
The Effect of the WIC Program on Food Security Status of Pregnant, First-Time Participants

Dena R. Herman, PhD, MPH, RD
University of California, Los Angeles

Gail G. Harrison, PhD
University of California, Los Angeles

Abdelmonem A. Afifi, PhD
University of California, Los Angeles

Eloise Jenks, MEd, RD
Public Health Foundation WIC Program

Using a prospective repeated measures design, we assessed changes in the food security status of 313 pregnant, first-time participants in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) and the effect of the program on specific spending patterns. Food security status was determined by using the U.S. Food Security Survey Module at entry to the WIC Program during each participant's first trimester, third trimester, and at 3 to 6 months postpartum. We collected both quantitative and qualitative data to explore possible determinants or modifiers of changes in food security status. Food insecurity characterized 112 of study participants' households at baseline and decreased by half, to 56 households, at the end of the year of WIC participation. Within the subgroup of initially food-insecure participants, analyses were conducted to explore factors related to improvements in food security status. Controlling for a number of relevant factors, we found that women who had at least a high school education and were enrolled in Medi-Cal during the postpartum period were likely to become food secure. Qualitative results revealed that participants most often used the additional food dollars made available through the WIC food package to purchase higher quality foods and items needed for their newborns and to pay bills. Overall, these data suggest that the WIC Program makes a significant contribution to reducing food insecurity among first-time program participants and suggest the need to consider food insecurity as a risk criterion for the WIC Program.

The literature on household food security in the United States has grown substantially in recent years, at least partially due to the availability since 1995 of a standardized instrument for assessing this phenomenon in the population (Hamilton et al., 1997). The food security status of participants in the Food Stamp Program (Gundersen & Oliveira, 2001; Perez-Escamilla et al., 2000), the Expanded Food and Nutrition Education Program (EFNEP) (Greer & Poling, 2001), and welfare programs (Borjas, 2001; Capps, Ku, & Fix, 2002; Winship & Jencks, 2001) has been investigated. There have been only a few studies on the influence of the effect of the U.S. Department of Agriculture's (USDA) Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) on food

security status. A Florida study found that participation in WIC and the number of different income sources were the two factors most highly associated with more weekly family food servings and improved food security (Taren, Clark, Chernesky, & Quirk, 1990). A large improvement in diet quality, and therefore indirectly food security, was demonstrated in an analysis of data from the 1989-91 Continuing Survey of Food Intakes by Individuals (1989-91 CSFII) that examined the relationship between WIC participation and dietary intake. Participation in the WIC Program by at least one family member was shown to raise the aggregate household Healthy Eating Index (HEI) score by 23.45 points in a sample of 1,438 WIC participants, compared with households that did not participate in the WIC

Program (Basiotis, Kramer-LeBlanc, & Kennedy, 1998).

The underlying premise of WIC is that low income predisposes individuals to poor nutritional status and poor health outcomes during critical periods of growth and development. The program is not designed as a safety net to guard against food insecurity or hunger but rather as a targeted intervention to protect the most vulnerable members of the population—namely, pregnant women with increased nutritional needs, as well as infants and children—from the effects of these phenomena. Although income eligibility is set at 185 percent of the Federal poverty level, most participants live in households with incomes at or below the poverty line. The WIC population also includes a high proportion of ethnic minorities—subgroups found to have the highest rates of food insecurity nationally (Nord, Andrews, & Carlson, 2002). In 2001, the WIC Program served about 7.3 million participants each month (USDA, 2001) and provided cash grants totaling \$4.1 billion to 88 State agencies (USDA, 2000).

In the Institute of Medicine's (IOM) 1996 report evaluating WIC nutrition risk criteria, it was suggested for the first time that food insecurity be used as a risk criterion for program eligibility. A subsequent report (Institute of Medicine, 2002) evaluating dietary assessment in the WIC Program recognized the significance of food insecurity as a potential contributor to nutritional risk and the likely benefit from participation in the WIC Program. However, the report did not offer specific recommendations about food insecurity because of lack of sufficient evidence on which to select a cutoff point to identify those most likely to benefit.

