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Food Assistance and Nutrition Research Small Grants Program

Executive Summaries of 2001 Research Grants

Laura Tiehen



*Food Assistance & Nutrition
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Abstract

This report summarizes research findings from the Food Assistance and Nutrition Research Small Grants Program. The Economic Research Service created the program in 1998 to stimulate new and innovative research on food assistance and nutrition issues and to broaden the participation of social science scholars in these issues. The report includes summaries of the research projects that were awarded 1-year grants in summer and fall 2000. The results of these research projects were presented at the 2001 Small Grants Program conference. The projects focus on food insecurity and hunger, nutritional outcomes, and the causes and consequences of food assistance program participation. Some projects focus on specific populations, such as people living in the rural South and on American Indian reservations.

Keywords: Food assistance, nutrition, vulnerable populations, food security, food insecurity, hunger, hungry, food assistance, food spending, well-being, Food Stamp Program, food stamps, National School Lunch Program, WIC, Food Assistance and Nutrition Research Program

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Preface

The Economic Research Service's (ERS) Food Assistance and Nutrition Research Program offers small grants to social science scholars to stimulate new and innovative research on food and nutrition assistance and to broaden participation in research on these issues. To administer the program, ERS partners with five academic institutions and research institutes that competitively award grants for 1-year research projects. Most grants are for \$20,000 to \$40,000. The Small Grants Program seeks to give junior scholars an opportunity to gain experience in conducting research on food security and food and nutrition assistance programs and to encourage more senior scholars to apply their skills and knowledge in these areas as well.

This report presents summaries of the research findings from the third set of small grants, which were awarded in summer and fall 2000. Preliminary findings were presented at a conference at ERS in Washington, DC, on October 11 and 12, 2001, and the research projects were completed in December 2001. More information about the Small Grants Program partners, as well as many of the completed research papers themselves, is 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: www.ssc.wisc.edu/irp/smgrants/smhome.htm

The Joint Center for Poverty Research, University of Chicago and Northwestern University

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: www.jcpr.org/usdarfp.html

The American Indian Studies Program, University of Arizona

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

Web address: info-center.ccit.arizona.edu/~aisp

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: nutrition.ucdavis.edu/usdaers.html

Southern Rural Development Center, Mississippi State University

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

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

Food Assistance and Nutrition Research Small Grants Program

Executive Summaries of 2001 Research Grants

Laura Tiehen, Editor

Introduction

Federal food and nutrition assistance programs—such as the Food Stamp Program; Special Supplemental Nutrition Program for Women, Infants, and Children (WIC); and school meals programs—have been a major component of public assistance to the poor since the 1930s. Welfare reform legislation enacted in the mid-1990s increased the prominence of these programs in the social safety net for low-income households and the demand among policymakers for accurate information and a better understanding of program performance. The U.S. Department of Agriculture (USDA), as the Federal agency charged with administering food and nutrition assistance programs, has a particular interest in monitoring their effectiveness in alleviating food insecurity and contributing to the Federal policy goal of a healthy, well-nourished population.

In 1998, USDA's Economic Research Service (ERS) responded to the new public assistance environment and new information needs by creating the Food Assistance and Nutrition Research Small Grants Program. The purpose of the program is to stimulate new research on food and nutrition policy issues and to broaden the participation of social science scholars in the research effort. Grant recipients come from a number of disciplines and employ a variety of approaches in their research. They include economists, sociologists, nutritionists, anthropologists, and public health professionals. Some conduct exploratory research using ethnographic methods to examine underlying factors influencing program participation and outcomes. Others use descriptive statistics to characterize the populations of interest. Still others use

statistical models to analyze program behavior. All the methods employed contribute to a growing body of knowledge on the food needs, coping behaviors, and food program outcomes of low-income families and individuals.

Small Grants Program Partners

ERS created partnerships with five academic institutions and research institutes to administer the Small Grants Program. Partner institutions have the advantage of being prominent members of the research community and being closer to the particular regional and State environments that influence program delivery and outcomes. ERS chose two of the five partner institutions for their experience in conducting policy-relevant poverty research at the national level and their ability to attract prominent scholars from a variety of social science disciplines to work on poverty and hunger issues. One of these is the Institute for Research on Poverty at the University of Wisconsin (IRP). IRP has a distinguished 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 Joint Center for Poverty Research (JCPR) at the University of Chicago and Northwestern University. JCPR was established in 1996 with a grant from the U.S. Department of Health and Human Services (HHS) to conduct and fund research and to advise Federal policymakers on issues of poverty. JCPR's small grants program with HHS and the Census Bureau served as a model for the ERS Small Grants Program.

ERS chose the remaining three 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 of the University of California at Davis brought to the Small Grants Program its expertise in nutrition education design and evaluation. A core group of faculty focuses its 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. The group views multidisciplinary research as critical to effectively monitoring the outcomes of nutrition programs.

The Southern Rural Development Center (SRDC) was chosen to administer small grants 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 the land-grant status of its member institutions. 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 Western and Great Plains States. ERS chose the University of Arizona's American Indian Studies Program (AISP) to administer small grants 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.

Research Overview

The research projects completed in 2001 cover four broad topic areas.

1. Food Insecurity and Hunger. The recent development of a Federal measure of food security and a consistent set of survey questions to assess it make it possible to monitor changes in the food-related hardships experienced by U.S. households. Winship and Jencks examined the changes in food insecurity and in other food-related problems of single mothers since the 1996 welfare reform legislation. Two research projects examined the measurement of food security. Bhattacharya, Currie, and Haider examined how well

food security was correlated with dietary adequacy among adults and children. Kaiser and Melgar-Quiñonez assessed how well the questions about food security translated to Hispanic households. Two studies examined the relationship between food insecurity and food insufficiency and negative health outcomes. Connell and coauthors focused on the correlation between food insufficiency and cardiovascular disease risk among adults in the South, while Greer and Poling focused on the relationship between food insecurity and health status among participants in the Expanded Food and Nutrition Education Program. Finally, Monroe and coauthors documented the food security status and diet quality of low-income families in Louisiana and South Carolina in the post-welfare reform era.

2. Food Assistance Program Participation. Parisi and coauthors examined the influence of individual and community characteristics in the decline in the Food Stamp Program caseload in urban and rural Mississippi. Tegegne and coauthors examined the decline in the Food Stamp Program caseload in Tennessee, with particular emphasis on the effect of local labor market conditions and changes in employment in the retail sector. Harkness and Newman examined the relationship between housing assistance and participation in the Food Stamp Program and the effect of housing assistance and food stamps on food expenditures. Lopez, Wyndham, and Reader documented the use of Federal food assistance programs on the Tohono O'odham Reservation and how the use of traditional Tohono O'odham foods can be encouraged through the programs.

3. Nutrition Education. Zastrow, Frenchman, and Smith conducted an evaluation of classes on healthy food choices and food preparation offered to food assistance program participants. Derrickson and coauthors evaluated the effect of a nutrition education intervention—administered by a private, nonprofit organization—on food security, fruit and vegetable consumption, and the ability to manage financial resources. USDA's Expanded Food and Nutrition Education Program was the focus of a study by Dollahite and coauthors. They compared the costs of the program with its benefits, measured in terms of improved health outcomes.

