

# RIDGE Project Summaries, 2006

## Food Assistance and Nutrition Research Innovation and Development Grants in Economics Program

Contractor and Cooperator Report No. 31  
August 2007

**T. Alexander Majchrowicz, editor**

### Abstract

This report summarizes research findings from the Food Assistance and Nutrition Research Innovation and Development Grants in Economics Program (RIDGE), formerly known as the Small Grants Program. The Economic Research Service created the program in 1998 to stimulate new and innovative research on food and nutrition assistance issues and to broaden the network of social scientists that collaborate in investigating the food and nutrition challenges that exist across communities, regions, and States. The report includes summaries of the research findings of projects that were awarded 1-year grants in summer and fall 2005. The results of these research projects were presented at the RIDGE conference in October 2006. The projects examine issues of obesity in children and immigrants, food assistance program participation and household well-being, food security, community influence on food assistance and dietary choices, food prices and quality, and child nutrition. Several of the projects focus on specific populations, such as Native Americans or people living in the rural South.

**Keywords:** Food assistance, nutrition, food security, food insecurity, obesity, childhood obesity, food assistance, food spending, Food Stamp Program, food stamps, WIC, Food Assistance and Nutrition Research Program.

**This studies summarized herein were conducted under research grants originating with USDA's Economic Research Service (ERS) Food and Nutrition Assistance Research Program (FANRP). The views expressed are those of the authors and not necessarily those of ERS or USDA.**

Photo credits: USDA Photo Center (upper left and right); Jeffrey Kaufman (lower left).

# Contents

<b>Introduction</b> .....	1
<b>Project Summaries</b>	
<b>Food Assistance Participation and Obesity</b>	
Policy Implications of WIC or Food Stamp Program Participation on Children’s Diet Quality and the Risk for Childhood Obesity .....	4
<i>Sibylle Kranz and Jill Findeis, Pennsylvania State University</i>	
Growing Up Poor and Weight Problems .....	6
<i>Haiyong Liu, East Carolina University</i>	
Food Stamps and Obesity Among Immigrants .....	8
<i>Neeraj Kaushal, Columbia University and National Bureau of Economic Research</i>	
<b>Food Assistance Participation and Well-Being</b>	
A National-Level Study of Food Stamp Program Participation Among American Indians: 1988-2004 .....	9
<i>Craig Gundersen, Iowa State University, and Dean Jolliffe and Laura Tiehen, U.S. Department of Agriculture</i>	
Well-Being of Citizen Children of Immigrants in Relation to Food Stamps and WIC, 1998-2005 .....	11
<i>Mariana Chilton, Drexel University, and Deborah Frank, Children’s Sentinel Nutrition Assessment Program, Boston Medical Center</i>	
Food Stamps, Unemployment Insurance, and the Safety Net.....	13
<i>Daniel Schroeder, University of Texas at Austin</i>	
Consumption Responses to In-Kind Transfers: Evidence from the Introduction of the Food Stamp Program.....	15
<i>Hilary W. Hoynes, University of California and Diane W. Schanzenbach, University of Chicago</i>	
<b>Food Security</b>	
Understanding Access to and Use of Traditional Foods by Hopi Female-Headed Households To Increase Food Security.....	16
<i>Matt Livingston, The University of Arizona Cooperative Extension, and Cornelia B. Flora, North Central Regional Center for Rural Development, Iowa State University</i>	
Food Stamps and Food Insecurity Among Families With Children: What Can be Learned in the Presence of Nonclassical Measurement Error?.....	18
<i>Craig Gundersen and Brent Kreider, Iowa State University</i>	
A Comparison of Food Insecurity Levels and Weight Status Among Rural- and Urban-Residing Latino/Hispanics in North Carolina.....	20
<i>Lauren Haldeman, University of North Carolina at Greensboro</i>	

Income Volatility and Food Insufficiency in U.S. Low-Income Households, 1992-2003 .....	22
<i>Neil Bania, University of Oregon, and Laura Leete, Willamette University</i>	
Food Insecurity in Poor, Female-Headed Families in Five of Alabama’s Black Belt Counties.....	24
<i>Andrew A. Zekeri, Tuskegee University</i>	
<b>Community-Based Studies</b>	
Native Plants and Nutrition .....	27
<i>Mari King and Wilbert Fish, Blackfeet Community College</i>	
Meeting the 2005 Dietary Guidelines for Americans: A “Daunting Challenge” for Food Stamp Recipients in Southeast Louisiana .....	28
<i>Carol E. O’Neil and Jeffery Gillespie, Louisiana State University</i>	
Small-Scale Backyard Integrated Aquamethaponics Food Production System and Training Program for Native Hawaiian Working Families in Hawaii.....	
<i>Aecio D’Silva, The University of Arizona, and Robert Howerton, University of Hawaii</i>	
<b>WIC and Child Nutrition</b>	
Intra-Household Allocation and Consumption of WIC-Approved Foods...32	
<i>Ariun Ishdorj, Helen H. Jensen, and Justin Tobias, Iowa State University</i>	
Association Between Prenatal WIC Exposure and Maternal Behavior, Health, and Birth Outcomes: Evidence From the Pregnancy Nutrition Surveillance System.....	34
<i>Ted Joyce and Cristina Yunzal, Baruch College, City University of New York</i>	
Feeding Practices of Childcare Staff in CACFP-Funded Centers .....	36
<i>Madeleine Sigman-Grant, Elizabeth Christainsen, and George Fernandez, University of Nevada</i>	
<b>Prices and the Food Environment</b>	
The Impact of the Food Stamp Program on Transient and Chronic Poverty .....	39
<i>Bradford Mills and Elton Mykerezzi, Virginia Tech</i>	
Is it Just Food? Geographic Differences in the Cost of Living .....	41
<i>Julie N. Zimmerman, Sunny (Seonok) Ham, and Sarah Michelle Frank, University of Kentucky</i>	
Mobile Market Participation and Impact: An Analysis of Pascua Yaqui Pueblo and the Old Nogales Highway Colonia .....	42
<i>George Frisvold, Shailaja Deva, and Jim Hazen, The University of Arizona; Anita Fonte, Community Renaissance, The University of Arizona; and Michelle Kuhns, Tucson Community Food Bank/ Food Security Center</i>	
Food Environment Quality and Food Choice in Clusters of Colonias in Hidalgo County of the Texas Rio Grande.....	44
<i>Joseph R. Sharkey, Scott Horel, Monica Wendel, and Li Zhu, School of Public Health, Texas A&amp;M University</i>	



# Introduction

Federal food and nutrition assistance programs form a crucial component of the social safety net in the United States. Unlike a number of other social programs, food assistance programs provide benefits and have eligibility requirements that are essentially uniform nationwide. The Food Stamp Program—the largest Federal food assistance program—is, with few exceptions, available to all Americans whose income and assets fall below certain levels. The other food assistance programs are generally targeted to specific demographic groups. Altogether, the 15 Federal food assistance programs collectively reach an estimated one in five Americans at some point each year. The U.S. Department of Agriculture (USDA), the Federal department charged with administering nearly all of the Federal food and nutrition assistance programs, has a particular interest in monitoring program effectiveness and contributing to the policy goal of a healthy, well-nourished population.

## Research Innovation and Development Grants in Economics Program

The USDA Economic Research Service's (ERS) Food Assistance and Nutrition Research Innovation and Development Grants in Economics (RIDGE) Program, formerly called the Small Grants Program, offers grants to social science scholars to stimulate new and innovative research on food and nutrition assistance issues. Moreover, the RIDGE Program seeks to broaden and strengthen the network of university-based researchers who collaborate in tackling the unique food and nutrition challenges existing across communities, regions, and States. Building pockets of expertise across the United States is a vital part of ensuring that food assistance policies and programs meet the needs of families and communities across a variety of special circumstances.

RIDGE researchers are drawn from an array of disciplines and include economists, sociologists, nutritionists, anthropologists, and public health professionals. The researchers employ a variety of approaches in their studies, such as using statistical models to analyze individual and household response to policy changes. Others conduct exploratory research that uses ethnographic methods to examine underlying factors that influence program participation and outcomes. Still others use descriptive statistics to characterize the populations of interest. All the research methods contribute to a growing body of literature on the food needs, coping behaviors, and food program outcomes of low-income families and individuals. The work supported by the RIDGE Program often inspires the development of new theories or research methodologies, elements that become the basis for securing expanded funding from other public or private sources to further develop these promising innovations.

This report presents summaries of the research findings from the seventh set of RIDGE awards, which were granted in summer and fall 2005. Preliminary findings were presented at a conference at ERS in Washington, DC, on October 12 and 13, 2006, and the research projects were completed in December 2006.

## RIDGE Program Partners

ERS created partnerships with five academic institutions and research institutes to administer the RIDGE Program and to competitively award grants for 1-year research projects. Most grants are for \$20,000 to \$40,000. Partner institutions have the advantage of being closer to the particular regional and State environments that influence program delivery and outcomes. Each partner institution provides a different emphasis on food and nutrition assistance research.

ERS chose two of the five partner institutions for their experience in conducting policy-relevant poverty research at the national level. One of these is the Institute for Research on Poverty (IRP) at the University of Wisconsin-Madison. IRP has a history of research and policy evaluation, including previous involvement in administering small research grants funded by USDA's Food and Nutrition Service. The second partner is the Irving B. Harris Graduate School of Public Policy Studies at the University of Chicago. The Harris Graduate School of Public Policy, a part of the Joint Center for Poverty Research from 1996 to 2002, has a strong history in conducting and supporting research on what it means to be poor in America.

ERS chose the remaining three of the five partner institutions for their ability to direct research of policy interest to USDA, either on a particular subset of food assistance and nutrition issues or on a particular subpopulation of those eligible for food and nutrition assistance. Among these, the Department of Nutrition at the University of California, Davis brought to the RIDGE Program its expertise in nutrition education design and evaluation. A core faculty group focuses their research efforts on identifying meaningful approaches to the design and evaluation of nutrition education for ethnically diverse, low-income families served by a variety of food assistance programs. They view multidisciplinary research as critical to effectively monitoring the outcomes of nutrition programs.

The Southern Rural Development Center (SRDC) at Mississippi State University was chosen to administer the RIDGE awards for its ability and commitment to conduct research on the problems of the rural poor in the South and its particular commitment to study the effects of welfare reform on this population. USDA has special ties to the SRDC because of its close working relationship with the region's 29 land-grant universities. The South is also of particular interest to USDA because of the large proportion of rural poor and rural African-Americans who reside in the region.

American Indian families living on reservations are a significant component of the low-income rural population in many of the Western and Plains States. ERS chose The University of Arizona's American Indian Studies Program (AISP) to administer RIDGE awards for research on the food assistance and nutrition needs and problems of American Indians. AISP is the home of the only doctoral program in American Indian Studies in the country. The program maintains close ties to the tribal colleges, which were given land-grant status by Congress in 1994. AISP also reaches out to Native American scholars in a variety of academic settings.

More information about the RIDGE partners and many of the completed research papers can be found on the Websites of the administering institutions, listed below:

**Institute for Research on Poverty, University of Wisconsin-Madison**

**Focus:** The effects of food assistance programs on food security, income security, and other indicators of well-being among low-income individuals and families.

Web address: <http://www.irp.wisc.edu/initiatives/funding/usdasgp.htm>

**Irving B. Harris School of Public Policy Studies, University of Chicago**

**Focus:** Interactions between food assistance programs and other welfare programs and the effects of the macroeconomy on the need for food assistance, the level of participation, and costs of food assistance programs.

Web address: <http://harrisschool.uchicago.edu/Research/funding.asp>

**The American Indian Studies Program, The University of Arizona**

**Focus:** The relationship between food assistance programs on reservations and family poverty.

Web address: <http://www.nptao.arizona.edu/>

**The Department of Nutrition at the University of California, Davis**

**Focus:** The impact of food assistance programs on nutritional risk indicators (anthropometric, biochemical, clinical, and dietary), food purchasing practices, and food insecurity.

Web address: <http://nutrition.ucdavis.edu/USDAERS/>

**Southern Rural Development Center, Mississippi State University**

**Focus:** Food assistance research issues impacting vulnerable rural people, families, and communities in the South.

Web address: <http://srdc.msstate.edu/focusareas/health/fa/food.htm>

# Project Summaries

## Food Assistance Participation and Obesity

### ***Policy Implications of WIC or Food Stamp Program Participation on Children's Diet Quality and the Risk for Childhood Obesity***

Sibylle Kranz and Jill Findeis, Pennsylvania State University

Federal food and nutrition assistance programs, such as the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) and the Food Stamp Program, target low-income families and provide food to participating individuals. Changes in consumption of food and nutrients associated with health goals, particularly in the child population, include the need to increase the dietary intake of fruits, vegetables, dairy and calcium, and whole grains and to decrease the intake of added sugar. The dietary intake recommendations for these foods have changed in the recent past and are included in the newly proposed WIC food package in an effort to improve child nutrition.