In addition to referrals for social services, the WIC Program offers

participants a supplemental food package tailored to participants' nutritional needs. The food package for pregnant clients has a value of nearly \$70 per month and contains foods that are suitable for consumption by all family members. Items include juice, cereal, eggs, milk and cheese, and a choice of beans or peanut butter. The package for the postpartum period is similar but has smaller quantities of these items and is worth about \$60. This package may also include canned tuna and fresh carrots for women who choose to breastfeed or infant formula for women who choose not to breastfeed.

The purpose of this study was to ascertain the baseline food security status of pregnant, first-time WIC participants and to identify any changes in food security status over the course of their pregnancy. We also wanted to determine whether particular aspects of the WIC Program were associated with changes in food security status of participants over time and, if so, what those characteristics might be.

Methods

Participant Recruitment and Data Collection

Women were recruited while enrolling for services at selected centers in the Public Health Foundation Enterprises (PHFE) WIC Program catchment area in Los Angeles (CA) between March and September 1999. Eligibility criteria for participants included (1) no prior enrollment in the WIC Program, (2) 16 or fewer weeks of pregnancy, (3) self-identification as Hispanic or African-American, (4) ability to speak either English or Spanish, and (5) being at least 18 years of age. The study was restricted to Hispanic and African-American women because, based on national data, these groups have the highest prevalences of household food insecurity.

Additionally, resources did not allow inclusion of adequate numbers of other ethnic groups. A total of 558 women were asked to participate; 43.7 percent refused and 0.4 percent were deemed ineligible. The two primary reasons for refusal (accounting for 80 percent of refusals) were not having enough time and not being interested. A final sample of 313 women was recruited; 38 (12 percent) dropped out during the study. Individuals who left the study had significantly lower average household income than did those who remained (\$8,780 vs. \$11,660).

Interviews were conducted at the WIC center where women were seeking services. Specially trained WIC nutritionists conducted three interviews over the period of 1 year in conjunction with regularly scheduled WIC appointments. Interviews were conducted at enrollment into the WIC Program (first 16 weeks of pregnancy), near the end of the third trimester, and 3 to 6 months postpartum. Household food security status was assessed with the U.S. Food Security Survey Module (Hamilton et al., 1997). The initial interview assessed household food security status over the previous 12 months. Subsequent interviews covered household food security for the prior 3 months, the shortest possible interval between interviews. The following data were also collected:

- **Household demographic variables:** age, income, household composition, ethnicity, education, marital status, language preference, and country of origin (first interview);
- **Program participation:** participation in Medi-Cal (California's version of Medicaid public health care insurance), Food Stamp Program and/or Temporary Assistance for Needy Families, and use of food banks and pantries (first and third interviews);

- **Pregnancy outcomes:** parity, gestation weeks at study entry, gestational age of infant at birth, and infant-feeding practices (first and third interviews); and
- **Use of WIC food package as income transfer:** expenditures for groceries and other nonfood items and whether, and how, these had changed since entrance into the WIC Program (second interview).

The protocol for this study was approved by the UCLA institutional review board.

Data Analysis

Household food security status was assigned according to the Guidelines for Using the Core Food Security Module (Bickel et al., 2000), which has since been renamed the U.S. Food Security Survey Module. Households were classified into food security status categories as follows:

- **Food secure:** Household shows no or minimal evidence of food insecurity.
- **Food insecure without hunger:** Little or no reduction in household members' food intake is reported but adjustments to food management, including diet quality, are made.
- **Food insecure with hunger:** Food intake in the household is reduced to the extent that adults repeatedly experience hunger.
- **Food insecure with severe hunger:** Food intake is further reduced so that children experience hunger and adults report more extensive reductions in food intake.

When determining household food security status, we included child-referenced items differentially between

baseline and follow-up interviews. If the household had no children at the initial interview, household food security status was based on only 10 items; if other children were in the family, all 18 items were used. For the final interviews during the postpartum period, all 18 items were used to assess food insecurity.

Qualitative data on allocation of additional food dollars were analyzed by comparing response categories to identify linkages between them and to consolidate data into the most common themes (Bernard, 2002). Responses were then tallied and percentages computed by using the total number of responses as the denominator.