4. Food Assistance, Nutrition, and Health. Chatterji and coauthors measured the correlation between WIC participation and breastfeeding. Yen

considered the related decisions to participate in the Food Stamp and WIC Programs and their association with nutrient intakes. Hiwalker and coauthors examined the relationship between participation in a food assistance program, food insecurity, nutrition, stress, and health. Gibson examined the relationship between

Food Stamp Program participation and obesity. Dunifon and Kowaleski-Jones estimated how participation in the National School Lunch Program and WIC, as well as food security status, affected children's well-being.

Executive Summaries

Food Insecurity and Hunger

Changes in Food Security After Welfare Reform: Can We Identify a Policy Effect?

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The authors investigated whether welfare reform has altered single mothers' standard of living relative to that of married couples with children. Welfare reform is broadly defined to include the Earned Income Tax Credit (EITC), a refundable tax credit that provides a subsidy to earned income up to a certain threshold. Much previous research attempted to track the well-being of welfare leavers, and many studies used income measures as proxies for material well-being. The studies of former welfare recipients, however, suffered from low response rates and did not examine how welfare reform affected nonenrolled families who face greater barriers to enrolling in Federal cash assistance programs. Focusing on income is also problematic in that employment involves new expenses as well as income; newly employed former welfare recipients face transportation, clothing, and childcare expenses, and often lose their Medicaid coverage. To address these shortcomings, the authors considered all single mothers and used direct measures of material well-being. They focused on changes in food-related problems, using data collected in the annual Food Security

Supplement to the Current Population Survey between 1995 and 1999. To distinguish the effect of welfare reform from that of the strengthening economy during this period, the authors compared trends in food-related problems among single mothers with trends among married mothers relatively unaffected by welfare reform.

The authors examined about 50 food-related problems. All these problems declined between 1995 and 1999 among single and married mothers, and the proportional declines were approximately equal for the two groups. Single mothers started with more food-related problems than married mothers, so equal proportional declines signify larger percentage point declines among single mothers. Multivariate analysis shows that single mothers and married mothers saw improvements from 1995 to 1997 and that problems declined among single mothers at least as much as among married mothers. After 1997, improvements appeared to cease among both groups. But, because the U.S. Department of Agriculture's report on its September 2000 survey showed significant improvement among female-headed households between 1998 and 2000, the absence of measurable progress between 1997 and 1999 may well be due to random sampling error or some other methodological artifact.

The interpretation of these findings depends upon how the strong economy of the late 1990s would be expected to affect single mothers relative to married couples with children. If one believes that prosperity would have reduced food-related problems by the same proportion among single mothers as among married couples with children even in the absence of welfare reform and the EITC, the authors' findings imply that welfare reform in itself had no effect on single mothers' living standards. If one believes that prosperity would have helped families with high labor force participation rates more than families with low labor force participation rates, then the fact that food-related problems fell by the same proportion among single mothers as among married mothers implies that single mothers did better under welfare reform and the EITC than they would have done in their absence.

Food Insecurity or Poverty? Measuring Need-Related Dietary Adequacy

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The U.S. Department of Agriculture monitors the food security of U.S. households through an annual survey that contains questions about behaviors that signal an inability to meet food needs because of financial constraints. The survey has been conducted annually since 1995 as part of the Current Population Survey (CPS) and has been adopted, at least in part, by many other surveys. Numerous researchers have used these questions to analyze a variety of topics, with reports published in medical and public health journals. An advantage of the questions is that they are relatively inexpensive to administer compared with biomedical measures or dietary recall.

Several recent studies examined the validity of the food insecurity questions. These studies examined how the questions are correlated among themselves (that is, their internal validity) and how the questions are correlated with demographic characteristics, household characteristics, and dietary outcomes (that is, their external validity). Generally, these studies found the food insecurity questions to be correlated in expected ways with both internal and external factors. For example, using the Continuing Survey of Food Intake by Individuals, one author found that in households reporting insufficient food, most household members had a significantly lower intake of most vitamins and minerals than members of other households. One exception was that preschoolers in food-insecure households did not suffer from low consumption.

The authors assessed the empirical content of the food insecurity questions, advancing the literature in several directions. First, rather than simply examine whether the food insecurity questions were correlated with other factors, they focused on how well they were correlated. The standard poverty measure serves as a useful benchmark for these purposes because it has been used extensively and can be computed from many different data sets. Second, this report used a unique dataset, the National Health and Nutrition Examination Survey III (NHANES III).¹ In addition to the dietary recall information collected in other data sets, NHANES III collects and analyzes blood from its participants. Thus, the authors could examine measures of diet adequacy from individuals of all ages without recall or proxy bias. Third, the authors examined how the correlations between the responses to the food security questions and dietary outcomes varied by age. This last point is particularly valuable, given that standard food insecurity questions make distinctions by age. For example, one distinction between the CPS's two most severe categories of food insecurity rests on whether children are skipping meals.

The study found that the responses to the food security questions are correlated with the diets of older household members but are not consistently correlated with the diets of children. In contrast, poverty is consistently related to the diets of preschoolers. Among adults, poverty and food insecurity questions are good predictors of diet. However, poverty may be a better overall predictor of diet quality, since it is more consistently related to a range of dietary outcomes than the food insecurity questions.

Although the focus of this research was related to measurement, it is important to note two substantive aspects of the study's findings. First, individuals in poverty tend to have different dietary outcomes even at the basic level of vitamin deficiencies and anemia. This finding is true for most age groups in the population, including the youngest and oldest, the two particularly vulnerable age groups. Second, the study reveals several underlying behavioral issues. For example, it

¹The authors note one important drawback of the NHANES III for their purposes. Most studies that examined food insecurity used a summary measure based on a specific series of 6 or 18 questions. NHANES III does not contain the entire series of questions, so a direct examination of the summary measure cannot be undertaken. However, the questions in NHANES III are very similar to those in the CPS, and these questions are highly correlated with the summary measures.

found much variation by age in the relationship between poverty and dietary outcomes. Adult dietary outcomes are more correlated with poverty than are child outcomes, and dietary outcomes of younger children are more correlated with poverty than are the dietary outcomes of older children. It is likely that

parents protect their children from the effects of poverty to the extent that they can and that older children have more opportunities to supplement their consumption outside the home. It would be useful to have a better understanding of these protective family behaviors.

Validation of Food Security Instruments in Hispanic Households

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Validation studies of food security instruments have reported strong relationships between food insecurity and (1) declines in household food supplies, (2) infrequent fruit and vegetable consumption, (3) unemployment and participation in food assistance programs, and (4) disordered eating behaviors. Validity testing of the Federal 18-item food security instrument has supported its usefulness for monitoring food insecurity and hunger in the general U.S. population. However, researchers conducting studies among Hawaiian and Pacific Islanders have questioned the validity of applying the categorical measure of food insecurity to that population. Similar research has not been conducted among Latinos.

The main goal of this study was to validate the 18-item food security instrument in a Latino population. The authors also developed and tested a cultural framework that links food insecurity to nutritional outcomes in Latino families with young children, primarily of Mexican descent. This research may contribute to more effective monitoring of food insecurity and hunger in the United States and for the design of nutrition education programs in diverse cultural groups.