Development of healthy eating patterns early in life is an important tool to prevent chronic diseases, such as diabetes and cardiovascular disease in adults. Because the obesity epidemic affects not only adults but also children, Federal nutrition assistance programs may serve a dual purpose. Foremost, the programs are a venue to increase the availability of food in low-income families, but may also increase access and consumption of high-quality foods to prevent the development of obesity and other chronic diseases.

Current research indicates that children participating in WIC are more likely to meet the dietary intake recommendations for nutrients than nonparticipants. WIC participation has also been shown to improve children's eating patterns, significantly reducing the amount of snacking and the intake of added sugar from snacks, reducing overall added sugar intake, and increasing the likelihood of meeting the Dietary Reference Intake (DRI) for dietary fiber.

No single food or nutrient is representative of total diet quality. Thus, a composite diet quality assessment score was developed and updated to reflect the latest Federal dietary intake recommendations. The Revised Children's Diet Quality Index (RC-DQI) includes 12 individual nutritional components, and 1 item to indicate overall energy balance, to determine the quality of the average dietary intake in children ages 2-18. Dietary intake of added sugars, total fat, specific fatty acids (linoleic acid, linolenic acid, EPA, and DHA), total grains, whole grains, fruits, vegetables, 100-percent fruit juice, dairy, and iron was used to determine whether children consume optimal levels of these key nutrients and foods. In addition, an energy balance component consisting of two subcomponents was introduced. The first subcomponent expressed the ratio between children's actual and ideal energy intake (as estimated using the age- and gender-specific Estimated Energy Requirements (EER) of the DRI). The second expressed the average number of hours spent watching television compared with the hours for television and computer time recommended by the American Academy of Pediatrics.

Socioeconomic, nutrition, and medical examination data on children 2-18 years old (n=7,546) from the National Health and Nutrition Examination Survey (NHANES) 1999-2002 were employed to examine the diet quality

---

Dietary intake patterns are not only an important predictor of children's health but also track into adulthood.

---

of American children. All analyses were conducted using STATA 9.2, which allowed for correction of the complex survey design and sampling techniques to maintain the nationally representative character of the data.

Total RC-DQI point scores ranged from 0 to 82, with younger children having better diet quality than teenagers. Four percent of preschoolers had between 90 and 100 percent of the possible RC-DQI points, and only 10 percent scored less than 50 percent of the possible points. School-age children and teenagers, on average, scored much lower, and none of either age group scored more than or equal to 90 percent of the possible points. Forty-six percent of children ages 12-18 and 31 percent of children ages 6-11 scored less than 50 percent of the possible points.

The study examined whether participation in Federal food and nutrition assistance programs could predict that American children were at “risk to be overweight” or “overweight.” A multivariate regression was conducted using nationally representative data for children ages 2-18 (NHANES 1999-2002), controlling for children’s age, gender, physical activity level, ethnic group, household income, preschool and school attendance, and school breakfast and school lunch participation.

Results indicated that WIC participation significantly improved children’s overall diet quality. For children who participated in WIC, the risk of being overweight was reduced by 40 percent compared with children who were income eligible for WIC (poverty-income ratio (PIR) less than 1.3) but did not participate. For children eligible for food stamps (PIR less than 1.3), the effect was even more beneficial: Children who participated in WIC were 57 percent less likely to be overweight than children in the same income group who did not participate in WIC.

Due to the dual problems of malnutrition and overweight (from overconsumption of energy or lack of physical activity), public policy on food and nutrition assistance programs must be re-evaluated regularly to assess whether the assistance provided addresses both of these issues. Data in this study indicate that the WIC program significantly affects young children. WIC participation not only improves preschoolers’ diet quality but decreases the risk for childhood obesity. Encouraging WIC participation in the low-income population may be an effective public policy strategy to help prevent childhood obesity and therefore to reduce the risk of chronic diseases not only during childhood but also later in life.

**Contact:**

Sibylle Kranz  
Department of Nutritional Sciences  
Pennsylvania State University  
5G Henderson Building  
State College, PA 16802  
Phone: 814-865-2138  
Fax: 814-865-5870  
E-mail: [sxk72@psu.edu](mailto:sxk72@psu.edu)

Grant awarded by the Department of Nutrition at the University of California, Davis

---

Validation of the index showed that increasing RC-DQI scores, representing better diet quality, were associated with improved values of indicators of overall health, such as obesity status and blood cholesterol and total triglyceride levels.

---

## **Growing Up Poor and Weight Problems**

Haiyong Liu, East Carolina University

With recent welfare reform, the Food Stamp Program (FSP) and other food and nutrition assistance programs have become the major components of the social safety net for low-income households. The FSP alone serves over 17 million participants, with an average per capita benefit of \$75 per month. Nearly 90 percent of FSP recipients live below national poverty lines. The goal of these food and nutrition assistance programs is to mitigate food insecurity and related health problems among vulnerable populations, especially impoverished children.

One measure of health outcomes directly linked to food consumption is obesity. Child obesity has become a very serious public health issue. The percentage of overweight children in elementary school more than tripled from 4 percent in the 1960s to 13 percent in 1999. Overweight children are also at risk for cardiovascular diseases, diabetes, and other serious health problems in childhood as well as negative outcomes on education and earnings.

Given the dramatic trends in the overweight status of the American population in the past few decades, certain socioeconomic factors other than genetics must play a significant role as well. In particular, the looming epidemic of childhood obesity fails to cover the weight/health disparities among children from different socioeconomic groups. The risks of underweight and overweight continue to be the highest among the most impoverished people. Food insecurity, defined as limited access to nutritionally acceptable or safe food, has been attributed as the main cause of the persistent underweight and overweight epidemic among children living in poverty. This study investigates the impact of living in poverty on the risks of childhood overweight and underweight.

The matched mother/child data from the National Longitudinal Survey of Youth (NLSY) are used in this study. This study examines the effects of growing up poor on risks of childhood overweight and underweight, accounting for unobserved heterogeneity that governs both children's weight and family income. FSP benefits are treated as cash income. The impacts of family income are also estimated on a child's weight measured by body mass index (BMI) at different points in the conditional distribution of children's weight using a two-stage residual inclusion least absolute deviation approach.

Results show that FSP benefits and other welfare programs are likely to mitigate weight problems for children at risk. Without controls for unobserved heterogeneity, the study finds that growing up poor is likely to be associated with reduced risk of being overweight by 4.7 percentage points and increased risk of being underweight by 3.1 percentage points. Both results are statistically significant. Once correcting for unobserved heterogeneity, the results indicate that the estimated effects of poverty exposure on overweight change signs, and the estimates on underweight increase by a factor of two. However, none of these estimates remain statistically significant.

---

Beyond genetics,  
socioeconomic factors  
contribute to weight  
conditions.

---

---

Growing up poor has  
negative and persistent  
impacts on children's  
weight conditions.

---

Further, this study finds that the mean effects of family income produced by ordinary least squares fail to characterize the change of BMI distribution induced by family income. Quantile regressions with appropriate controls for unobserved heterogeneity suggest that there are variations in the impacts of poverty exposure along the conditional distribution of child weights. Specifically, this study concludes that children who are at risk of underweight—that is, located at the lower tail of the conditional distribution of BMI because of genetics or other underlying factors—are likely to become underweight as a result of extensive exposure to poverty in early childhood. Similarly, those who are located at the upper tail of the conditional distribution of BMI are subject to increased risk of being overweight when growing up poor. For these children who are at risk of weight problems, as predicted by their family characteristics and other personal traits, receiving FSP benefits will reduce the risks by increasing the disposable family income. Furthermore, the models that use binary indicators of underweight and overweight with controls for unobserved heterogeneity indicate that the mean effects of poverty status on each competing health risk are not statistically different from zero. This finding might help explain the mixed evidence about the impact of FSP participation on the mean risks of weight problems from previous studies.

**Contact:**

Haiyong Liu  
East Carolina University  
Department of Economics  
Brewster A439, 10th Street  
Greenville, NC 27858  
Phone: 252-328-1083  
E-mail: [liuh@ecu.edu](mailto:liuh@ecu.edu)

Grant awarded by the Institute for Research on Poverty,  
University of Wisconsin-Madison

## ***Food Stamps and Obesity Among Immigrants***

Neeraj Kaushal, Columbia University and National Bureau of Economic Research

This report presents the findings of a natural experiment research design to study the effect of food stamps on body mass index (BMI) of adults in low-income immigrant families. To accomplish this, the study uses changes in immigrant eligibility for the Food Stamp Program (FSP) caused by the 1996 Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA) and State responses to the Federal law.

The 1996 Federal law denied immigrants access to food stamps, resulting in a sharp decline in their FSP participation. In response to PRWORA, some States started substitute FSPs to provide benefits for new immigrants and those who had entered the country before the enactment of the Federal policy. (Federal law subsequently restored FSP eligibility to certain groups of pre-PRWORA arrivals.)

The study hypothesizes that, if FSP participation leads to obesity, the prevalence of obesity among immigrants should decline in the post-PRWORA period in States that implemented the Federal law compared with States that instituted substitute FSPs. Further, the use of food stamps by post-PRWORA arrivals also declined. Again, if FSP participation causes obesity, the decline in obesity should be greater among newly arrived immigrants compared with pre-PRWORA immigrants.

The study uses the National Health Interview Survey (NHIS) and the March Current Population Survey (CPS) and applies a two-sample instrumental variables research design to estimate the association between FSP participation and BMI of foreign-born adults. Federal and State changes to immigrant FSP eligibility in 1996 are used as instrumental variables to predict FSP participation.

The empirical analysis suggests that, in the post-1996 period, food stamp use by foreign-born unmarried mothers with a high school or lower education was 10 percentage points higher in States with substitute programs than in States that implemented the Federal restrictions. However, this increase in FSP participation was not associated with any statistically significant difference in BMI among low-educated, foreign-born unmarried mothers.

### **Contact:**

Neeraj Kaushal  
Columbia University, School of Social Work  
1255 Amsterdam Avenue  
New York, NY 10027  
Phone: 212-851-2235  
Fax: 212-851-2204  
E-mail: [nk464@columbia.edu](mailto:nk464@columbia.edu)

Grant awarded by the Harris School of Public Policy, University of Chicago

## Food Assistance Participation and Well-Being

### ***A National-Level Study of Food Stamp Program Participation Among American Indians: 1988-2004***

Craig Gundersen, Iowa State University, and Dean Jolliffe and Laura Tiehen, U.S. Department of Agriculture

The economic status of American Indians is substantially worse than that of the general U.S. population. For example, per capita income of American Indians is 40 percent below the national average, large numbers have earnings in the lower end of the income distribution, and in counties with a high proportion of American Indians, per capita income is much lower than in other counties. This worse economic status is also seen in direct indicators of well-being. For example, one in five American Indians was food insecure compared with about one in eight for the entire population in 2003. Further, the rate of food insecurity with hunger was twice as high for American Indians than for the rest of the population.

A series of public policies are being used to address the hardships facing American Indians. One program with the potential to have a major impact is the Food Stamp Program. In light of the importance of food stamps, understanding food stamp use by American Indians in relation to the general population seems relevant. This paper represents the first examination of food stamp use among American Indians at the national level.

The participation rate among American Indians in the Food Stamp Program is compared with the rate among the general population by using data from the 1989-2005 March Supplements of the Current Population Survey (CPS) (calendar years 1988-2004). From these data, samples are constructed consisting of (1) gross-income-eligible households and (2) gross-income- and asset-eligible households. The use of multiple years allows the study to ascertain how the participation rate may have changed over time. Results indicate that, from 1988 to 2004, the participation rate of American Indians was higher than the rate of the general population in every year. This result holds for both the gross-income-eligible sample and the gross-income- and asset-eligible sample. This difference does not generally hold, however, once the sample is broken down by presence of children in households and by whether the household is in a metro or nonmetro area.

Next, the study considers, after controlling for other factors, the effect of American Indian status on the probability of food stamp participation. For the full sample under the gross-income test, American Indians have a 30.1 percent higher probability of receiving food stamps. For the gross-income- and asset-eligible-sample, the difference is 20.3 percent. When the sample is restricted to households with children and households without children, American Indians again have higher food stamp participation rates, contrary to the bivariate results discussed above. All else being equal, in the sample of all gross-income-eligible households, the probability of an American Indian household receiving food stamps is 41.3 percent in nonmetro areas and 33.6 percent in metro areas. In contrast, households in the rest of the population in nonmetro areas have a 35.1 percent probability of receiving food stamps and in metro areas a 27.8 percent probability.

---

A large share of American Indians, given the high poverty rate among them, would be eligible for food stamps and presumably would benefit from receiving this assistance.