Statistical Methods

Statistical analyses were performed with SPSS for Windows (Version 11.0). Analysis of variance and chi-square analyses were used to explore relationships between household food security status and household demographics, program participation, and pregnancy outcome variables. Logistic regression was conducted to determine whether variables could be identified that would explain the process of attaining or not attaining household food security over the course of 1 year. Only participants who were food insecure at study entry and remained in the study through the postpartum period were included in this analysis (N = 110 or 40 percent of the sample).

After the first screening of bivariate statistics, variables in the model-building process included highest year of education completed, ethnicity, income at study entry, income postpartum, language preference, marital status, number of years in the United States, parity, participation in the Medi-Cal Program at study entry and postpartum, place of birth, postpartum infant-feeding method, and occurrence of miscarriage. To find the most

Overall, one-half (50 percent) of those participants who reported being food insecure at entry to the WIC Program were classified as food secure 1 year later (112 vs. 56).

parsimonious model, we tested both forward and backward stepwise methods. We used a p-value based on the likelihood ratio test of 0.15 as the criterion for variable removal and 0.10 as the criterion for variable entry (Hosmer & Lemeshow, 1989; Afifi & Clark, 1995). The outcome variable—food security status—was divided into two categories: participants who were food insecure both at study entry and during the postpartum period and those who were food insecure at study entry but achieved food security by the postpartum period. The fit of the model was assessed by using both graphing techniques (ROC curve) and classification-table methods.

Results

Basic characteristics of study participants by ethnic group and for the total sample at study entry are presented in table 1. Hispanic participants, compared with African-American participants, lived in larger households, had less formal education, entered the study a bit earlier in their pregnancies, had lower BMI at study entry, and were more likely to have recently immigrated to the United States. Additionally, Hispanic participants were more likely to be married or the equivalent (data not shown). There were no differences between groups in age or household income, although the larger household sizes of Hispanic women resulted in lower per capita income for these participants. Hispanic households reported lower rates of food security than did African-American households.

Changes in Food Security Status Over Time

Table 2 shows the reported changes in food security status from study entry to the postpartum interview for the 275 participants who remained in the study. Of these, 112 households (40.7 percent) were classified as

Table 1. Characteristics of study participants, overall and by ethnic group

Indicator	Total sample	Hispanic	African American
		<i>Mean</i>	
Age (years)	25.13	25.07	25.26
BMI (kg/m ²)*	26.44	25.90	27.17
Education (years)*	10.24	9.07	12.81
Gestational stage at study entry (weeks)*	10.83	10.18	12.27
Household size*	3.11	3.32	2.66
Income/year	\$11,912	\$11,317	\$11,317
		<i>Percent</i>	
Years in the United States			
0-5	37.4	52.1	5.1
6-10	16.9	23.3	3.1
>10	45.7	24.7	91.8
Food security status			
Food secure	57.5	54.4	64.3
Food insecure			
With no hunger	33.9	38.6	23.5
With moderate hunger	8.0	7.0	10.2
With severe hunger	0.6	2.0	0

*Significant difference between Hispanic and African-American participants based on F test or chi-square test; p < 0.01.

N = 313 (total sample); 215 (Hispanic) and 98 (African American).

food insecure at study entry; 23 (8.4 percent), with moderate or severe hunger. At the postpartum evaluation, 56 of the initially food-insecure households (20.4 percent of total participants) reported still being food insecure. Overall, one-half (50 percent) of those participants who reported being food insecure at entry to the WIC Program were classified as food secure 1 year later (112 vs. 56). The prevalence of food insecurity with moderate hunger also decreased from 8 percent at study entry to 2.9 percent postpartum. The prevalence of food insecurity with severe hunger (often including child hunger) remained the same (one family) throughout the study.