The authors used data from a cross-sectional survey, carried out between February and May 2001, of approximately 250 low-income Latino households in six California counties. Prior to the survey, 4 focus groups were conducted to examine cultural interpretation of the 18 food security questions. The survey included the following instruments: (1) the 18-item

food security instrument, (2) a 171-item self-reported household food inventory, (3) a 66-item food frequency questionnaire, and (4) a 16-item family demographic record form. All families included in the study self-identified as Latino, Mexican, or Mexican-American and had at least one healthy child, between 3 and 5 years old. Trained bilingual interviewers recruited subjects from a variety of community-based agencies, including those that administer the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) and Head Start, migrant camps, the local public health department, local health centers, and family resource centers. Subjects were interviewed in a private clinic room or in their homes. Statistical procedures included Pearson correlations, the Kruskal-Wallis test (for nonparametric data), and the Mantel-Haenzel chi-square. About 80 percent of the survey respondents were primarily Spanish-speaking and of Mexican descent. Seventy-nine percent were enrolled in the WIC program, and 25 percent received Food Stamps. Forty-four percent of the families (n=105) reported food insecurity without hunger, 13 percent reported moderate hunger (n=30), and 3 percent reported severe hunger (n=8).

Across the four levels of food security (food secure, food insecure with no hunger, food insecure with moderate hunger, and food insecure with severe hunger), the frequency of affirmative responses to each of 18 food security items increased as the level of food insecurity became more severe. However, within a given level of food insecurity, the frequency of affirmative responses did not always decline as expected as the severity of the items increased. In particular, subjects tended to respond positively more often to some of the child hunger items than to some of the adult hunger items.

The food insecurity scale measure was negatively associated with all categories of household food supplies: dairy, fruit, grains, meat, snack foods, and vegetables. Similarly, the categorical measure of food insecurity was significantly associated with lower household food stores. Neither the scale nor categorical measure of food security was correlated with daily servings of fruits or vegetables among preschool children. However, child fruit and vegetable intakes were significantly correlated with household supplies of those foods. Food insecurity was associated with declines in household supplies of many nutritious foods (carrots, tomatoes, whole wheat bread, apples, and oranges), as well as several less nutritious foods

(soda, cookies, and chocolate powder). Household supplies of traditional Mexican foods, including beans, corn tortillas, and chili, tended to remain stable, as did supplies of several relatively high-fat or inexpensive food items (hot dogs, ice cream, Kool-Aid, and instant soup).

The authors conclude that their research findings indicate that the 18-item instrument used to monitor food insecurity and hunger in the United States is valid for use in the Latino population. However, they note that

the Latino subjects responded more sensitively than expected to some of the child hunger items in comparison to the adult items, suggesting that the tool may be unable to detect the subtle differences between the quantity of foods available in these households and the nutritional quality of the food available. This research may contribute to more effective monitoring of food insecurity and hunger in the United States and to the design of nutrition education programs for diverse cultural groups.

Structural Analysis of the Relationship of Food Insufficiency to Disease Risk and Outcomes Among Adults From NHANES III

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This study was based on the conceptual framework developed by Campbell for risk factors and consequences of food insufficiency. In this framework, food insufficiency could be both an outcome and a predictor of other outcomes, such as poor health. Over the past decade, research has provided evidence for the relationship between food insufficiency and each health risk factor or health outcome proposed by Campbell, but has not demonstrated inter-relationships among all model components simultaneously. The southern region of the United States has a relatively high rate of cardiovascular disease (CVD) and a high rate of food insufficiency. These conditions indicate a need to investigate interrelationships among food insufficiency, diet quality, health behaviors, CVD risk factors, and CVD. Therefore, this study developed and tested a model—derived from Campbell’s conceptual framework—of the relationships among food insufficiency, diet quality, CVD risks, and CVD in the South.

The authors examined these relationships among a sample of adults from the South who participated in the Third National Health and Nutrition Examination Survey (NHANES III). The study examined the relationship between food insufficiency and three categories of individual characteristics, referred to as latent constructs. The latent constructs were (1) health behaviors, (2) CVD risks, and (3) CVD outcomes. The structural model included independent variables for food insufficiency and diet quality, as well as socio-demographic variables known to be associated with food insufficiency and diet quality.

Data analysis involved the use of structural equation modeling (SEM) in a two-phase process. In the first phase, the authors estimated the relationships between predictor variables and the latent constructs. In the second phase, the authors tested the structural model using SEM. This involved estimating relationships among latent constructs and predictor variables simultaneously.

The results of the analysis indicated that food insufficiency is more prevalent among individuals with low income and education levels and those who are non-White and female. Evaluation of the measurement models indicated reasonably good fit of the latent constructs and their indicator variables. However, structural equation modeling did not confirm a statistically significant relationship between food insufficiency and CVD. The authors noted that because food insufficiency is correlated with many other factors, it is difficult to disentangle its effect on CVD. They suggest that future research focus on assessing correlations among the indicator variables to better define future structural models of the relationships among food insufficiency and cardiovascular disease risks and outcomes. In addition, the authors suggest that future research assess direct and indirect effects of the indicators for cardiovascular disease. Assessment of these effects may suggest areas of future investigation in cardiovascular disease prevention and management.

Impact of Participating in the Expanded Food and Nutrition Education Program on Food Insecurity

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Considerable research has been conducted to develop a conceptual definition of food security, food insecurity, and hunger. Based on this definition, an instrument was developed to measure the prevalence of food insecurity and hunger among U.S. households. It is important to know if participation in nutrition education classes reduces food insecurity and if individuals in food-insecure households have poorer health status than individuals in food-secure households.

The objectives of this research were to (1) examine the relationship between food insecurity and participation in nutrition education, (2) examine the relationship between food insecurity and health status, and (3) determine factors associated with food insecurity. The authors compared rates of food insecurity between an intervention group—individuals enrolled in the Expanded Food and Nutrition Education Program (EFNEP)—and a nonintervention group—individuals who were eligible for EFNEP but who either had not enrolled or had completed only one lesson in the program. Participants were classified as food secure, food insecure, or food insecure with hunger, based on their responses to the 18-item household food security questionnaire. Respondents also reported whether their general health was excellent, very good, good, fair, or poor. Demographic variables collected in the interviews included race, age, educational level, participation in food assistance programs, number of children, marital status, county type—calculated using Tennessee census classification of rural and urban counties—gender, and income. The majority of the

subjects in the study were female, and more than half lived in an urban community.

The authors used descriptive analysis and logistic regression to study the association between participation in EFNEP and food insecurity. In the logistic regression, an individual's food security status was estimated to be a function of the rurality of county of residence, race, age, educational level, participation in food programs, health status, number of children, marital status, gender, and income. A forward logistic regression analysis was conducted to examine the point at which the independent variables enter the equation. Odds ratios were determined for variables included in the model.

The intervention and comparison groups were not significantly different from each other in terms of their race, gender, marital status, education, or number of children in the family. There were also no significant differences in the rurality of the county of residence of the intervention and comparison groups. However, the intervention group was significantly older (by an average of 2 years), and the two groups differed significantly based on the food security score. The respondents who had participated in more lessons in the EFNEP educational program were more food secure than the respondents who had not yet started or who had completed only one lesson in the EFNEP program.