---

---

The probability of American Indian households receiving food stamps is greater than other households in both metro and nonmetro areas.

---

To examine the manner in which the unequal distribution of American Indians across States affects the results, the sample is further limited to States where more than 3 percent of the food-stamp-eligible population is American Indian. For all households and for households with children, the restriction to fewer States does not have much of an influence on the estimated coefficients. For households without children, however, in the gross- and asset-income-eligible sample, the effect of being American Indian on food stamp participation is insignificant. Also, the joint effects of American Indian status, nonmetro residence, and their interaction in the gross- and asset-income-eligible sample is insignificant.

**Contact:**

Craig Gundersen  
Department of Human Development and Family Studies  
Iowa State University  
74 LeBaron Hall  
Ames, IA 50011  
Phone: 515-294-6319  
Email: *cggunder@iastate.edu*

Grant awarded by the American Indian Studies Program,  
The University of Arizona

## ***Well-Being of Citizen Children of Immigrants in Relation to Food Stamps and WIC, 1998-2005***

Mariana Chilton, Drexel University, and Deborah Frank, Children's Sentinel Nutrition Assessment Program, Boston Medical Center

One in five children under the age of 6 in the United States is a child of immigrant parents, making children of immigrants the fastest growing child population in the United States. Although 93 percent of children of immigrants are U.S. citizens, Federal assistance programs meant to provide a safety net for poor families often do not reach these vulnerable children. Information is limited on how this difficulty in participating in food assistance programs affects the health and well-being of U.S. citizen infants and toddlers of immigrant parents.

The Children's Sentinel Nutrition Assessment Program (C-SNAP) is an ongoing multi-site survey that investigates the associations between well-being and public assistance participation among young children under the age of 3. Since its inception in 1998, the C-SNAP study has been interviewing caregivers of infants and toddlers in emergency departments and ambulatory care practices in Boston, Little Rock, Baltimore, Los Angeles, Minneapolis, Washington, DC, and Philadelphia.

This study investigated the associations between Federal food assistance participation and maternal and child well-being among immigrant households. Indicators of household and child food insecurity, child health, history of child hospitalizations since birth, maternal depression, and child development were used to measure well-being.

In the C-SNAP sample restricted to no receipt of private insurance (n=19,272), 7,216 children had immigrant parents. Caregivers were interviewed in English, Spanish, or Somali. Criteria for inclusion were mother's recorded place of birth and no receipt of private insurance. All infants and toddlers included in the study were U.S. citizens.

Food insecurity was measured with the USDA's 18-question survey module. Food insecurity was categorized at two levels: household food insecurity and child food insecurity. The caregiver's report of the child's overall health status was asked in standard form as used in the Third National Health and Nutrition Examination Survey. A three-item maternal depression screen was used to screen for maternal depression. The Parents' Evaluation of Developmental Status (PEDS), a validated parent assessment of their child's development, was asked of families with an infant of 4 months and older.

Bivariate associations between immigrant status and other categorical variables used chi-square tests, and t-tests were used for bivariate associations with continuous variables. Variables controlled in regression analyses included study site, low birth weight, whether or not child was breastfed, maternal race/ethnicity, and level of mothers' education. In secondary analyses, the study also evaluated the impact of immigrant parents' length of stay in the United States, as some States continue to require a minimum of 5 years of stay for legal immigrants to be eligible for food stamps and other forms of Federal assistance.

Study findings were further disaggregated by mother's country of origin. Results demonstrate that households with Mexican-born mothers had almost three times the prevalence rate of food insecurity than households with U.S.-born mothers (46 versus 16 percent) and more than five times the rate of child food insecurity (34 versus 6 percent). Mexican caregivers have the highest prevalence of food insecurity compared with other immigrant groups.

The odds of household food insecurity for all immigrant households were two times the odds of household food insecurity among households with U.S.-born mothers. The odds for food insecurity were even more pronounced for child food insecurity. Length of stay beyond 10 years significantly mitigated food insecurity, as the odds of household and child food insecurity decline drastically when compared with immigrants more newly arrived (within 5 years or less).

For children of immigrants, the odds of fair or poor health were 1.2 times greater than the odds of fair or poor health for children of U.S.-born parents. Compared with the odds among the Latino sample only, the odds of fair or poor health were significantly higher for children of Latino immigrants than for children of U.S.-born Latinos.

The odds of depression among all immigrant mothers were significantly less than the odds for depression among U.S.-born mothers, although the adjusted results for the Latino sample did not remain significant. Length of stay, after adjusting, showed significant association with increased odds of maternal depression for all immigrants considered together but not for the Latino immigrants considered separately.

Among all immigrants, the study was unable to demonstrate that improved child health, maternal depression, and hospitalizations were associated with receipt of food stamps or the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC).

The increased risk for poor child health for immigrant Latinos, despite considerably higher rates of breastfeeding and lower rates of low birth weight, is a clear indication of the struggle of immigrant families to protect their children's health in the United States. The high rates of food insecurity for all immigrants and the elevated risk of poor child health of young children should encourage decisionmakers to reassess current policies toward immigrants, both documented and undocumented. Poor health early in life can affect cognitive development and ultimately affect a child's ability to function in school, succeed on the job market, and develop to their full potential.

**Contact:**

Mariana Chilton  
Department of Community Health and Prevention  
Drexel University School of Public Health  
Mail Stop 660  
245 North 15<sup>th</sup> Street  
Philadelphia, PA 19102-1192  
Phone: 215-762-6512  
Fax: 215-762-4088  
E-mail: [Mariana.Chilton@drexel.edu](mailto:Mariana.Chilton@drexel.edu)

Grant awarded by the Harris School of Public Policy, University of Chicago

---

Demographic characteristics of immigrant caregivers differ substantially from the U.S.-born caregivers.

---

## ***Food Stamps, Unemployment Insurance, and the Safety Net***

Daniel Schroeder, University of Texas at Austin

The Food Stamp Program (FSP) and cash assistance were reformed in 1996 and later to emphasize work as a route out of poverty. When employment opportunities were plentiful, as they were in the late 1990s, many families were able to transition off program rolls and into jobs. However, when the employment situation reversed starting in 2000, social supports were needed. This study attempts to determine whether Unemployment Insurance (UI) was a significant source of support for these families, as might be expected because many former welfare recipients should have developed work histories that would have made them eligible for UI benefits. In particular, the study asks whether UI was able to replace or complement food stamps for unemployed, welfare-eligible families.

This study uses a rich data set of electronic case records from Texas on food stamp receipt, UI earnings, and UI claim benefits to examine patterns of employment, unemployment, and program participation over the period 1996-2004. Research using administrative records is advantageous due to large sample sizes and accurate accounts of the beginning and ending dates of assistance spells. The primary disadvantage of this approach is lack of depth in the constructs measured.

Data were assembled into longitudinal data sets for analysis. Descriptive analysis of UI earnings data over time indicates that monetary eligibility for UI among FSP recipients was moderate in the beginning (40-41 percent). However, as expected with the increased emphasis on work, eligibility increased by several percentage points throughout the study period, peaking at 46 percent around 2002. Concurrent receipt of UI benefits among FSP recipients also rose to a peak around 2002, at the height of the recession, at 7 percent, several times higher than its level at the beginning of the study.

Cox proportional hazards regressions were used to identify factors associated with exit from an FSP spell and found that both currently and recently receiving UI benefits was associated with increased rates of exit from the FSP. This effect held even when controlling for earning levels and monetary eligibility for UI benefits, suggesting that UI can act as a substitute for the FSP among families that qualify for and receive this benefit.

Similar attempts to model return to the FSP among former recipients also found strong positive associations with currently and recently receiving UI benefits. Contrary to the deterrent effect that had been expected, this finding suggests that UI might be acting as a first-tier safety net, with the FSP being the second tier. Although there was some concern that receiving UI benefits in this regression may have served as a marker for job loss, inclusion of UI earnings and employment measures in this regression did not diminish the UI benefit effects.

A final attempt to ascertain the role of UI benefits in FSP participation was estimated by modeling takeup, or entry into the FSP, among the entire population of workers with earnings reported to the UI system. Among individuals with a recent decline in earnings (20 percent or greater decline in

---

Receiving unemployment insurance benefits is associated with increased exit rates from the Food Stamp Program.

---

quarterly earnings within a year), entry into the FSP was found once again to have a strongly positive association with both current and recent UI benefit receipt.

Whereas most prior analysis suggested that the UI role in FSP dynamics did not vary in the economic expansion and recession/post-recession periods, this last model did suggest some variation. Before 2001, concurrent receipt of UI (in the same quarter) strongly predicted entry into the FSP, while recent UI receipt (in the prior quarter) only weakly predicted FSP entry. But in 2001 and later, recent UI receipt is a much stronger predictor of FSP entry, while the estimated effect of concurrent receipt is substantially weaker. This situation can also be observed in descriptive statistics, which show that, in the early years of the study, 5-10 percent of FSP spells were preceded by receiving UI compared with 16-20 percent of FSP spells in 2002 and later. As with the findings regarding re-entry to the FSP, this finding suggests that UI benefits act as a first-tier safety net, with the FSP being the second tier. This trend appears to be increasing over time.

Similar methods were also used to identify factors associated with exit from and re-entry and entry into spells of receiving UI benefits, but FSP participation was found to play little or no role in UI benefit dynamics. Although indicators for concurrently receiving food stamps were sometimes associated with measures of UI entry and re-entry, prior FSP receipt did not show such associations.

In summary, findings from this study suggested that receiving UI benefits plays a large role in FSP dynamics but that the FSP plays little role in the dynamics of receiving UI benefits. FSP recipients who qualified for and received UI benefits tended to have shorter spells in the FSP, suggesting a substitution effect. Although the analysis did not reveal the expected deterrent effect of receiving UI benefits on FSP participation, UI benefits did seem to increasingly provide a first-tier safety net, whereas the FSP constituted the second tier. These findings suggest that the increased emphasis on work has led to a greater role for UI in the dynamics of the FSP but that room for improvement remains.

**Contact:**

Daniel Schroeder  
Ray Marshall Center for the Study of Human Resources  
LBJ School of Public Affairs  
University of Texas at Austin  
3001 Lake Austin Boulevard, Suite 3200  
Austin, TX 78703  
Phone: 512-471-2196  
Fax: 512-471-0585  
E-mail: *[schroed@uts.cc.utexas.edu](mailto:schroed@uts.cc.utexas.edu)*

Grant awarded by the Harris School of Public Policy, University of Chicago

---

The pattern of the findings suggests that food stamps were not the causal factor in unemployment insurance dynamics.

---

## ***Consumption Responses to In-Kind Transfers: Evidence from the Introduction of the Food Stamp Program***

Hilary W. Hoynes, University of California, and Diane W. Schanzenbach, University of Chicago

The Food Stamp Program (FSP), serving 24 million people in 2004 at a cost of \$27 billion, is one of the most important income support programs in the United States. Despite this prominence, it has been relatively understudied because researchers find isolating the impact of the FSP on food spending, nutritional intake, labor supply, and other outcomes difficult. Because the program is national, no variation exists in program parameters (such as stark differences in State benefit levels or eligibility) that is typically exploited by researchers to measure program impacts.

This study leverages previously underused variation across counties in the date they originally implemented their FSP in the 1960s and early 1970s. The study employs difference-in-difference methods identified by comparing counties within the same State that introduced the program at different times. Impacts of program availability are estimated on food spending, labor supply, and family income by using data from the Panel Study of Income Dynamics (PSID) from 1968 to 1978.

The introduction of the FSP leads to a sizable increase in total food consumption and (consistent with economic theory) to small decreases in both out-of-pocket food spending and the propensity to eat meals in restaurants. The results are quite precisely estimated for total food spending, with less precision in estimating the impacts on the individual components of food spending. In addition, income support programs like the FSP include incentives that might cause recipients to reduce their work effort. This finds no evidence in the PSID of work disincentive impacts—measured as whether the household head is employed or by earnings—associated with the introduction of the FSP. These findings are further confirmed in an analysis of work behavior in the 1970 and 1980 Census.

### **Contact:**

Diane Whitmore Schanzenbach  
Harris School  
University of Chicago  
1155 East 60<sup>th</sup> Street  
Chicago, IL 60637  
E-mail: [Schanzenbach@uchicago.edu](mailto:Schanzenbach@uchicago.edu)

Grant awarded by the Harris School of Public Policy, University of Chicago

## Food Security

### ***Understanding Access to and Use of Traditional Foods by Hopi Female-Headed Households To Increase Food Security***

Matt Livingston, The University of Arizona Cooperative Extension, and Cornelia B. Flora, North Central Regional Center for Rural Development, Iowa State University

This study assessed the ability of Hopi single-parent, female-headed households to access traditional Hopi foods. These foods are important to Hopi nutritional well-being and cultural participation and inclusion. Traditionally, the production of the Hopi crops of corn, beans, squash, and melons has been the duty of male farmers. If a household has no male present, other relatives produce crops for the female. Changes in this tradition within today's economic and social setting may impact households headed by females in relation to health and participation in Hopi culture.