Reported Changes in Allocation of Food Dollars

During third-trimester interviews, participants were asked several questions regarding changes in personal shopping practices since enrolling in the WIC Program about 6 months previously. About two-thirds (66.4 percent) reported that they spent *less* money on groceries after enrolling (data not shown). Figure 1 shows the approximate amounts saved per month as reported by these participants. Food security status was not significantly related to reported expenditures for food and other items. Thus for about one-third of participants, the WIC food package appeared to be a complete

Table 2. Food security status at study entry, at postpartum interview, and transitional status

Food security status at <i>study entry</i>		Food security status at <i>postpartum interview</i>			
		Food secure (70.2)	Food insecure (29.8)		
			With no hunger (25.5)	With moderate hunger (3.6)	With severe hunger (0.7)
		<i>Percent</i>			
Food secure	59.3	49.8	8.0	1.5	0
Food insecure	40.7				
With no hunger	32.3	17.5	13.5	1.1	0.4
With moderate hunger	8.0	2.9	4.0	1.1	0
With severe hunger	0.4	0	0	0	0.4

n = 275.

supplement to the household budget because there was no reported substitution. For the other two-thirds, a variable amount of substitution was reported; however, about one-sixth (17.7 percent) of those who reported reduced spending for groceries from the household budget estimated the substitution at more than \$60 per month, the approximate value of the average monthly WIC food package.

Participants reported purchasing a wide array of items with the money they saved through foods already provided with the WIC food package (data not shown). The most common response, given by 30 percent of participants, was buying “items for the baby,” including baby clothes, food, supplies, medicines, diapers, hospital expenses, and saving the money for the baby’s arrival. Even though the question asked what participants spent their money on *other than groceries*, 27.6 percent of responses were buying “other foods,” primarily more fruit, vegetables, meat, chicken, fish, and yogurt. These foods might be interpreted as improving diet quality. In addition, some participants used the money to eat out. A number of participants used the money to pay bills (e.g., phone, rent, utilities, and

credit cards). Almost 13 percent of participants saved the money, some stating for “emergencies.” Other responses included doctor’s visits or prescriptions, school supplies and expenses, childcare, children’s shoes, transportation, and sending the money to family members living in the participant’s place of birth.

Predictors of Improvement in Food Security Status

A logistic regression model yielded two significant variables predicting change in food security status over time (data not shown). The odds of achieving food security for participants who had at least a high school education were 3.5 times those for participants with less than a high school education. For participants who took part in the Medi-Cal Program during their postpartum period, the odds of achieving food security were about three times greater, compared with participants who did not participate in Medi-Cal.

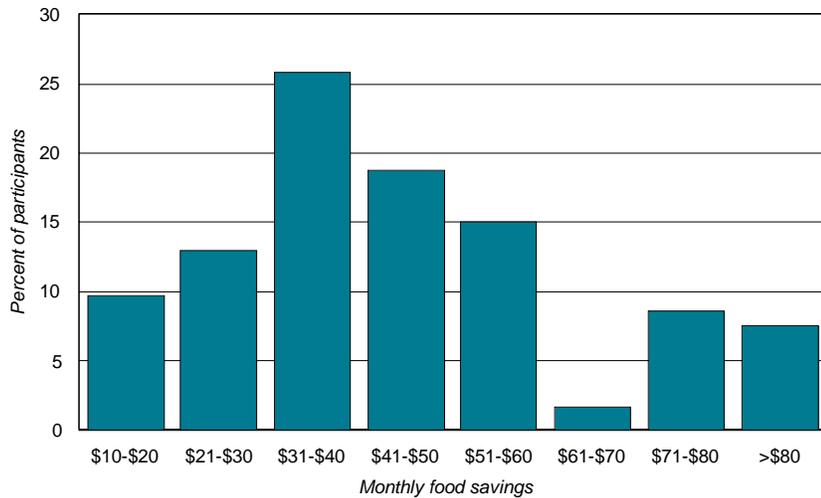
The model classified the data correctly 71.8 percent of the time. The area under the ROC curve encompassed 70.7 percent. The chi-square goodness-of-fit statistic showed that the model fit reasonably well (Pearson chi-square = .01, df = 1, p = 0.91).

We reviewed the family composition of those who reported their family food security status to be moderately food insecure and severely food insecure at all three interviews and found that all of these families had other children in addition to the newborn.