Most of the subjects who reported excellent, very good, or good health were food secure, while most of the subjects who reported fair or poor health were food insecure. The variables significantly associated with food insecurity were health, income, nutrition education intervention, food program participation, and marital status. The subjects who had not participated in the EFNEP program were more likely to use food assistance programs and were half as likely to have excellent health status. Divorced and separated households were more likely to be food insecure than married-couple households.

The authors found that participation in a series of nutrition education programs that teach basic nutrition, food resource management, and basic cooking skills was associated with lower food insecurity. They also found that individuals who were food insecure had poorer health status than those who were food secure. Health was the first variable that loaded into a forward stepwise logistic regression model, and food-insecure individuals with severe hunger were half as likely to

report excellent health as food-secure individuals. The exact nature of the association between food security and health status needs further study. It is well established that poor diets contribute to poor health and that low-income individuals are at greater risk for poor health than higher income people.

The findings in this study support the need for multi-session nutrition education for low-income households, focusing on teaching basic nutrition, food

shopping, and cooking skills. These programs are associated with higher levels of food security and promote more efficient use of food resources and better health. The authors suggest that the study be replicated in other nutrition education programs to determine if similar results are found or if other variables contribute to the success of the program in decreasing food insecurity.

Assessing Food Security and Dietary Intake in the Post Welfare Reform Era in Two Southern States

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The authors examined the consequences of welfare reform legislation in two Southern States, Louisiana and South Carolina, by observing food security outcomes for families receiving Temporary Assistance for Needy Families (TANF), former TANF families, low-income non-TANF families, and local communities. The authors conducted interviews with approximately 130 former welfare recipients and working poor women in Louisiana and South Carolina from late fall 2000 through late summer 2001.

Most women (72 percent) in the Louisiana sample received food stamps; none received TANF benefits. Monthly food stamp benefits averaged \$299.43, with a range from \$16 to \$594. More than half (56 percent) of the women in the study reported that their actual food costs exceeded their monthly food stamp benefits;

the monthly shortfall averaged \$112.50. In South Carolina, the average monthly food stamp benefit reported by the 34 women participating in the program was \$280, and the monthly benefit ranged from \$10 to \$455. Fifteen of the 34 women using food stamps reported that they spent no money for food beyond their food stamp benefits. Among those spending money for food beyond their food stamp allotment, the average amount spent was \$52 each month.

In Louisiana, almost one-third of the women in the survey lived in households classified as food insecure and a fifth lived in households classified as food insecure with hunger. In South Carolina, 58 percent of participants lived in food-insecure households and 25 percent lived in households classified as food insecure with hunger.

Twenty-four-hour diet recalls were collected from 74 of the women in the original sample. Dietary recall data were collected at the start of a household's resource cycle, when the respondent received her food stamps or other source of income, and at the end of the resource cycle. The analysis shows a positive correlation between overweight and food insecurity in women, possibly as a result of monthly resource cycling. Women on food stamps often skipped meals at the end of the resource cycle. Diet quality, measured relative to the Federal Food Guide Pyramid recommendations, was similar for both groups: low in nutritional quality, high in fats, and generally deteriorated over the resource cycle. The diets lacked fruits and vegetables, variety, and key nutrients, minerals, and vitamins. When asked to give an example of a "balanced meal," neither group could adequately define a balanced diet. Both groups were overweight, with poor diet quality a likely contributor to overweight status.

Food Assistance Program Participation

Food Stamp Dynamics Across Rural and Urban Landscapes in the Era of Welfare Reform

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Welfare reform has encouraged researchers to develop new conceptual and empirical frameworks for examining low-income populations. The authors extend previous research by integrating into a single model the influence of individual, place, and geographic-setting characteristics on Food Stamp Program (FSP) participation dynamics. They tested whether local resources influence the dynamics of FSP participation. They also gauged the effect of spatial inequality, in terms of economic resources and social resources, across rural and urban populations.

The authors estimate that FSP recipients who exited the program were most likely to do so between the 1st and 13th months following passage of the 1996 Welfare Reform Act. The probability of exit leveled off by the end of the second year after the passage of the welfare reform legislation.

The authors used logistic regression analysis to estimate the effect of individual and community characteristics on the probability that an individual stopped receiving food stamps during the year after passage of the welfare reform legislation. The community characteristics included as explanatory variables in the regression analysis were measures of local labor market conditions, measures of civic capacity (such as the number of churches per person), and indexes that measure how active local organizations are in addressing issues such as poverty and unemployment. They also examined the variation in the probability of exiting the FSP across metropolitan and nonmetropolitan regions of Mississippi.

The estimation results indicated that Whites were more likely to stop receiving food stamps than African-Americans and that households without children were more likely to stop receiving food stamps than those with children. The community characteristics with the largest estimated effect on the probability of individuals leaving the FSP were the indexes of community activity in addressing local issues. Individuals in communities with organizations that focus on job promotion and with churches actively engaged in local issues were more likely to exit the FSP than individuals in communities without those organizations. In addition, FSP recipients in nonmetropolitan regions were less likely to exit the program than those in metropolitan regions, and those in the Delta region were the least likely to exit the program.

The authors conclude that individual and community characteristics are important factors to predict exit from the FSP. They suggest that future research focus on the extent to which policies resulting from welfare reform legislation affect declines in Food Stamp Program participation at the community level.

A County-Level Analysis of Food Stamp Caseload Changes in Tennessee

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This study examines the factors associated with the decline in the Food Stamp Program (FSP) caseload in Tennessee from 1994 to 1999. Previous studies used State-level data to assess the effect of economic conditions and the 1996 welfare reform legislation on cash welfare and food assistance caseloads. The authors extend this research by focusing on the effect of local labor market conditions on the FSP caseload. They used county-level FSP data and unemployment insurance administrative data obtained from the Tennessee Departments of Human Services and Employment Security as well as data from the Regional Economic Information System.

The authors estimated a regression model, with FSP caseload change as the dependent variable. Their estimation results indicated that the unemployment rate and growth in retail jobs were important determinants of caseload changes. Their finding that a higher unemployment rate is associated with a smaller decline in the caseload suggests that, in times of economic difficulty, people tend to stay in the program rather than leave. This finding is consistent with the general trend of caseload change for the country over the years. The study finds that the growth in retail jobs reduces the FSP caseload because, given their education and skill levels, most of food stamp recipients found jobs in the retail sector. In contrast, growth in wage and salary jobs in the primary labor market—where jobs offer relatively high wages, good working conditions, and advancement opportunities—was not associated with a decline in the FSP caseload. The authors suggest that changes in the primary labor market do not affect FSP recipients, because they are unlikely to have the qualifications for primary labor market jobs.

The results of the study underscore the importance of focusing on that segment of the local labor market in which recipients find jobs. The authors recommend a focus on job creation in areas where job opportunities are limited. In addition, the authors suggest that the expansion of education and training programs may enable food stamp recipients to access jobs in the primary labor market.

The Interactive Effects of Food Stamps and Housing Assistance

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The Food Stamp Program (FSP) and housing assistance are two of the largest Federal in-kind transfer programs for the poor, and the overlap in the clientele of the two programs is substantial. In 1999, about 38 percent of food stamp recipients also received housing assistance, and 30 percent of housing assistance recipients used food stamps. Unfortunately, virtually no research exists on the combined effects of the two programs. The authors examined the effect of housing assistance on food expenditures both for recent food stamp recipients and nonrecipients.