Using a participatory action research approach based on the principles of Appreciative Inquiry, the experiences of single mothers in using and accessing traditional foods were determined. In the study of single mothers' access to and use of traditional food, the study recruited four community representatives from each mesa.

The community representatives were full partners in designing the sample frame and the number of interviews planned. The study defined the Hopi single-parent, female-headed household as a mother, a female relative, or a grandmother raising children and being the primary person responsible for their care. The female could be living within a larger extended family setting.

Representatives conducted 100 interviews over a period of 9 months during October 2005-June 2006. The representatives almost always interviewed in pairs to ensure quality control and accurate data. The women interviewed were from the 12 villages on the Hopi Reservation. All representatives took the Institutional Review Board examination offered on-line by Iowa State University.

In this study, the representatives learned processes to build the codebook in the Statistical Package for Social Sciences (SPSS) for Windows. The survey was conducted as a conversation and then coded as to whether something was mentioned or not mentioned. Researchers coded the data, checked them for errors, and ran the marginal values of the variable.

"What does Hopi food mean to you?" was the first question asked. Most of the women had to wait and think before they answered the question. The majority (60 percent) of the respondents stated that traditional food is good for you, healthy, and used for ceremonies and initiations. A similar number responded that traditional food is homegrown. A third of the sample said that traditional food meant survival. Older women were more likely to mention survival and energy than younger women.

The foremost source of traditional Hopi food is corn. It is the main ingredient for all of the traditional Hopi meals and is used in all traditional Hopi ceremonies. Sixty-eight percent of the respondents mentioned the importance of

---

Perceptions of traditional foods vary among the Hopi.

---

corn and/or traditional food to their identity as Hopi. Older women were more likely than younger women to mention either food as a source of identity. Fifty-seven percent mentioned only corn as important to Hopi identity.

A majority of respondents believes a relationship exists between age and the access to, and use of, traditional Hopi foods. Many of the elders had traditions passed on to them at an early age and were expected to use and prepare traditional foods as part of their daily lifestyle. They were not given an option to use or not use Hopi foods.

Most individuals rely on a network of family to obtain sufficient traditional Hopi foods. However, other methods exist to obtain these foods. Females assisting in the cleaning and preparing of harvested corn for storage will usually be given a portion of the crop. At religious ceremonies, the kachinas will present some traditional foods to the people attending. Hopi foods may also be secured through trading or purchasing items.

The family is important in passing on methods of cooking traditional food. Ninety percent of respondents reported that they received some cooking knowledge from female relatives. In addition, 29 percent of respondents reported male relatives as a source of cooking knowledge, while 7 percent stated that skills were gained through self-teaching by watching others and using cookbooks. Over 20 percent of the women stated that their cooking instructions from relatives were supplemented by self-teaching.

Preliminary results of the study show that traditional foods are an integral part of Hopi life today. These foods are very necessary for cultural and spiritual purposes. The foods are important for women in their inter-generational family relationships and connection to the greater Hopi community. Sixty-four percent of the respondents stated that traditional foods are obtained in the same manner used by their mothers and grandmothers. The study revealed an awareness of the importance of traditional food but also some breaks in passing on Hopi traditions.

The reaction to the study was positive within the communities in which the results were distributed. The need to maintain knowledge of traditional wild foods and greens was frequently mentioned by attendees. The Hopi community believes that this information is important and feels that younger women should be taught Hopi food preparation, mentioning that this knowledge may be gained by assisting in traditional ceremonies, such as weddings and naming of babies. Also, some women who have lived off reservation are trying now to learn preparation methods of traditional food in order to become more involved in their communities.

**Contact:**

Matthew Livingston  
The University of Arizona Cooperative Extension  
P.O. Box 1203  
Keams Canyon, AZ 86034  
Phone: 928-734-3708  
E-mail: [mateo@ag.arizona.edu](mailto:mateo@ag.arizona.edu)

Grant awarded by the American Indian Studies Program,  
The University of Arizona

---

Traditional Hopi foods  
and preparation skills  
are acquired through  
various methods.

---

## ***Food Stamps and Food Insecurity Among Families With Children: What Can be Learned in the Presence of Nonclassical Measurement Error?***

Craig Gundersen and Brent Kreider, Iowa State University

The central goal of the Food Stamp Program is to alleviate food insecurity in the United States. Given this goal, policymakers have been puzzled to observe that food stamp households with children are more likely to be food insecure than similar nonparticipating eligible households. In 2003, food stamp participants had food insecurity rates of 52.3 percent while eligible nonparticipants had food insecurity rates of 34.4 percent, a gap of 17.8 percentage points. For a more severe measure of food insecurity, food insecurity with hunger, the gap between participants and eligible nonparticipants was 6.4 percentage points. This positive association between food stamp participation and food insecurity has been ascribed to several factors, including self-selection, the timing of food insecurity versus food stamp receipt, misreporting of food insecurity status, and misreporting of food stamp receipt.

This study focuses on misreporting issues with data from the Core Food Security Module (CFSM), a component of the Current Population Survey (CPS). More specifically, the study investigates what can be inferred when food stamp participation and food insecurity status are subject to nonclassical measurement error. This work contrasts with the previous literature on the connection between food stamps and food insecurity that has implicitly assumed that both indicators are measured without error.

In terms of food stamp participation status, previous studies have demonstrated that the weighted number of food stamp participants in nationally representative surveys is substantially fewer than that found in administrative records. The underreporting is about 15 percentage points in the CPS. In terms of food insecurity status, while not as straightforward, there are reasons to expect inaccurate reports of food insecurity. For example, some food stamp recipients might misreport being food insecure if they believe that to report otherwise could jeopardize their eligibility. Alternatively, some parents may misreport being food secure if they feel ashamed about heading a household in which their children are not getting enough food to eat.

In light of the problems of misreporting in food stamps and food insecurity, the study introduces a nonparametric framework for assessing what can be inferred about conditional probabilities when a binary outcome (food insecurity) and a binary conditioning variable (food stamp participation) are both subject to nonclassical measurement error. The study first posits that food stamp participation is not accurately reported but food insecurity is accurately reported. Under this assumption, the study considers three cases:

- Corrupt sampling bounds, where no assumptions are made about reporting errors.
- Orthogonal errors, where classification errors arise independently of true participation status.
- Corrupt sampling bounds with no false positives, where reported food stamp nonparticipants are allowed to be participants but not vice versa.

---

The assumption of no errors in reports of food stamp participation status and food insecurity status is questionable.

---

Under corrupt sampling bounds, if as few as 7.1 percent of eligible households misreport food stamp participation status, the positive association between food insecurity and food stamp participation is no longer identified. For orthogonal errors and “no false positives,” the figures are 8.2 percent and 10.1 percent. When considering the case of food insecurity with hunger, under corrupt sampling bounds and orthogonal errors, if as few as 1.8 percent and 2.9 percent of the eligible sample misreport their food stamp participation status, the positive association between food insecurity and food stamp participation is no longer identified. For “no false positives,” the number of misreports is higher—12.4 percent. Given that previous work has found that food stamp participation rates are underreported in the CPS by about 15 percent, findings in this study may be of importance. Specifically, if misreporting rates of less than 13 percent are sufficient to prevent identification of the positive relationship between food insecurity and food stamp participation, policymakers may wish to be cautious about drawing conclusions about the relationship between food insecurity and food stamps.

Policymakers should be even more cautious once errors are allowed in reports of both food stamp participation and food insecurity. For example, under the assumption of orthogonal errors in food insecurity reports with no false positive reports of food stamp participation, if as few as 4.1 percent of households misreport their food insecurity status, the positive relationship between food insecurity and food stamp participation is no longer identified.

**Contact:**

Craig Gundersen  
Department of Human Development and Family Studies  
Iowa State University  
74 LeBaron Hall  
Ames, IA 50011  
Phone: 515-294-6319  
Email: [cggunder@iastate.edu](mailto:cggunder@iastate.edu)

Grant awarded by the Institute for Research on Poverty,  
University of Wisconsin-Madison

---

Misreporting rates of under 13 percent may be sufficient to prevent identification of the positive relationship between food insecurity and food stamp participation.

---

## ***A Comparison of Food Insecurity Levels and Weight Status Among Rural- and Urban-Residing Latino/Hispanics in North Carolina***

Lauren Haldeman, University of North Carolina at Greensboro

The high prevalence of food insecurity and overweight/obesity among low-income, Latino/Hispanic households has serious implications for the health and welfare of the members of these households. Indisputable evidence indicates that proper nutrition is essential to normal development of children and that it serves as a protective factor in reducing susceptibility to illness and disease. Consequently, determining ways to avoid food insecurity and overweight/obesity is an important priority.

The problems of food insecurity and overweight/obesity are likely to manifest differently as a consequence of the availability of support systems and density of population groups. Latino/Hispanic immigrants living in rural areas likely face additional barriers that their counterparts do not face living in urban areas. Urban areas are more likely to have more services available to low-income residents of any ethnicity and consequently offer more resources to food-insecure families than those living in less populated and less service-dense areas.

The Latino/Hispanic population is particularly vulnerable as they have disproportionately high rates of obesity and diet-related chronic diseases compared with Caucasians and African Americans. Being overweight or obese is associated with most chronic diseases, such as diabetes, cardiovascular disease, hypertension, coronary heart disease, and cancer. Living in a rural area only compounds these issues as availability and accessibility of necessary resources are limited.

Given its potential impacts on health and well-being, understanding the determinants of food insecurity and weight status is essential. Little has been done to assess the food security levels of the increasing rural Latino/Hispanic population. This issue is of particular importance as this group, compared with non-Hispanic Whites, is at the greatest risk for poverty, poor dietary intake, and the development of diet-related chronic diseases, such as obesity.

The objectives of this study were as follows:

- Assess the level and contributors to food insecurity and weight status in a rural Latino community.
- Compare food insecurity and weight determinants among rural and urban Latino populations.
- Identify barriers to food acquisition and strategies used by Latino/Hispanic families to manage limited food resources.

A convenience sample (n=126) of rural-residing, low-income Latino/Hispanics adults were recruited and interviewed by two bilingual, bicultural interviewers. A translated and face-validated survey examining socioeconomic status and demographics; nutrition knowledge, attitudes, behaviors, and beliefs; food security; strategies for managing food; food group consumption; acculturation; food assistance program participation; and anthropometrics was used for data collection. Rural data were then compared with data collected previously on an urban sample (n=166). Based on information derived from

---

The Latino/Hispanic population has extremely high rates of obesity and diabetes and increased chances of dying from certain cancers and heart disease.

---

the survey questionnaire, a qualitative component involving a semi-structured interview was conducted with a subsample of the rural respondents. Interviews focused on identifying barriers to food acquisition and strategies used by families to manage limited food resources.

Rural Latinos were primarily low-income, low-educated, Mexican women that spoke Spanish only. Respondents had been in the United States on average for 9 years. Over three-quarters of the participants reported some level of food insecurity with one-quarter reporting current food stamp participation. The majority of respondents (greater than 80 percent) were overweight or obese with a mean body mass index (BMI) of 29.1 kilograms/meter<sup>2</sup>.

Both rural and urban participants were similar in demographic characteristics. However, some distinct differences were noted with regard to key variables in this study. Compared with their urban counterparts, rural Latinos were significantly more likely to have been receiving food stamps at the time of the interview, to report food insecurity, and to be classified as overweight. Although rural respondents had been living in the United States significantly longer than urban respondents (9 years versus 4.5 years, respectively), this was associated only with current food stamp use among the urban respondents. Respondents living in the United States longer were more likely to be currently receiving food stamps. Rural respondents were also more likely than urban respondents to report that eating healthy was difficult and to have a lower self-efficacy with regard to selecting healthy snacks for their children.

Logistic regression revealed that determinants of food insecurity and weight status differed between groups. For rural respondents, difficulty eating healthy was a determinant of both food insecurity and overweight/obesity. However, this was not the case for the urban sample. Food insecurity, older age, and weight gain since arriving in the United States were determinants of overweight/obesity among urban respondents.

Findings from this study indicate that rural-residing Latinos are more vulnerable than urban Latinos to food insecurity and overweight, which may be partly caused by rural Latinos having more difficulty in eating healthy and reporting less confidence in their ability to choose healthy snacks. High levels of food insecurity and overweight/obesity, however, exist among both rural and urban Latinos. Not addressed in the survey was the availability of alternative food assistance options and opportunities for nutrition education that may help explain the difficulties that rural Latinos are experiencing with regard to healthy eating. Qualitative interviews may help elucidate reasons for this increased vulnerability by identifying strategies used by rural Latinos to meet food needs.

