (<http://www.uwyo.edu/WinTheRockies/>) This model project sought to support healthy environments for children in rural communities by working with citizens of all ages to promote a healthy community. Specifically, WIN the Rockies worked with six rural communities - Preston and American Falls, Idaho; Lewistown and Miles City, Montana; and Powell and Torrington, Wyoming. <http://www.wintherockies.edu>

**Objectives:** Community members were encouraged to:

- a) improve their physical well-being by improving their food and physical activity habits;
- b) improve their sense of self-worth, basing it more on healthy eating and physical activity habits and vitality than on body size and shape; and
- c) become more accepting of people of varying body sizes and shapes.

**Results:** In response to WIN the Rockies personnel sharing their own data with them, citizens made the decision to increase physical activity and to promote health awareness. Walking programs are ongoing in all communities - already engaging slightly more than 20 % of the adult population in each community. Distribution of pedometers helped motivate initial participation and has reinforced behavioral change at the individual level. Strategically placed billboards replaced counter-productive advertising with messages about valuing health. The WIN the Rockies health awareness campaign led to plans for one community's first health fair. Frequent advertising in local newspapers kept citizens informed about their own community's progress. Simultaneously, health awareness programs initiated in the schools integrated take-home messages and family activities. Examples of this integration included placement of a vending machine for milk in a local school and a three-generation family walking team in the physical activity programs.

Analyses of data, both qualitative and quantitative, is ongoing. Initial findings show that adults in these rural communities with a higher BMI were more likely to drink sweetened beverages, order super-sized portions, eat while doing other activities, and report a lower frequency of participation in physical activity. Body dissatisfaction was associated with a greater likelihood that self-consciousness would keep individuals from participating in physical activity. Rural women in our study ate more fruits and vegetables and restricted portion sizes more than men, but the men drank more milk. Narrative research illustrated the power that others have on individual food and activity behaviors and that values, such as productivity and avoiding wastefulness, also have prominent impact on personal food and activity patterns.

Among the rural children who participated, 78 % reported doing something else while eating, and 44 % reported watching TV or playing video games outside of school for three or more hours each day. This physical inactivity was reflected in poor performance on the one-mile run, with the average time falling below the 50th percentile for national fitness awards for both genders. The average BMI for these children fell between the 75th and 85th percentile for both genders. Nonetheless, these children responded very positively to programs that emphasized physical activity as fun and to programs that emphasized family involvement.

Results from ongoing data analyses, communicated effectively to community members, will help maintain enthusiasm for the goal of improved community health.

**Publications to date from this project:**

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