This study used data from the Panel Study of Income Dynamics that was address-matched to a census of assisted housing units over the period 1968-93 to identify housing assistance recipients. The following characteristics were examined: (1) out-of-pocket food spending per household member for food consumed at home, (2) food stamp benefits per person for households that receive food stamp benefits, (3) total out-of-pocket food spending plus food stamp benefits per person, and (4) total family income. Changes in these characteristics that occurred between the 2 years just before and the 2 years just after a family moved into assisted housing were compared with changes that occurred over a similar period for a matched set of families who did not move into assisted housing, thereby statistically controlling for other characteristics. Separate models were estimated for two major types of Federal housing assistance programs: public housing and privately owned housing that was built or renovated using Federal subsidies.

The authors found that both types of housing assistance increased FSP participation and benefit levels for those not receiving food stamps at the time they initially received housing assistance, but did not prolong or increase it for those already receiving food stamps. Public housing reduced out-of-pocket and total food spending among those already receiving food stamps. But among those not already receiving food stamps, public housing tended to raise food spending because it increased food stamp participation rates. Privately owned assisted housing had no statistically significant effects on total or out-of-pocket food spending.

Those who move into public housing are more disadvantaged than other housing assistance recipients, which is why public housing has a different effect on food stamp recipients and nonrecipients. Food stamp recipients who move into public housing have the lowest income of all groups, and their income drops sharply after they move. It may be that the income loss is cutting into the food budgets of this group. In contrast, in the period before the move, food stamp nonrecipients who move into public housing spent less on food than any other group. The large increase in their food stamp participation and benefits connected to the move into public housing may have helped to ensure adequate spending.

The study results indicated that those who move into either type of assisted housing experience a decrease in income. The magnitude of this income loss is about the same for food stamp recipients as it is for nonrecipients. Thus, the work disincentive effects of housing assistance do not appear to be magnified for food stamp recipients.

The implications of this research for food and nutrition assistance programs are mixed. On the positive side of the ledger, there is no evidence that the work disincentive effects of housing assistance are magnified in the presence of food stamps. In addition, housing programs appear to serve as a conduit into food assistance programs, helping nonrecipients gain food stamp benefits for which they are eligible. Public housing, which raised the food expenditures of those not receiving food stamps when they moved in, is especially notable in this regard. These considerations suggest complementary roles for housing and food assistance programs.

On the negative side is the income decline associated with moving into assisted housing. For food stamp recipients who move into public housing, the income drop may contribute to reduced spending on food. This income decline may also explain, at least in part, why privately owned assisted housing fails to increase food

expenditures. Additional research is needed to understand why incomes decline when families move into assisted housing and to examine more closely whether the drop in income contributes to the failure of housing assistance to increase food spending for most groups.

The Impact of Food Assistance Programs on the Tohono O’odham Food System: An Analysis and Recommendations

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The Tohono O’odham Nation sits in the heart of the Sonoran Desert, 60 miles west of Tucson, AZ. Approximately 18,000 of the tribe’s 28,000 members live on the main section of the Tohono O’odham Reservation. The Nation encompasses nearly 4,600 square miles, roughly the size of Connecticut.

Per capita income is \$3,113, the lowest of all U.S. reservations. Almost 66 percent of the population has income below the poverty line, and almost 63 percent of the adult population is unemployed. More than 50 percent of all Tohono O’odham adults have adult-onset diabetes, the highest rate in the world. Life expectancy is more than 6 years shorter than the U.S. average.

The Tohono O’odham have moved from producing almost all of their own food to being almost entirely dependent on food produced off the reservation. The authors investigated the causes of the loss of the traditional Tohono O’odham food system. Their research found that the causes of the decline in food production

on the reservation are (1) Federal work projects developed on cotton farms, (2) the introduction of processed food through commercial outlets and Federal food programs, (3) dependence on Federal food assistance programs, (4) environmental factors, such as the lowering of the water table due to nearby development, and (5) the movement of Tohono O’odham people off the reservation to attend boarding schools and participate in the U.S. military.

The authors note that many scientific studies have confirmed that traditional Tohono O’odham foods—such as tepary beans, mesquite beans, acorns, and cholla (cactus) buds—help regulate blood sugar and significantly reduce the incidence and effects of diabetes.

The authors documented the use of Federal food assistance programs on the Tohono O’odham Reservation. They found that, in an average month in 2001, 475 households received food through the Food Distribution Program on Indian Reservations (FDPIR), while 1,209 households received food stamps. About 750 people received WIC benefits each month. The authors note the positive effect of the food assistance programs, but also recommend some changes that might encourage the use of traditional Tohono O’odham foods and improve the health conditions on the Tohono O’odham Reservation. Some of their recommendations are to establish the WIC Farmers Market Nutrition Program on the Tohono O’odham Reservation, allow and encourage the purchase of locally produced food through the FDPIR, and encourage the development of culturally appropriate nutrition education efforts.

The authors recommend further study of the specific nutritional needs of Native Americans to be used as a guide in the implementation of Federal food assistance programs.

Nutrition Education

The Impact of Nutrition Education on the Winnebago Indian Reservation

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The Winnebago Indian Reservation is located in Thurston County, NE, and comprises approximately 113,000 acres. There are 2,341 people who live on the reservation, with 1,156 declaring membership in a Native American tribe. A recent study found that obesity has become more prevalent on the reservation. The rate of obesity increased from 28 percent of the reservation residents in 1991 to 43 percent of residents in 1996. Because obesity is a risk factor for diabetes, the results of the study prompted the organization of a community task force, which developed four principles for community programs in diabetes prevention. One of the four principles is that nutrition would be addressed at the community, school, and clinical level.

The authors' first objective was to understand the nutrition guidelines and nutrition components of the food assistance programs available on the Winnebago reservation. They interviewed the directors of Head Start, the Food Stamp Program, the Summer Feeding Program, the Food Distribution Program on Indian Reservations (FDPIR)—known on the reservation as the Commodities Program—the school meals

programs, Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), and Senior Citizens Program. They found great variation in the degree to which nutrition education was provided through each of the programs. The Head Start Program and Summer Feeding Program included nutrition education as part of their daily curriculum. The school meals programs and the Senior Citizen Program provided nutrition workshops for their clients. The Food Stamp Program, FDPIR, and WIC provided pamphlets on nutrition to their clients.

The second objective of the research was to conduct a pilot evaluation of nutrition education classes offered to mothers who received WIC benefits or whose children were enrolled in the Head Start Program. The classes taught healthful food preparation techniques. Nine classes were held during October and November of 2000. All the mothers participated in the Food Stamp Program or FDPIR and at least two other food assistance programs. Class participants completed surveys before and after receiving the nutrition education classes. The participants reported some changes in their food choices and food preparation techniques. After completing the course, more reported that they chose fresh fruits and vegetables and reduced-fat dairy products. They also reported changes in food preparation, such as a reduction in frying food or adding gravy to foods. All participants reported positive physical and emotional changes after attending the classes.

The authors recommend that the study be replicated with more participants over a longer time period to evaluate physical or emotional changes in the participants and their families. They also recommend that nutrition education classes on food preparation be provided to clients of all food assistance programs on the reservation, with a particular focus on the selection and preparation of healthy foods. A final recommendation is to increase the coordination between reservation food programs and their nutrition education components.