**Contact:**

Lauren Haldeman  
University of North Carolina at Greensboro  
Department of Nutrition  
P.O. Box 26170  
Greensboro, NC 27402-6170  
Phone: 336-256-0311  
Email: [lahaldem@uncg.edu](mailto:lahaldem@uncg.edu)

Grant awarded by the Southern Rural Development Center,  
Mississippi State University

---

Latinos in rural areas  
are more vulnerable to  
food insecurity and  
overweight than their  
urban counterparts.

---

## ***Income Volatility and Food Insufficiency in U.S. Low-Income Households, 1992-2003***

Neil Bania, University of Oregon, and Laura Leete, Willamette University

This study examines changes in monthly income volatility in low-income U.S. households since the early 1990s, as well as the relationship between income volatility and food insufficiency. Understanding the role of income volatility in determining food insufficiency is especially important in light of policy changes in the last decade, which may have contributed to changes in both factors or to changes in the relationship between them for low-income, welfare, or food stamp-eligible populations.

In the mid-1990s, State and Federal welfare reforms limited cash assistance as an entitlement, increased the work requirements for recipients of cash assistance, eliminated food stamp eligibility for some populations, and limited food stamp benefit levels for others (among other things). For many households, relatively stable income from Aid to Families with Dependent Children (AFDC)/Temporary Assistance for Needy Families (TANF) payments (and in-kind food stamp benefits) was replaced by potentially less stable earnings from employment. If hours of work per week or employment spell lengths were to vary, then income would have become more variable for these families following the implementation of welfare reform. Because mean income levels and material well-being of welfare leavers and recipients have increased little since welfare reform, there is little reason to expect that this population has either accumulated savings or has sufficiently high incomes to be able to weather this variability without consequence. However, the extensive literature that examines post-reform outcomes for welfare recipients and leavers appears to include little study to date of the potential role of income variability. Similarly, while there has been considerable investigation into the determinants of food insufficiency, few authors have considered income variability as a contributing factor.

This study employs data from the 1991, 1992, and 2001 panels of the Survey of Income and Program Participation (SIPP) to construct data on household income, food insufficiency, and characteristics spanning two 12-month periods in 1991-92 and 2002-03. The sample is limited to households with two or more people, nonelderly (ages 18-59) household heads, and income levels up to 300 percent of the poverty line. Monthly income volatility for a household is measured as the coefficient of variation in that household's total income over a 12-month period. Monthly income shocks are measured as deviations in any given month from the 12-month average income. A variety of descriptive statistics are used to examine differences over the two periods for low-income households overall and for a variety of subsamples. Logistic regression is used to model the probability of food insufficiency as a function of average annual income and monthly income deviations, as well as a wide range of controls for other household characteristics.

The findings show the greatest increases in income volatility in households with incomes below the poverty line, households in deep poverty (below 50 percent of the poverty line), and households "at-risk" of receiving welfare (households headed by single parents without a high school diploma). Decomposing income volatility reveals that these increases have their roots in the shift of household income away from relatively stable

---

Welfare reforms are likely to have increased the volatility of income in the low-income population.

---

---

Monthly income volatility is highest for lower income households and increased substantially between 1992 and 2003.

---

public assistance (AFDC/TANF) benefits toward earnings. The study shows that volatility is smoothed considerably by receiving food assistance benefits (food stamps and/or the Special Supplemental Nutrition Program for Woman, Infants, and Children), which narrows the income volatility gap between lower and relatively higher income households. Nevertheless, the inclusion of food assistance benefits does not eliminate the large increases in income volatility otherwise observed over the period.

Logistic regression models explaining food insufficiency show that both the level of income and monthly income shocks affect the predicted probability of food insufficiency. The results are consistent with theoretical models in which low-income households face either liquidity constraints or binding constraints in spending associated with contractual nonfood expenditures. Finally, the study finds some evidence to suggest that the probability of higher income households suffering food insufficiency is not related to income volatility; this is consistent with these households not facing liquidity constraints. Despite the clear rise in income volatility over time and the dependence of food insufficiency on income shocks, there has been little trend in the rate of food insufficiency in this sample over the same period.

**Contact:**

Neil Bania  
Department of Planning, Public Policy and Management  
1209 University of Oregon  
Eugene, OR 97403-1209  
Phone: 541-346-3704  
Fax: 541-346-2040  
E-mail: [bania@uoregon.edu](mailto:bania@uoregon.edu)

Grant awarded by the Institute for Research on Poverty,  
University of Wisconsin-Madison

## ***Food Insecurity in Poor, Female-Headed Families in Five of Alabama's Black Belt Counties***

Andrew A. Zekeri, Tuskegee University

Although we live in a wealthy Nation, food insecurity—that is, when individuals and families have limited access to food or their ability to obtain food is limited or uncertain due to lack of financial resources—continues to affect millions of American families. According to the most recent data released in 2005 by USDA, food insecurity affected 11.9 percent of U.S households in 2004.

Analyses of national survey data by researchers of USDA's Economic Research Service also documented racial and regional differences in the likelihood of food insecurity and hunger among households. African-American and Hispanic households are more likely than White households to be food insecure and hungry, and rural African-Americans are an especially vulnerable group. Further, households at higher risk of being unable to secure adequate amounts of food because of financial constraints are generally headed by single women, particularly African-American women.

Although analyses at the national level have produced new insights into some aspects of the prevalence of food insecurity and hunger, the adverse health impact of food insecurity is not well described. Little systematic information exists that delineates the harmful health consequences of food insecurity as measured with the USDA 18-item Core Food Security Module (CFSM). The limited information available suggests that children from food-insufficient and hungry homes have poorer overall health than children from food-secure households. Furthermore, children who live in food-insufficient households are more likely to have poorer mental health and be withdrawn or socially disruptive. Some studies have examined the impact of food insufficiency as measured by a scale derived from National Health and Nutrition Examination Survey III on health status among adults in urban areas. In these studies, poor or fair self-rated health status and depression are associated with food insufficiency. However, reports of the relationship between household food insecurity and health status in rural areas are limited. Despite its potential impact on health and well-being, surprisingly little research has been done on the relationship between household food insecurity as measured by the CFSM and the physical and mental health among poor female-headed families in the rural South. Therefore, the purpose of this study is to determine the prevalence of food insecurity and describe the association of food insecurity with health status and depression.

The sample for this study, 300 female-headed families who were receiving welfare and/or food stamp benefits, was drawn from a list of families in five counties that participated in previous studies. Subjects were selected using random stratified sampling methodology. Participants in previous studies were low-income individuals living in neighborhoods characterized by high rates of poverty or welfare receipt. The location of single mothers was reestablished through contacts with community informants, contact at

---

African-American female-headed households are more likely to experience food insecurity than other groups.

---

previous addresses, and local churches. Face-to-face, in-home, structured interviews were conducted from June 2005 to September 2006. The interviews lasted about 90 minutes. Prevalence of food insecurity and self-reported health status were measured using a structured questionnaire based on the CFSM and other questionnaires constructed and previously used that were approved by the Human Subject Participants Review Committee, Tuskegee University. Depression was measured using the Center for Epidemiological Studies Depression Scale. Descriptive statistics and multivariate analyses (multiple regression) were used in data analyses.

The study found that about 36 percent of the single mothers were food insecure. That is, at some time between 2004 and 2005, these low-income single women had difficulty providing enough food for their children due to lack of resources. The prevalence of food insecurity in the study region was about three times the average for the Nation (11.9 percent) and for the State of Alabama (12.2 percent) between 2002 and 2004.

Consistent with some previous research, the study also found that the association between food insecurity and depression is statistically significant. Single mothers that are food insecure report significantly higher levels of depression. Food insecurity explains about 10 percent of the variation in depression. Health status follows a similar pattern. Food insecurity is statistically associated with self-reported health status in this sample. Single mothers who are food insecure are significantly more likely to report poor or fair health than those who are food secure.

The multiple regression analyses, controlling for background and sociodemographic factors, indicated that, among the predictor variables, food insecurity is still a statistically significant predictor of depression and self-reported health. Food insecurity is by far the strongest predictor of depression among these low-income single mothers in rural Alabama. In accordance with earlier studies, single mothers with less education and who were unemployed at the time of the interview reported significantly higher levels of depression.

Taken together, this set of analyses provides support for the hypothesis that food insecurity is associated with depression and self-reported health status even when sociodemographic variables are controlled. The results of the study suggest that, using the USDA food security scale, more than a third of low-income single mothers from rural Alabama are food insecure.

Overall, the findings of the study are consistent with growing evidence that food insufficiency is associated with depression and self-reported health status. The only difference is that, while this study used the CFSM to measure food insecurity, a majority of the previous studies used a single-item measure of food insufficiency. The study suggests to program administrators and policymakers that preventive measures to decrease food insecurity among low-income single mothers may lower the risk of major depression. Finally, the study recommends that further research is needed. The cross-sectional nature of the study, limitations of

---

Food insecurity among single mothers in the five Alabama counties well exceeded State and national averages.

---

measurements, and self-reported data must be considered when interpreting the results of the analyses.

**Contact:**

Andrew A. Zekeri

Department of Psychology and Sociology

Tuskegee University

Tuskegee, AL 36088

Phone: 334-727-8006

E-mail: [zekeri@tuskegee.edu](mailto:zekeri@tuskegee.edu)

Grant awarded by the Southern Rural Development Center,  
Mississippi State University

## Community-Based Studies

### ***Native Plants and Nutrition***

Mari King and Wilbert Fish, Blackfeet Community College

Ancestral Native North American people maintained a healthy immune system and strong physical structure until a very old age. This study identifies the foods that sustained ancestral members of the Blackfeet Nation of northern Montana, one of several Great Plains Cultural Area Indian Tribes. Wild plant food nutrition and the manner in which the Blackfeet people perceive food and nutrition from a cultural perspective were also investigated.

A team of researchers from Blackfeet Community College conducted the study on the Blackfeet Native American Reservation, Browning, MT, from July 2005 to September 2006. Research methods included interviews of individuals and institutions in the community, as well as a survey of literature found in libraries and Internet resources. Historical information (pre-contact by Europeans) on the health and traditional diet of the Blackfeet were obtained along with plant identification of cultural foods.

Fifty-eight plant foods, roots, stems, leafy greens, and berries were identified as sources of vitamins and minerals that made the Blackfeet a strong race of hunter-gatherers. The hunter-gatherer history of the Blackfeet exemplifies the progression of diet and nutritional changes and the resulting health concerns affecting Native Americans today. Studies indicate that, since the beginning of the introduction of modern, processed foods, along with other assimilative measures promulgated over time, Native Americans, such as the Blackfeet people, are at risk for greater food-related illnesses and death.

#### **Contact:**

Marietta King  
Blackfeet Community College  
P.O. Box 101  
East Glacier Park, MT 59434  
Phone: 406-226-4635  
E-mail: [mariking@3rivers.net](mailto:mariking@3rivers.net)

Grant awarded by the American Indian Studies Program,  
The University of Arizona

**Meeting the 2005 Dietary Guidelines for Americans: A “Daunting Challenge” for Food Stamp Recipients in Southeast Louisiana**

Carol E. O’Neil and Jeffery Gillespie, Louisiana State University

In general, low-income women have diets that compromise their health. Low levels of food intake coupled with poor food choices, specifically in low food security groups, increase the likelihood of vitamin and mineral deficiencies. Low-income females are more likely than middle- or high-income females to be overweight/obese and to report having poorer overall health or a chronic disease. Participation in the Food Stamp Program (FSP) adds an additional level of complexity to the link between diet and food insecurity. Food cost is a major barrier to eating healthy meals in this population; it is not known whether low-income individuals have adequate resources to meet the food recommendations of 2005 Dietary Guidelines for Americans (DGA).

A market basket of 149 menu items was priced at 29 food stores in eight parishes (counties) in southeast Louisiana over a 2-week period. Using these foods, a 2-week cycle menu with recipes was planned that met the food recommendations for the 2005 DGA for a reference family of four (male, female, and two children). Nutrient content was assessed using Nutritionist Pro. It was also determined whether low-income individuals could afford to buy and could find foods for the menus from Pennsylvania State University (Penn State menus) published with the Thrifty Food Plan. Lastly, the cost of both of these healthy low-cost menus was compared with the cost of food that low-income women in the State are actually eating.

The cycle menus that were designed had some preparation required, relied on canned fruits and vegetables, and consisted of mostly nutrient-dense foods. Incorporating variety into the meals while keeping costs low was a major problem. Although menus met the food recommendations, they were low in potassium, linolenic and alpha-linolenic acid, and vitamin E but high in sodium and phosphorus. At the time of the study, the maximum FSP benefit for a family of four was \$471 per month and the average benefit was \$326 per month. The mean cost of the 2-week menus was \$615.89 (\$5.09 per person), \$144.89 higher than the maximum and \$289.89 higher than the average FSP benefit, suggesting that the cost of the meals exceeds benefits. Whether low-income families will accept these menus and recipes remains to be determined. Although foods commonly eaten in this region were originally intended to be incorporated into the menus, the foods eaten by the women were of such low nutritional quality and the 2005 DGA recommendations so stringent, doing so was not always possible. For example, 3 cups of low-fat dairy is recommended for each family member, but previous studies have shown that low-income women consume much less than one serving per day. Fruits and vegetables showed similar intakes and dietary shortfalls when compared with the DGA.

The total cost of the Penn State menus was \$117.01 ± \$11.79 (mean ± standard deviation) for week one and \$112.19 ± \$11.44 for week two. These average costs were 54 percent and 47 percent more than the average food stamp benefits received, respectively. However, note that these menus do not meet the food recommendations of the 2005 DGA. Only 7 of the 29 stores (24 percent) carried all 86 items. The menu items most frequently missing were pearl barley, garbanzo beans, and ground pork. There were no differences in

---

Cost of menus that meet the food recommendations of the 2005 Dietary Guidelines for Americans exceed food stamp benefits.

---

the costs of food from stores in high- or low-income areas or in areas with a higher percentage of people in poverty. Data suggest that the menus are, on average, not accessible to people receiving the average food stamp benefits.

Lastly, food group intake, energy/nutrient intake, and diet cost were assessed in 64 female FSP recipients in southeast Louisiana. From one 24-hour dietary recall collected at the beginning of the monthly resource cycle (Day 1) and one at the end (Day 2), nutrient intakes and diet costs were determined for both days of the resource cycle. Data were analyzed as a whole population, by food security status, and by fast food intake. Overall, intake was very poor, failed to meet recommendations for whole grain, fruits, vegetables, and dairy, and exceeded the recommendations for discretionary calories. Nutrition education, needed to plan healthy meals on a restricted income, was lacking. Overall, mean costs were lower than the healthy menus \$4.94 (Day 1) and \$4.08 (Day 2) ( $p=0.038$ ). Food security status did not change the amount of money spent on food. Individuals consuming fast food spent significantly more money (\$8.81) than those not consuming fast food (\$4.72) on Day 1 and \$7.14 and \$3.44 for Days 1 and 2, respectively. These data suggest that FSP-reliant women spend a considerable amount of money on food that is nutritionally poor and that, with appropriate nutrition education, they could improve the quality of their diets. However, with the monies that most are currently spending, they cannot meet the 2005 DGA.

**Contact:**

Carol E. O'Neil  
Director, Didactic Program in Dietetics  
261 Knapp Hall  
Louisiana State University AgCenter  
Baton Rouge, LA 70803  
Phone: 225-578-1631  
Email: [coneill@lsu.edu](mailto:coneill@lsu.edu)

Grant awarded by the Southern Rural Development Center, Mississippi State University

---

Lack of money, food stamps, and nutrition education are among the barriers that low-income individuals face in meeting the 2005 dietary guidelines.

---

***Small-Scale Backyard Integrated Aquamethaponics Food Production System and Training Program for Native Hawaiian Working Families in Hawaii***

Aecio D`Silva, The University of Arizona, and Robert Howerton, University of Hawaii

Native Hawaiians have the highest health statistics in Hawaii for morbid obesity, depression and other mental illnesses, high blood pressure, diabetes, respiratory illnesses, heart disease, and cancer mortality compared with other ethnic groups. A contributing factor to these health problems was the adoption of westernized lifestyles that introduced dietary items that replaced the traditional Native Hawaiian diet of predominantly fish, taro, fruits, and vegetables.

In the latter half of the 20th century, institutional efforts, including the Native Hawaiian Health Care Improvement Act, the Native Hawaiian Health Care System of 1988, and the Native Hawaiian Health Scholarship Program of 1992, were initiated to improve the social and health situation of Native Hawaiians. The mission of the Native Hawaiian Health Care Program is to improve the health status of Native Hawaiians by advocating, initiating, and maintaining culturally appropriate actions aimed at improving the physical, mental, and spiritual health of Native Hawaiians.

Hawaii has one of the highest costs of living in the United States. A significant amount of expenses for a household in Hawaii are food purchases. Moreover, a substantial number of working families of ethnic origin in Hawaii, including a majority of Native Hawaiians, live close to or under the poverty level.

The purpose of this project was to recruit five Native Hawaiian families and train them in producing food, including fish and vegetables in small-scale aquamethaponics systems (called Systems Aquamethaponici of Recirculation, or SAAR). These low-cost integrated aquaculture-agriculture systems can be constructed in backyards and supplement healthful foods that may be too expensive to purchase in quantities for low-income families. The food items produced by this system, principally fresh fish and vegetables, were the traditional dietary components of Native Hawaiians. The hypothesis of this project is that, by making access to these foods easier and more affordable, participants may return to a more healthful lifestyle.

Four families were selected for the project by advertising for participants in local working-class communities and newsletters and by word of mouth. Initially, four families and a nonprofit organization, the Paia Learning Center (PLC), were chosen for participation in the aquamethaponics project. The PLC was chosen because of its mission to work with “at-risk” families and teenagers and to teach vocational-technical skills. The PLC verbally committed to the project for a minimum of 3 years and also agreed to help at least one family develop another system. The families selected built five aquamethaponics systems. All families were trained in a week-long “hands-on” workshop.

All family systems are operational. Results show that the families have harvested over 250 pounds of lettuce and tomatoes, as well as green onions, cilantro, and basil. Families also use organic biofertilizer to irrigate terrestrial plants and fruit trees adjacent to the aquamethaponics system. The total fish

---

Native Hawaiian health care programs encourage a return to traditional diets that include fish and taro.

---

---

A small-scale family food production system could reduce household expenses and increase nutritional input for poor working families.

---

production was approximately 120 pounds. All fish and vegetable production went directly to family consumption, indicating that aquamethaponics systems could help native Hawaiians return to a more healthful lifestyle.

Work continues at the Paia Learning Center on two classrooms. After completion in 2007, the classrooms will be used for a regular series of aquaculture and integrated agriculture-aquaculture workshops. These classrooms will facilitate the expansion of the backyard SAAR program and provide a facility in which resources may be consolidated.

In support of the PLC and its aquaculture program, a number of Hawaii-based nonprofit charitable foundations have been solicited for funds to expand the backyard SAAR project. Anticipated funds from these foundations will double the number of SAAR systems in production by the end of 2007.

The agriculture coordinator from the Maui County Office of Economic Development (MCOED) toured a number of the systems. Based on a favorable impression of the production of vegetables, fish, and herbs, a proposal was submitted to MCOED and funds subsequently awarded to expand the program with five additional systems. Families have been selected and materials and supplies purchased to install the systems in 2007. One of these systems will be set up at Maui Community College to expand educational capacity with the aquaculture classes.

An additional system also has been completed recently at Kamehameha School. The high school aquascience class has begun to use the system for educational purposes and will continue to do so throughout the school year.

**Contact:**

Aecio D’Silva  
The University of Arizona  
104 BioEast  
Tucson, AZ 85721  
Phone: 520-621-1959  
E-mail: [ams@arizona.edu](mailto:ams@arizona.edu)

Grant awarded by the American Indian Studies Program,  
The University of Arizona

---

Initial results of the  
aquaculture program have  
spurred expanded interest.

---

## WIC and Child Nutrition

### *Intra-Household Allocation and Consumption of WIC-Approved Foods*

Ariun Ishdorj, Helen H. Jensen, and Justin Tobias,  
Iowa State University

The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) is one of USDA's major food assistance programs, with benefits targeted to the needs of qualifying women, infants, and young children in the household. Vouchers provide for specific amount and types of foods designed to enhance the intake of key nutrients needed by the targeted individuals. Reallocation of program benefits in response to a program targeted toward individuals would lead to smaller than expected gains to the recipient of the transfer and larger than expected intake by nontargeted individuals in the program household.

The overall goal of this study is to carefully examine intake of program-determined foods by household members so to better understand targeting of food benefits and spillover of WIC program effects within the household. In order to clearly identify the effect of the food program, it is important to account for endogenous program participation—that is, an eligible household's choice to participate in the program. The specific application is to household allocation of WIC-approved foods and uses dairy products as the example food.

The empirical analysis used data from the USDA Continuing Survey of Food Intake by Individuals (CSFII) 1994-96. These data allowed tracking food consumption of targeted WIC recipients and other members of the same household. All individuals who lived in households that had income less than or equal to 200 percent of the poverty income level and that included at least one member of a WIC-targeted group (pregnant, lactating, or postpartum women and children ages 1-4) were included in the analyses. The threshold of 200 percent of the poverty income level was selected to account for some variability in income that increases the likelihood that a household may become income eligible. Infants were not included in the analysis. This selection process led to an analytical data set that included 1,018 program-eligible households with 2,421 individuals.

All individuals in the selected households were assigned to one of the four mutually exclusive groups: targeted individuals in WIC households, nontargeted individuals in the same households, targeted individuals in non-WIC households, and nontargeted individuals in non-WIC households. The WIC-targeted group included children ages 1-4 and pregnant, lactating, or postpartum women; the nontargeted group included other adults and children ages 5 and older. Households in the sample were identified as WIC eligible by meeting the income criterion and having at least one targeted individual living with them. Although several foods are included in the program packages, only intake of milk and cheese, measured in calcium-equivalence, was used here. The dairy products were widely consumed and represent a significant share of the foods provided in the WIC package for children and women.

---

Although WIC vouchers are issued to an individual, once acquired, the food items are available to share in the household.

---

The estimation model accounted for the household's decision to participate in the WIC program, included as a probit equation, and the calcium intake of the individuals in the household, included as a Tobit equation. The system with the two equations was estimated jointly using Bayesian methods. Demographic variables for age, gender, race/ethnicity, education level, and other variables useful in determining the WIC participation decision, such as household size and income, were also included. The estimation resulted in predicted intake values for calcium conditioned on being in one of the four assigned groups based on program participation and target group status. The predicted values allowed comparison between intake of individuals in the four groups and assessment of likely redistribution of program foods.

Large households, households with infants, those that participate in the Food Stamp Program, and those in the South were more likely to participate in the WIC program. Preliminary results of the joint estimation for consumption of calcium from dairy products show that targeted individuals in WIC households consumed higher amounts of calcium from dairy products than did individuals in the other three groups. This outcome supports the objective of the WIC program to increase intake of targeted foods. Another finding was that the consumption of dairy foods by nontargeted individuals in WIC households was no greater than the consumption of similar nontargeted individuals in non-WIC households. Hence, the study found no evidence that the WIC program improved the intakes of the nontargeted WIC household members.

The WIC program is designed to improve diets of participating individuals in order to assure better health. The preliminary evidence suggests that, during the study period (1994-96), program participants did have greater intakes of dairy foods. In addition, there may have been program-induced effects for others in the household. These effects might have come from reallocation of program-provided foods within the household, from the indirect effect of providing increased resources to the household that resulted in changes in foods consumed by all members of the household, or from changes in diets due to nutrition education. In the case of dairy products, the study found no evidence that program benefits were reallocated or that they enhanced calcium intake of individuals not targeted by the program. Further examination of the case of dairy products and of different foods will help to clarify the source and types of intrahousehold allocation of other program benefits.

**Contact:**

Helen H. Jensen  
Iowa State University  
578 Heady Hall  
Ames, IA 50011-1070  
Phone: 515-294-6253  
E-mail: [hhjensen@iastate.edu](mailto:hhjensen@iastate.edu)

Grant awarded by the Department of Nutrition at the University of California, Davis

---

Several factors play a role in determining household participation in WIC.

---

## **Association Between Prenatal WIC Exposure and Maternal Behavior, Health, and Birth Outcomes: Evidence From the Pregnancy Nutrition Surveillance System**

Ted Joyce and Cristina Yunzal, Baruch College, City University of New York

Although many public health analysts have found the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) to be strongly protective against pre-term birth, the clinical literature provides little support for such an association. One limitation is that most evaluations of WIC have focused almost exclusively on birth outcomes. And yet, if the association between WIC and enhanced infant health is truly causal, then participation should also be associated with indicators of maternal behavior that affect intrauterine growth and improve maternal health. Remarkably few attempts have been made to offer such corroborating evidence.

This study tested whether early and sustained participation in WIC during pregnancy results in less maternal smoking, greater weight gain, more breastfeeding, and healthier infants among women on WIC in North Carolina between 1996 and 2003.