Lessons Learned From the Spend Less, Eat Well, Feel Better Program Efficacy Trial

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This study evaluated the effect of the Spend Less, Eat Well, Feel Better (SLEWFB) educational intervention on (1) household food security status, (2) ability to pay rent, (3) average daily fruit and vegetable intake, and (4) success in accomplishing self-set financial and food goals. SLEWFB is an educational program initiated and delivered by the Family Service Office (FSO) of the Salvation Army in Honolulu, HI. FSO is the primary distributor of emergency housing and utility assistance in Honolulu. SLEWFB is a 3-hour session on financial resource management and food, diet, and health. It is intended to provide resources, skills, and motivation that will “teach participants how to fish, rather than just giving them fish.”

Participants eligible for the evaluation included 438 FSO clients who entered FSO offices between January and August 2001. Upon their initial entry to the FSO office, participants were randomly placed in the intervention group, which received the SLEWFB session, or in the control group, which received a 1-hour course in food safety.

Members of both groups were surveyed both before and after the intervention. The pre-intervention survey was completed in person, and a followup survey was administered 4-6 weeks after the intervention through the mail, by phone, or in person. A third interview, scheduled for 6 months after the intervention, was canceled due to poor response rates to the followup survey. Both surveys included seven questions used to

measure household food security, a question about ability to pay rent on time, and two questions pertaining to the frequency of fruit and vegetable consumption. Pearson’s chi-square analysis and repeated measures of application of analysis of variance (ANOVA) were used to assess statistical significance of variables over time and by intervention. The researchers also conducted two focus groups to clarify the perceived value of the SLEWFB.

Two hundred participants, or 46 percent of those eligible, completed the SLEWFB session or the food safety course. Of the 200 participants, 115 completed the SLEWFB session and 85 completed the food safety course. About half (47 percent) of all participants completed the followup survey, 48 percent of the SLEWFB group, and 47 percent of the food safety course group. The authors found that food security status improved in both the control and intervention groups. SLEWFB participants were 26 percent more likely than the control group to report that they could pay rent on time before and after the intervention. Members of the intervention group were also significantly more likely than those in the control group to report that they no longer had to choose between food and rent in the followup survey. Small but statistically significant improvements in fruit and vegetable intake were demonstrated only by the SLEWFB participants. Goal progress did not vary by intervention type; 88 percent of the subjects reported at least some progress toward their financial goal. Focus group participants confirmed that the SLEWFB intervention improved their ability to manage their resources and their self-perception. Participants confirmed the value of dialogue with their peers in similar circumstances, although most felt a financial incentive was required to entice their participation in either educational class. In addition, four of six focus group participants reported that they had decreased the number of packages of cigarettes smoked a day because of the SLEWFB intervention, although this was not a specific objective of the program.

The authors conclude that even a short, 3-hour contact can improve desired outcomes if delivered in a manner that encourages self-assessment, motivates clients, and provides adequate monitoring of project variables for every client. However, the authors note that participants reported a need for a financial incentive to participate in the SLEWFB and that the low survey response rates made it impossible to assess the long-term effects of the educational program.

Implications of an Economic Evaluation of Projected Health Outcomes in a Community Nutrition Program for Limited-Resource Audiences

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The objective of this research was to apply and extend economic evaluation methods—cost effectiveness analysis (CEA) and cost benefit analysis (CBA)—to the Expanded Food and Nutrition Education Program (EFNEP) in New York State. EFNEP is a national nutrition education program, delivered through the Cooperative State Research, Education, and Extension Service in all 50 States and 6 territories with funding from the U.S. Department of Agriculture. It is designed to improve the diet and nutritional well-being of low-income families and to contribute to their personal development. The authors adopted a broad societal perspective, consistent with the goal that the economic evaluation provide more general guidance on the allocation of resources among EFNEP, other food and nutrition programs, and other uses. The evaluation also has important implications for allocations of resources and program management within a State.

Previous research reported CBAs for the Virginia, Iowa, and Tennessee EFNEPs. The Tennessee CBA measured actual savings in food expenditures realized by participants and reported an average savings over 5 years of \$2.48 in direct food costs for every dollar spent on EFNEP. The Virginia and Iowa studies assessed projected

health benefits of between \$10 and \$11 for every dollar spent. Neither study included estimates of CEAs or of society's willingness to pay for improved health.

In fiscal year 2000, when data were collected for the present study, 5,730 adult participants graduated from the New York EFNEP. For the cost-benefit analysis, the study included all costs of the adult program (Federal, State, and local dollars). The authors collected information from graduates of EFNEP nutrition education classes on nutrition and food safety practices before and after attending the classes. Health benefits, estimated from the outcome data, were monetized using secondary data sources. The method used in Virginia was replicated, and revisions were made for comparison. Incidence rates for the diseases assessed were updated from those used in the previous studies. Lifetime risk (cumulative incidence) was used for chronic conditions. Criteria for success in dietary change, as well as rates for diet-attributable risk—particularly for osteoporosis, stroke, and commonly occurring infant diseases—were changed to be more consistent with current understanding of the effect of diet on health outcomes. The effectiveness of EFNEP in reducing future health care costs and society's willingness to pay for the projected improvements in morbidity and mortality were estimated. The CEA used quality-adjusted life-years (QALYs) to measure people's utility levels and preferences over different health states, expressing these in a common metric.

The estimated benefit-to-cost ratio for New York's adult EFNEP was \$3.17 to \$1.00. Cost per graduate was higher in New York (\$849) than in Virginia (\$553) or Iowa (\$710). In addition, a smaller percentage of participants had changed to optimal nutrition behaviors in New York. Therefore, the benefit-to-cost ratio in New York was only about one third of those reported for Virginia and Iowa.

The authors expanded the analyses to include the CEA that resulted in a total of 245 QALYs. Comparing the direct costs of EFNEP with the alternative of having no program, the New York EFNEP was estimated to have an incremental cost-effectiveness ratio of \$19,842 per QALY saved. The program was estimated to lower medical and productivity costs. Previous research estimated that society is willing to pay in excess of \$200,000 per QALY. Hence, the willingness-to-pay analysis resulted in a benefit-to-cost ratio of \$10.08 to \$1.00.

The study also included cost-benefit analyses on two subgroupings of data in an attempt to understand variation across the State from a programmatic perspective. First, the effect of population size and density was investigated by comparing benefit-to-cost ratios across rural counties (<50,000 residents), urban counties (>50,000 residents), and New York City (NYC). Programs in rural areas had the highest benefit-to-cost ratios (\$1.05 to \$1.00 compared with \$0.94 to \$1.00 in NYC and \$0.56 to \$1.00 in other urban areas). The urban result is probably due to several urban programs in the State with overall poor outcomes. Second, the study investigated the effect of different program delivery methods by comparing benefit-to-cost ratios among local programs delivering more than 60 percent of their classes in groups, those delivering more than 60 percent individually, those balanced with 40 to 60 percent delivered in groups and 40 to 60 percent delivered individually, and those using a mixed method in which classes were delivered in groups along with individual contacts with participants. Individual education produced higher benefit-to-cost ratios than group education. The best results were seen among counties

that provided a combination of group and individual instruction. This method appeared to improve efficiency and retain the individualized education that had the greatest effect.