The study used data from the Pregnancy Nutrition Surveillance System (PNSS) in North Carolina and New Jersey. The PNSS file in North Carolina had been further linked to birth certificates. North Carolina proved to be richer and to have fewer missing values than the PNSS data from New Jersey. Thus, the primary results focused on North Carolina. The data provided over 400,000 observations on WIC participants in North Carolina between 1996 and 2003 and 140,000 in New Jersey between 1999 and 2003.

The analysis began by replicating the frequently reported finding that prenatal WIC participation strongly protects against pre-term birth. However, if WIC protects against adverse birth outcomes, then greater exposure to WIC should be associated with greater improvement in birth outcomes. As a test, the study compared the outcomes of women who enrolled in WIC in the first, second, and third trimester of pregnancy with women who enrolled postpartum. Postpartum enrollees were a potentially credible comparison group for prenatal participants. First, they are clearly eligible for WIC, and second, any stigma associated with publicly funded welfare programs was not sufficient enough to prevent participation. The study was also able to stratify the analyses by race and ethnicity. In addition, samples were sufficiently large to allow analysis of subsets of women in an effort to lessen heterogeneity among participants. Specifically, the study examined outcomes among women all of whom registered for prenatal care in the first trimester and who had no previous live births.

Despite these attempts to limit potential selection bias, one can never be sure that estimates are free of such contamination. Thus, the study used falsification exercises to uncover potential selection bias. For instance, the North Carolina PNSS asks women if they quit smoking before their first prenatal care visit. These women are referred to as spontaneous quitters. The study regressed spontaneous quitting on the timing of WIC enrollment among women who had a first birth and who initiated prenatal care in the first trimester. There should be no association between the cessation of smoking and the timing of WIC enrollment because quitting precedes

---

The study questions whether increased exposure to WIC is associated with greater improvement in birth outcomes.

---

enrollment. Should the study find, for example, that women who enroll in WIC early were more likely to “spontaneously quit,” such a finding would suggest that early enrollees are more health-conscious and more motivated than women who enroll later.

The study was able to replicate the frequently reported finding that prenatal WIC participation protects against pre-term birth. However, when examining the association between WIC participation and pre-term birth by trimester of WIC enrollment, the study found that the association between prenatal WIC participation and lower rates of pre-term birth was driven primarily by women who enrolled in WIC in the third trimester. These were counterintuitive findings. The results pointed to fetal selection rather than strong treatment effects associated with WIC. As additional evidence, the study found no association between greater exposure to WIC and reduced smoking during pregnancy. In addition, women who enrolled in WIC in the first trimester were not more likely to breastfeed than women who enrolled postpartum. If WIC were to strongly protect against pre-term birth, then the study would have expected WIC to have a substantial effect on maternal behaviors, such as smoking and breastfeeding.

The results of the study should not come as a surprise. After decades of clinical trials aimed at preventing pre-term birth, few interventions have proven effective. It is unlikely, therefore, that a modest nutritional supplementation program could achieve what well-designed trials have not. The study concluded that a focus on birth outcomes is misguided. It recommends that the success of WIC be evaluated on how effectively programs achieve changes in maternal health and behavior that have well-established links to health over the lifetime of participants and their offspring. Obvious targets would be smoking cessation, breastfeeding, and obesity prevention.

**Contact:**

Ted Joyce  
Department of Economics and Finance  
Baruch College, City University of New York  
Box 10-225  
One Bernard Baruch Way  
New York, NY 10010  
Phone: 212-802-5962  
E-mail: [ted\\_joyce@baruch.cuny.edu](mailto:ted_joyce@baruch.cuny.edu)

Grant awarded by the Institute for Research on Poverty,  
University of Wisconsin-Madison

---

Findings represent a challenge to those who contend that WIC has a meaningful impact on birth outcomes.

---

## **Feeding Practices of Childcare Staff in CACFP-Funded Centers**

Madeleine Sigman-Grant, Elizabeth Christainsen, and George Fernandez, University of Nevada

As one of USDA's food assistance entitlement programs, the Child and Adult Care Food Program (CACFP) provides nutritious meals and snacks to 2.9 million low-income American children by reimbursing eligible childcare providers. CACFP also has suggested written feeding guideline policies to foster a supportive feeding environment, including allowing children to serve themselves. These guidelines are congruent with recommendations to prevent childhood overweight. Moreover, they support the concept of the division of responsibility between parents and children in feeding. This concept assumes that adults are responsible for selecting, preparing, and offering healthful foods and for determining when and where meals and snacks are served. Children, on the other hand, are responsible for how much they eat or whether they eat at all—that is, they control their own food intake.

Thus, in addition to being a partner in combating childhood hunger, CACFP can play a significant role in establishing healthy eating habits, promoting self-regulation of food intake, and supporting self-sufficiency. Moreover, because low-income households are at high risk for obesity, CACFP-funded centers can play a role in modulating childhood overweight.

While some information exists regarding food selection in CACFP-funded centers, little is known about the feeding environment in these centers. The study also explores issues facing CACFP-funded centers that encounter very hungry children and answers the following questions:

- Do centers that serve low-income children receive CACFP funding?
- Do staff members in centers that receive CACFP funds and training report providing more opportunities that support the promotion of healthy eating and feeding behaviors espoused to prevent childhood obesity in young children than staff in centers not receiving CACFP funding?
- What challenges do CACFP-funded centers face in response to feeding children coming into centers who exhibit signs of extreme hunger?

The first two questions were answered using quantitative data gathered from responses to a previously conducted survey, About Feeding Children (AFC). A stratified (by census density and State) random sampling method was used to identify 1,600 centers within California, Colorado, Idaho, and Nevada (400 from each State) to receive mailed questionnaires. Responses were received from 574 centers (470 directors and 1,210 staff). Interview data from 49 AFC staff as well as from 11 experts knowledgeable in CACFP were used to qualitatively explore the last question.

Of centers responding to the AFC survey, 61 percent reported serving low-income families. Of these, 125 centers served meals and snacks, with significantly more receiving CACFP funding (66 versus 34 percent,  $p < 0.01$ ). Center location stratification revealed that some centers in the poorest communities (that is, the first quartile) do not participate in CACFP (24

---

This unique study compares reported implementation of feeding policies in childcare centers that receive CACFP funding to nonfunded centers that serve low-income children.

---

percent with poverty rates ranging from 14.5 to 39.6 percent and 35 percent with median incomes ranging from \$20,129 to \$33,193). One could speculate that, if eligible centers are aware of the program, they may not choose to enroll due to the arduous application process and/or the cumbersome record keeping required.

A pattern emerged for very hungry children entering CACFP-funded childcare. Both providers and experts stated that some children do not receive sufficient food or food of healthful nutritional quality over the weekend. Thus, early in the week (especially Mondays), some children enter centers in an apparent state of extreme hunger. Although this study could not determine if these children lived in food-insecure households, the children displayed behaviors that reflected such a situation by acting out, being irritable, lacking concentration, and expressing an overwhelming desire to eat. Staff and experts reported that these children needed and wanted more than the one serving of food for which the center is reimbursed, resulting in unmet hunger. In some centers, these children remained hungry until the next eating occasion, as second helpings were not prepared. Other centers met the increased hunger by maintaining a stock of food provided by food banks or purchased without CACFP reimbursement.

In general, CACFP-funded centers were more likely than unfunded centers to report practices consistent with feeding guidance and with an overall environment purported to support self-regulation of food intake in children. CACFP-funded staff allowed children more involvement in determining what to eat, the order in which to eat, and how much to eat. Interestingly, staff in both funded and nonfunded centers did not believe that teaching children how to serve themselves food (52 percent) was extremely important compared with teaching social skills (75 percent), conversational skills (72 percent), table manners (76 percent), or motor skills (using spoons and cups, 72 percent). This belief is reflected in the frequency of teaching certain skills: 42 percent always taught children how to serve foods compared with always teaching social skills (75 percent), conversation skills (79 percent), motor skills (83 percent), and table manners (84 percent). However, requiring self-service may not work for all CACFP-funded centers, even Head Start Centers, because some centers receive foods pre-plated.

In summary, this study suggested several strategies that CACFP could implement in response to both child hunger and overweight. For centers that serve extremely hungry children, CACFP needs to reconsider the reimbursement policy. For example, additional quantities of food could be prepared for Mondays and Tuesdays when children enter centers most hungry and on Fridays to accommodate weekends, when food is scarce. CACFP reimbursement policies also may not coincide with obesity research. Reimbursement allows for a specified amount of food per child. However, research suggests that children self-regulated their food intake. Implicit in this suggestion is that some children will eat less than the reimbursed serving size whereas others will need to eat more. In theory, for most centers, sufficient quantities of food would be available for all. In reality, this may not happen, especially in centers with very hungry children. Finally, CACFP could specify funds to be set aside to train all CACFP-funded staff, directors, and sponsors on the role CACFP can play in child

---

The quantity of CACFP foods provided may not fully satisfy the needs of some children early in the week.

---

overweight prevention and in setting up a supportive feeding environment. However, none of these strategies will help low-income children if eligible centers do not enroll in the CACFP program. Increased outreach efforts and reduced paperwork may entice centers, especially those in the poorest neighborhoods, to seek program benefits.

**Contact:**

Madeleine Sigman-Grant  
University of Nevada Cooperative Extension  
8050 South Maryland Parkway  
Las Vegas, NV 89123  
Phone: 702-257-5534  
E-mail: [sigman-grantm@unce.unr.edu](mailto:sigman-grantm@unce.unr.edu)

Grant awarded by the Department of Nutrition at the  
University of California, Davis

## Prices and the Food Environment

### ***The Impact of the Food Stamp Program on Transient and Chronic Poverty***

Bradford Mills and Elton Mykerezi, Virginia Tech

The United States has two relatively distinct types of poor; those consistently below the poverty line (chronically poor) and those temporarily exposed to poverty due to negative short-run economic shocks (transiently poor). The social-safety-net needs of transiently and chronically poor families are likely to differ significantly, particularly with respect to food assistance. If food assistance is primarily used as an expenditure-smoothing mechanism, it will reduce transient poverty. If, on the other hand, food assistance is mainly used to support long-term expenditure levels, it will reduce chronic poverty. Yet little is known about the role of food assistance in ameliorating these distinct types of hardship. This study examines the differential role of USDA's Food Stamp Program (FSP) on reducing household exposure to transient and chronic poverty.

The study uses Consumer Expenditure Survey (CEX) data from 1996 to 2004 to generate transient and chronic poverty measures from a short-term panel of quarterly family expenditures. In the application, transient poverty measures the component of poverty that stems from intra-annual (quarterly) variability in family expenditures over 1 year, while chronic poverty refers to the component of poverty associated with average expenditures below the poverty line over the same year. Specifically, a household is identified as chronically poor if expenditures averaged across the four survey quarters are below the U.S. poverty line. A family is defined as transiently poor if, on the other hand, expenditures in at least one quarter are below the poverty line but the family is not chronically poor. A severity-of-poverty measure is also employed in the study and is additively decomposed into its chronic and transient poverty components. Expenditures offer several advantages over income for measuring the dynamics of economic well-being in the short to medium run. More importantly, expenditures take into account the impacts of consumption smoothing as families use assets and credit markets to buffer shocks. Expenditures also appear to be less susceptible to systematic underreporting than income, particularly among poorer families.

The multivariate modeling effort focuses on identifying the determinants of the transient and chronic components of the severity of poverty. Most families have transient and chronic severity-of-poverty measures of zero, as well as zero FSP benefits over the previous year. FSP benefits and the severity-of-poverty measures are also likely to be jointly determined. Therefore, the severity of poverty and FSP participation is modeled as systems of censored equations. Due to changes in the way that FSP benefits are reported in the CEX, two different systems are estimated for each of the poverty measures. Under one specification, all data for years 1996-2004 are used, while alternative specifications use only data for years 2001-04.

The study shows that the incidence of exposure to a spell of transient poverty within a year is at least as great as the incidence of chronic poverty over the whole year. Further, the transient component accounts for approximately three-fourths of the total severity of poverty. Annual income-based poverty measures do not capture this important indicator of within-year economic hardship.

---

Descriptive statistics for transient and chronic poverty measures indicate that transient poverty accounts for a large share of the economic hardship that U.S. families face.

---

Estimates of transient and chronic poverty systems of equations indicate that the common determinants of transient and chronic poverty are low human capital, minority status, and geographic location. However, the FSP primarily impacts transient poverty. Thus, poor and near-poor families appear to use the FSP as a short-term expenditure-stabilization tool rather than for long-term expenditure support. The parameter estimates from the transient poverty system imply that a 1-percent increase in FSP benefits for the average family of FSP participants reduces the transient component of the severity of poverty by 3.9 percent.

An alternative expenditure measure is then developed that smoothes lumpy expenditures on homeownership and durable goods. Homeownership costs are replaced by the rental value of the property, and expenditures on durables are excluded from total expenditures. Adjusted expenditures are then normalized by the nondurable share of expenditures for families around the U.S. poverty line. As expected, the transient poverty component is much smaller, about a third of the total severity of poverty, under the alternative measure.

In terms of policy, the results suggest that a two-track FSP may be warranted. Given the primary impact of FSP benefits on transient poverty, fast-track eligibility and certification guidelines could enhance short-term program use and improve program effectiveness as an expenditure-smoothing mechanism for transiently poor families. Alternative guidelines and certification procedures to enhance the ability of the FSP to meet the needs of chronically poor families also need to be explored.

**Contact:**

Bradford F. Mills, Jr.  
Department of Agricultural and Applied Economics  
Virginia Tech University  
314 Hutcheson Hall  
Blacksburg, VA 24060  
Phone: 540-232-6461  
E-mail: [bfmills@vt.edu](mailto:bfmills@vt.edu)

Grant awarded by the Southern Rural Development Center,  
Mississippi State University

---

Poor families use food stamps to stabilize short-term expenditures.

---

## ***Is it Just Food? Geographic Differences in the Cost of Living***

Julie N. Zimmerman, Sunny (Seonok) Ham, and Sarah Michelle Frank,  
University of Kentucky

Two key features of food assistance programs' ability to meet local food needs are food access and cost. The familiar assumption is that it costs less to live in a rural area. However, research indicates that food prices can be higher in rural areas. Absent a national database containing rural prices, experiments to adjust the poverty threshold rely on housing costs to account for geographic differences in the cost of living. The resulting measures would lower poverty rates for rural areas and for the South. If housing cost differences do not accurately reflect all geographic differences in costs of living, adjustments to the current poverty threshold would disproportionately affect rural areas and the families living there, especially in the South.

This research examines the question: If a person made the same purchases in an urban and a rural area, would they encounter the same prices? Replicating the same methods used in a national study, local prices were collected from eight rural counties in Kentucky and compared with urban counties participating in the national project. As price data alone do not capture externalities, such as distance and availability, contextual data on these factors were also collected.

The research found that, given the diversity of rural places, although prices for some items were higher prices in urban areas, prices for other items were lower. Likewise, although some rural counties had lower prices overall, others had higher prices than urban areas. Furthermore, the eight rural counties had other costs in addition to prices that the urban areas did not. If the study had the ability to include these costs, prices associated with living in the rural counties would have increased.

While the popular perception is that it costs less to live in a rural area, a much more complex picture emerged. Instead, the diversity of rural areas means that there is no simple answer to the general question of whether it costs less to live in a rural area. While high-priced urban places, such as San Francisco, Los Angeles, or New York City, are not representative of all urban areas, likewise, neither are all rural areas the same. Consequently, although it may cost less to live in some rural areas, this could not be generalized to all of the rural areas in this study.

### **Contact:**

Julie N. Zimmerman  
Department of Community and Leadership Development  
University of Kentucky  
500 Garrigus  
Lexington, KY 40546-0215  
Phone: 859-257-7583  
E-mail: [jzimm@uky.edu](mailto:jzimm@uky.edu)

Grant awarded by the Southern Rural Development Center,  
Mississippi State University

---

No consistent pattern of lower prices across all rural places was discovered.

---

**Mobile Market Participation and Impact: An Analysis of Pascua Yaqui Pueblo and the Old Nogales Highway Colonia**

George Frisvold, Shailaja Deva, and Jim Hazen, The University of Arizona; Anita Fonte, Community Renaissance, The University of Arizona; and Michelle Kuhns, Tucson Community Food Bank/Food Security Center

The Community Food Bank in Tucson, AZ, operates its own grocery store, the Value Foods Store, that sells food (and other) items at a substantial discount over regular grocery stores. The Food Bank also operates mobile markets in Pima County, AZ, that provide items from the Value Food Store to low-income areas with less access to grocery stores. The two communities examined in this study were the Old Nogales Highway Colonia and the New Pascua Yaqui Pueblo, 13 and 15 miles south of downtown Tucson.

This study uses market basket analysis to assess the impacts of mobile markets on the availability and affordability of food on the outskirts of Tucson, AZ. USDA’s Thrifty Food Plan (TFP) is a market basket of items designed to meet basic nutritional requirements at minimal cost. The cost of purchasing food suggested by the TFP was compared with the costs of food from two alternative market baskets. A “Healthier” basket, patterned after a University of California, Davis study, had four times the dietary fiber and one-fifth the fat of the TFP. The second basket, used in an Urban and Environmental Policy Institute (UEPI) study in Los Angeles, included more grains, legumes, and fresh fruits and vegetables than the TFP. It also contained more foods regularly included in Hispanic diets. The study further calculated the cost of items actually purchased at mobile markets if they had been purchased at local grocery stores.

At the surveyed stores, the Healthier market basket cost an average of 10.6 percent more than the TFP cost, which is lower than the 18-percent average premium found in a similar study conducted by others in Sacramento and Los Angeles. Results were mixed for the UEPI market basket which, on average, cost 2.8 percent more than the TFP, but was less expensive than the TFP for half the stores surveyed.

Whole wheat bread and grain items, ground beef with less than 10-percent fat, and yolk-free noodles were more likely to be unavailable at surveyed stores. This result is consistent with previous research examining the availability of healthier food items in California stores.

By substituting mobile market purchases for regular supermarket purchases, a family of four could reduce the cost of purchasing TFP food by 10 percent, the cost of Healthier basket food by 6 percent, and the cost of UEPI basket food by 7 percent. These cost reductions were statistically significant at the 1-percent level even with a small sample size. Mobile markets periodically provide free bread as well as discounted grocery items. When free bread is included, mobile market substitution reduced the cost of TFP food by 12 percent, Healthier basket food by 9 percent, and UEPI basket food by 10 percent.

---

In the study area, the average cost of purchasing food suggested by the TFP was lower than the national average. However, at the closest store to the Pascua Yaqui Pueblo, the TFP cost was 17 percent higher than the national average.

---

---

Patrons of mobile markets recognize substantial savings on food costs.

---

Items sold at mobile markets at the Pascua Yaqui Pueblo in May 2006 would have cost 47-85 percent more if purchased at local supermarkets. In other words, for every dollar spent at the mobile market, patrons saved 47-85 cents, with the size of savings depending on the comparison store. In May 2006, sales averaged \$125.20 per mobile market visit, with total cost savings to the community ranging from \$59 to \$107 per visit. If five loaves of free white bread and five loaves of free whole grain bread are included in the calculation, total community cost reduction per mobile market visit increases to \$75-\$122 per visit. Community cost savings increase proportionally with total sales volume; therefore, cost savings will be greater in months with greater sales or if sales increase in the future.

**Contact:**

George B. Frisvold  
Department of Agricultural and Resource Economics  
The University of Arizona  
319 Cesar Chavez Building  
Tucson, AZ 85721  
Phone: 520-621-6269  
E-mail: [frisvold@ag.arizona.edu](mailto:frisvold@ag.arizona.edu)

Grant awarded by the American Indian Studies Program,  
The University of Arizona

## ***Food Environment Quality and Food Choice in Clusters of Colonias in Hidalgo County of the Texas Rio Grande***

Joseph R. Sharkey, Scott Horel, Monica Wendel, and Li Zhu, School of Public Health, Texas A&M University

Families that reside in areas of persistent poverty face individual, family, and environmental challenges to food security and healthful eating. The economic and social burden posed by nutrition-related chronic health conditions (for example, obesity, cardiovascular disease, and diabetes) is tremendous. The burden becomes greater for children and adults who are poor, Hispanic, reside in colonias along the Texas border with Mexico, and face greater vulnerability to food insecurity, poor nutritional health, and adverse health outcomes. Personal, structural, and neighborhood characteristics serve as either barriers or enhancements to lifestyle behaviors, such as physical activity or healthy eating. Residents of colonias face the greatest structural and neighborhood disadvantage, such as substandard housing areas, inadequate roads, and poor access to community food resources. These disadvantages make it particularly difficult for children and adults in these areas to initiate or maintain lifestyle changes that are critical for the prevention of disease conditions. Thus, the goals of this study were as follows:

- Assess the food environment through direct observation in targeted colonia census block groups (CBGs) in Hidalgo County.
- Determine the geospatial characteristics of food environment accessibility and examine the association between neighborhood deprivation (CBG-level neighborhood socioeconomic status) and locational disadvantage for access to food stores and foodservice places.

The study area included 197 census block groups, an urban and rural land area of approximately 772 square miles, and a population of more than 423,000 people (87 percent Hispanic). The types of food stores and foodservice places were defined using a modified version of the 2002 North America Industry Classification System (NAICS) definitions.

*Food stores* were distinguished as being fixed or mobile:

- Supermarkets and grocery stores.
- Convenience stores or food marts.
- Discount stores (general merchandise and some perishable and nonperishable foods) and beverage stores (with some perishable and nonperishable foods).
- Pharmacies and drug stores (with some perishable and nonperishable foods).
- Specialty food stores (for example, meat markets, fish and seafood markets, fruit and vegetable markets, or baked goods not for immediate consumption).

---

This study is the first step in understanding the influence of the food environment on food choice and diet quality in Hispanic families who live in high- or persistent-poverty areas where public transportation is limited or nonexistent and many residents lack access to a vehicle.

---

*Foodservice places* were classified as follows:

- Full-service restaurants (patrons order and are served while seated and pay after eating).
- Fast food restaurants (limited-service where patrons order or select items and pay before eating).
- Cafeteria or buffet.
- Snack and nonalcoholic beverage bars (for example, ice cream, frozen yogurt, snow cones, coffee, or juices for consumption on or near premises).
- Drinking places (provide limited food service).
- Microenterprises, such as a food stand that offers food for the public and operates secondary to a nonfood-related business (for example, a repair shop, hardware store, or beauty salon) or residence.

Observers were trained to use Global Positioning System technology for enumerating and geocoding all food stores and foodservice places at the level of individual address. Observers also conducted unobtrusive outside audits using a structured checklist through direct observation in systematically driven CBGs. Neighborhood (CBG-level) deprivation was determined through construction of an index of socioeconomic variables from the 2000 U.S. Census and categorized from low to very high deprivation. Locational disadvantage was determined through calculations of network distance from CBG centroid to the nearest food store and foodservice place. Stability and difference in locational disadvantage between types of food stores and foodservice places was examined.

This study identified and geocoded 971 different food stores and foodservice places through direct observation. Of the 18 supermarkets and grocery stores, 10 were locally owned, 2 were rated as being medium-sized, and 5 were classified as small grocery stores. The study identified 255 convenience stores. Almost 65 percent of all convenience stores marketed gasoline, 19.5 percent offered drive-through shopping, 47 percent marketed fast food items, and 23 percent marketed grocery items. Of the 97 specialty food stores, 31 percent were fruit and/or vegetable markets and 35 percent were baked goods stores. Almost 27 percent of the specialty stores did not have a fixed location. There were 204 foodservice places (21 percent of all food stores and foodservice places) that exclusively sold fast food items, 44 percent of which were national chain stores. In areas of high or very high neighborhood deprivation, an average of 15-16 percent (CBG range 2.7-53.0 percent) of households did not have access to a vehicle.

The average network distance from the center of the CBG to the nearest supermarket/grocery store was 2.7 miles (median 2.3 miles) and ranged from 0.18 mile to 14.9 miles. The average distance to the nearest large supermarket was 3.0 miles (median 2.7 miles), and the average distance to the nearest convenience store was 1.1 miles (median 0.90 mile; range 0.05-4.8 miles). Almost 32 percent (n=63) of all CBGs experienced very high locational disadvantage for access to a large supermarket. Among CBGs with very high locational disadvantage, distance to the nearest supermarket/grocery store increased significantly with greater deprivation. Low deprivation

---

Improved knowledge about the food environment is essential for combining environmental approaches with traditional health interventions and food assistance programs to make it easier for individuals to make healthier food choices.

---

CBGs were an average of 4.1 miles to the nearest supermarket/grocery store, medium deprivation CBGs 4.5 miles, high deprivation CBGs 5.5 miles, and very high CBGs 6.0 miles ( $p < 0.01$ ). After combining categories of locational disadvantage for supermarkets/grocery stores with convenience stores, overall locational disadvantage for food stores was determined. Over 20 percent of CBGs ( $n=40$ ) were classified as CBGs with both high food stores and foodservice places locational disadvantage.

**Contact:**

Joseph R. Sharkey  
Texas Healthy Aging Research Network (TxHAN) Center  
School of Rural Public Health  
Texas A&M Health Science Center  
MS 1266  
College Station, TX 77843-1266  
Phone: 979-458-4268  
E-mail: [jrsharkey@srph.tamhsc.edu](mailto:jrsharkey@srph.tamhsc.edu)

Grant awarded by the Southern Rural Development Center,  
Mississippi State University