Based on state-of-the-art economic analyses, the New York EFNEP lowered cost in terms of projected future health care costs. The authors note that caution should be used when interpreting the study results. Many potential benefits of the program, such as nutrition and food safety benefits to other family members, could not be captured in the study, which leads to an underestimate of the program's benefits. On the other hand, the people who graduate from EFNEP are probably those who are most likely to benefit from it. Therefore, the program benefits may not be as great for the general population as those estimated for the people who completed the program. However, these results can be used by Federal policymakers to help guide funding decisions, and could also be useful at the State level to guide decisions about funding and program changes to improve health outcomes.

Food Assistance, Nutrition, and Health

WIC Participation and the Initiation and Duration of Breastfeeding

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This study measured the effect of participation in the Supplemental Nutrition Program for Women, Infants, and Children (WIC) after the birth of a child on one important health behavior: the initiation and persistence of breastfeeding. In the United States, many low-income mothers do not initiate breastfeeding at all and very few breastfeed for at least 4 months, although most pediatricians recommend breastfeeding exclusively for at least 4 to 6 months. Recognizing this problem, during the 1990s, the U.S. Department of Agriculture implemented many new policies intended to promote and support breastfeeding among WIC participants. While the new policies promote breastfeeding, the program provides infant formula in food packages, a major incentive for mothers to participate in WIC. The provision of infant formula in WIC food packages may work against the program's emphasis on breastfeeding.

To build on previous research on breastfeeding among WIC participants, this study used data from the children of the National Longitudinal Survey of Youth—a large, longitudinal data set that includes children born between 1990 and 1995. Average annual expenditures on breastfeeding education and promotion increased from \$9 million in 1990 to \$36 million in 1995. The authors employed econometric methods to account for self-selection into the WIC program and linked

mothers' breastfeeding practices to State WIC and Medicaid policies.

Very little is known about the effect of WIC participation on breastfeeding practices among participants during the 1990s. Previous research suggests that a woman's participation in WIC during pregnancy leads to important health benefits for children, including increases in birth weight, reductions in iron deficiency anemia, and reductions in infant mortality. Much less is known, however, about the benefits of WIC participation after pregnancy, during infancy, and during early childhood. Although research on the effectiveness of the WIC program focuses almost exclusively on a woman's participation during pregnancy, most WIC participants are not pregnant women, but rather are infants, young children, and post-partum women. A large proportion of WIC funds are targeted at these groups, but little is known about whether WIC improves health behaviors and outcomes for them. This information is necessary to evaluate the overall effectiveness and cost-effectiveness of the program, as well as to better target existing funds.

The main empirical challenge in this study was to account for the possibility that women select into WIC based on unobservable characteristics that also determine breastfeeding practices. For example, mothers disinclined toward breastfeeding might be more likely to participate in WIC. In this case, standard estimation methods will lead to a biased and inconsistent estimate of the effect of WIC on breastfeeding. The authors used three methods to account for this problem:

- (1) They estimated standard probit models with a rich set of covariates intended to capture many factors associated with breastfeeding decisions.
- (2) They estimated the models using an instrumental variables approach with State-level WIC and Medicaid policies as identifying instruments.
- (3) They took advantage of data available on siblings to estimate heteroscedastic, family-level fixed effects models that control for differences across families in unobservable characteristics.

The results of the study suggest that WIC participation has a negative effect on initiating breastfeeding, but it is not clear whether the program affects breastfeeding

persistence. Baseline results, which are preferable to instrumental variables results, indicate that WIC participation has a strong, negative effect on breastfeeding initiation, but no effect on breastfeeding for at least 16 weeks. A heteroscedastic fixed-effects model suggests that within families, WIC participation is associated with fewer weeks of breastfeeding. It is important to note that these results are based on a sample of mothers who are older and probably more advantaged than the national WIC population. It is also important to note that expenditures on WIC breastfeeding education and promotion have increased

significantly since 1995, which would be expected to influence the effect of the program on breastfeeding.

To generate implications for policy, more qualitative and quantitative research is needed that confirms the results from this small body of work. However, if these results can be replicated using other data, they imply that, while WIC has the potential to affect infant feeding practices, the program faces the challenge of increasing breastfeeding rates among participants, while continuing to offer infant formula to mothers who decide not to breastfeed.

The Effects of Food Stamp and WIC Programs on Nutrient Intakes of Children

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This study investigated factors determining participation in the Food Stamp Program (FSP) and the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), and the effects of these programs on nutrient intakes of small children. In previous studies, program participation was often investigated without consideration of the decisions on food and nutrition intakes. However, consumers typically make food choices from several commodities, and each food item typically contains multiple nutrients. Further, the decision to participate in the FSP and WIC is likely to be made simultaneously with the food and nutrient intake decisions. Statistical estimation procedures that ignore cross-equation correlation can cause loss of efficiency, and failure to accommodate simultaneity also leads to biases in empirical estimates.

This study addressed participation and effectiveness of the FSP and WIC in a multi-equation framework for nutrient intakes with endogenous FSP and WIC participation. The model considered is a multivariate generalization of the sample selection model and can also be viewed as a restricted form of switching regression for a system of equations.

In this study, the author examined (1) simultaneity of program (FSP and WIC) participation, food and nutrient intakes, and program participation and nutrition intakes, (2) effects of income and other explanatory variables on program participation, (3) effects of programs on nutrition intakes, and (4) effects of income and other explanatory variables on nutrient intakes. Nutrient intakes are expressed as a percentage of the recommended daily allowance reported in Federal dietary guidelines.

Empirical analysis was conducted for formula-fed infants and children, using data from the 1994-96 Continuing Survey of Food Intakes by Individuals and the 1998 supplemental Children's Survey. The findings indicate that the decision to participate in the FSP and WIC, as well as nutrient intake decisions, are made simultaneously. WIC participation is found to increase the intakes of most nutrients, whereas the effects of FSP are mixed. Overall, participation in both programs increases the intakes of all nutrients except protein. The methodology developed in this study can be used in future studies of the effects of other food assistance programs, such as the National School Lunch Program, on food intakes, nutrient intakes, and other outcome variables.

The Relationship of Nutritional and Health Status, Diabetes, and Stress to Food Security Among the Northern Cheyenne

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This project examined the relationships between food insecurity, nutrition, stress, and health status on the Northern Cheyenne Reservation. The authors assessed the food security and nutritional status of Northern Cheyenne residents, identified stress factors that may contribute to the development of health problems—especially the risk for diabetes.

The research design included collection of both quantitative and qualitative data. The authors collected quantitative data from a stratified sample of approximately 475 households on the Northern Cheyenne Reservation. The survey included questions about demographic characteristics and questions used to measure household food security and individual and family stress levels. The survey also contained questions about nutrition and health risks, including the risk factors associated with diabetes. The authors also collected qualitative data from 10 in-depth, unstructured interviews with reservation residents and diabetes program

staff regarding nutrition and diet, as well as sources of stress that may affect health and quality of life.

The authors found that almost 70 percent of residents of the Northern Cheyenne Reservation live in food-insecure households, and that almost 35 percent live in households classified as food insecure with hunger. Almost one-fourth of survey respondents report that they have been diagnosed with diabetes, compared with roughly 4 percent of the overall U.S. population. Survey respondents were asked about several conditions or behaviors associated with an increased risk of diabetes. The research found that almost three in four residents are classified at medium or high risk for diabetes, as defined by the American Diabetes Association. The risk of diabetes is fairly constant throughout many different subgroups of the population and at many different levels of education and employment status. However, reservation residents age 55 and older are at a lower risk of diabetes than younger residents. The researchers also found that about one-fourth of reservation residents report high levels of stress, and that those with higher levels of education and who work more hours are more likely to report high stress levels.

The results of the logistic regression analysis indicated that the age of the household head and the number of children in the household are positively related to the likelihood that the household is food insecure. Households in which the head is employed part-time or in seasonal work experience higher rates of food insecurity than those in which the head is employed full-time. Respondents that report high levels of stress are more likely to experience food insecurity.

The authors note that this data analysis suggests the importance of continued attention to many aspects of reservation life and, in particular, to the factors producing high levels of diabetes and diabetes risk in Native American populations.

Food Stamp Program Participation and Obesity: Estimates From the NLSY79

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This study examined the relationship between Food Stamp Program (FSP) participation and adult obesity. Based on past empirical research and the human capital model of the demand for health, the relationship between FSP participation and obesity is indeterminate. This study used the National Longitudinal Survey of Youth (NLSY79) to examine the relationship between FSP participation and obesity. A benefit of using the NLSY79 is that it is possible to include detailed controls for current income, FSP participation, and long-term eligibility for and participation in the FSP, as well as individual fixed effects.

Current and long-term FSP participation are positively and significantly related to obesity for low-income women in models with individual fixed effects. The estimates suggest that food stamp benefits do not have the same relationship to obesity as do cash income or other benefits provided by the Government. FSP participation is associated with approximately a 9.2-percent increase in the probability of obesity, and 5 years of FSP participation in the previous 5 years is associated with approximately a 19-percent increase in the probability of obesity for low-income women. By contrast, the relationship between FSP participation and high body mass index (BMI), although statistically significant, is considerably less. Current FSP participation is associated with an almost 1-percent increase in BMI, and 5 years of FSP participation in the previous 5 years is associated with an almost 3-percent increase in BMI for low-income women. Current and long-term FSP participation is not significantly related to obesity for low-income married men in models with individual

fixed effects. However, long-term FSP participation is positively and significantly related to BMI. Five years of FSP participation in the previous 5 years is associated with approximately a 3-percent increase in BMI for low-income married men.

The models did not control explicitly for food insecurity, and this exclusion may confound the relationship between FSP participation and obesity. Assuming the relationship between FSP participation and obesity is estimated correctly, recommendations for policy changes to reduce obesity will depend on the mechanism for the relationship between FSP participation and obesity. The analyses in this research are based on the human capital model of obesity, where FSP participation is related to obesity as a result of the resources and education provided by the FSP. Therefore, the model implies that education and changes in restrictions on the use of FSP benefits, the mode of delivery, and the amount of FSP benefits are possible policy tools to reduce the prevalence of obesity among FSP participants.

The large increase in the predicted probability of obesity for low-income women who participate in the FSP suggests the usefulness of nutrition education or other education programs that aim to reduce the obesity of FSP participants, regardless of whether obesity is caused by or simply correlated with FSP participation. The author also notes that the research findings suggest that more attention should be paid to the food choices made by FSP participants and the ways in which the program influences those food choices. Other possible policies aimed at reducing obesity could change the mode of delivery or the amount of FSP benefits. However, it is important to note that obesity is not a problem for all FSP participants. A reduction in benefits may increase other problems for the participant or members of his or her family.

A person's obesity status is influenced by current and past choices concerning food consumption and health behaviors. In order to determine the most effective policies for reducing obesity among food stamp recipients, more research is needed that will examine the relationship between FSP participation and these choices.

Associations Among Food Insecurity, Food Assistance Programs, and Child Development

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Few studies have evaluated the link between food insecurity and children's development. The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) and the National School Lunch Program (NSLP) are Federal programs that have the potential to reduce food insecurity among children and to influence children's development. This project examined ways in which participation in these programs and levels of food insecurity operate together to influence measures of well-being among children.

Specifically, the authors examined four research questions: (1) What are the roles of WIC and the NSLP in alleviating food insecurity? (2) What is the impact of food insecurity on the development of toddlers and school-aged children? (3) What is the effect of participation in NSLP and WIC on children, and is this effect mediated by levels of food insecurity? and (4) Does participation in WIC or NSLP moderate the effects of food insecurity on children? The results from this

project provide insight into the role of two important food assistance programs in alleviating food insecurity and influencing the well-being of U.S. children.

The effect of food insecurity on the development of U.S. children has not been widely researched, though previous research has found food insufficiency to be associated with adverse outcomes among children. Previous research on the WIC program has found positive effects of participation in WIC on infant birth weight, reduced Medicaid expenditures, and children's nutritional intake. Although there has been little research on the effects of WIC participation on child adjustment and age-appropriate achievement measures, studies have found that WIC has positive effects on verbal ability and infant temperament. Many of the available evaluations of the NSLP focus on the relationship between participating in the program and increased nutrient intake.

The study used data from the 1997 Child Development Supplement to the Panel Study of Income Dynamics (CDS-PSID), a longitudinal study of a representative sample of the U.S. population. The analyses focus on two samples of children: those under 2 years old in 1997, for whom there are measures of WIC participation in 1997; and those 6-12 years old in 1997, for whom there are measures of participation in the NSLP in 1997.

The authors used logistic regression and Ordinary Least Squares (OLS) methods to estimate the relationships of interest. They also employed methodological techniques to address the selection issues that may bias estimates of the effects of food assistance programs on individual outcomes.

The authors did not find a significant association between participation in the WIC program and food insecurity. While they did observe a positive association between participation in NSLP and food insecurity, the association did not hold when they addressed the selection issue.

The study also estimated the effect of food insecurity on the development of toddlers and school-aged children. Among younger children, food insecurity was associated with higher levels of difficult temperament. Food insecurity was also associated with lower levels of positive behavior among older children. This association persisted in the restricted sample models where selection was addressed. These results suggest that

while food insecurity may not affect cognitive outcomes, it does affect the social behaviors of children.

The research investigated the effects of NSLP and WIC participation on child outcomes and examined the potential for these effects to be mediated by levels of food insecurity. The authors found no association between participation in the WIC program and early child outcomes. They found evidence of negative associations between participating in NSLP and achievement, behavior, and health. However, when the authors controlled for selection bias, NSLP participation no longer had significant negative effects on child outcomes. These results demonstrate that selection bias must be addressed in any policy evaluation of the effects of NSLP.

The authors did not find evidence that food insecurity had a mediating effect on the influence of food assistance programs on children. This result suggests that, at least in this sample of children, the effects of participation in food assistance programs on children are not mediated by coexisting levels of food insecurity. Finally, the authors tested whether participation in WIC or NSLP moderated the effects of food insecurity on children. Among older children, they found evidence of one moderating relationship. Logistic regression results indicate that food insecurity and participation in NSLP increase the odds of having health limitations. However, for children in food-insecure households participating in NSLP, the odds of health limitations are significantly reduced. Thus, participation in NSLP may help protect children from the detrimental effects of food insecurity.