Discussion

There was considerable improvement in food security status for participants after 1 year on the WIC Program. Food insecurity decreased by half, and no participants who were initially food secure became food insecure. While we cannot completely attribute this improvement to WIC participation, our qualitative data on changes in expenditure patterns support such a conclusion. Among those who were food insecure at program entry, women whose households were most likely to move to food-secure status were either those with a high school education or more or those who had, by the postpartum period, taken advantage of Medi-Cal health insurance benefits. The strong influence of education in our findings is consistent with the literature both domestically and internationally. For example, studies demonstrating effective use of food

Figure 1. Perceived savings in groceries (per month) as a result of WIC benefits for people who spent less on food



n = 186.

assistance benefits show that women with education beyond high school are more efficient in managing their household food supply and therefore experience less food insufficiency (Basiotis, Johnson, & Morgan, 1987). Women with more years of education generally have a greater understanding of nutrition and the foods that comprise an adequate diet (Behrman & Wolfe, 1984; Behrman & Deolalikar, 1987).

Medi-Cal participation is perhaps one factor that can be directly attributed to participation in the WIC Program, because referral to health care and social services is one of the program's primary objectives. Our study demonstrated that the odds of achieving food security for participants who, by the postpartum period, took part in the Medi-Cal Program were almost three times greater than for participants who did not participate in Medi-Cal. It appears that participants who were more likely to take advantage of this health insurance program were also better able to manage their household resources to improve food security with the assistance of the WIC and Medi-Cal Programs.

All of the improvements in food security status observed in this study were among participants classified as food insecure without hunger or with moderate hunger. The prevalence of food insecurity with severe hunger was low but was unchanged across the time of the study. We speculate that food security with severe hunger indicates a level of resource constraint or household management deficit or both that is too great to be remediated effectively by the assistance that the WIC Program can provide. By conceptualizing food insecurity as a continuum with adverse effects more likely occurring at severe levels, we believe it appears that the WIC Program does enable, at least for many participants, improvements in food security at a time when vulnerability to the potential ill effects is greatest.

Our qualitative data on this relatively small sample shed some light on the question of the extent to which the WIC food package is actually providing supplemental food to the participants versus displacing monetary resources for other uses. It has been

suggested that the foods supplied by WIC may free household resources for other uses rather than truly supplementing them (Basiotis et al., 1998; Arcia, Crouch, & Kulka, 1990; Besharov & Germanis, 2001). Participants in our study commented that they used the additional money "for food, for the time her husband did not have any income" or that "the money [saved] substituted for what she couldn't buy before, [such as] bread, peanut butter, [or] more food."

While food insecurity is a self-reported (and unverifiable) attribute, it is our experience that reporting food insecurity is not easy for most people, and we do not anticipate that self-reports would be biased in the direction of overreporting. While the present study is not definitive, it demonstrates that rates of household food insecurity among a group of first-time WIC participants were significantly reduced after participation in the WIC Program for several months. Because food insecurity is a nutrition and health concern in its own right, identifying individuals who are food insecure may also be a more specific way of targeting individuals who are nutritionally vulnerable rather than assuming that nearly all low-income women in their childbearing years and children ages 2 to 5 years are at dietary risk.

Historically, WIC Program services that have been targeted to the most vulnerable have achieved the greatest success in improving the health and wellness of their clients (Abrams, 1993; Devaney, Bilheimer, & Schore, 1992; GAO, 1992; Rush et al., 1988). To continue to improve on this history of success, efforts should be concentrated on choosing appropriate criteria that will help the most needy (Besharov & Germanis, 2001).

This study has several limitations. The sample was limited and not

representative at the local, State, or national levels. Asian Americans and Caucasians were not included, and there was a larger-than-expected proportion of recently immigrated Hispanic participants. Similar to all research on the effect of the WIC Program, our study was constrained by lack of a control group. WIC participants self-select into the program. In Los Angeles County, an overwhelming proportion of low-income pregnant women participate in the WIC Program, which makes it effectively impossible to find a comparable control group. We considered a comparison group of first-time pregnant women who entered the WIC Program late in their pregnancy, but such participants are significantly fewer and likely to be systematically different from those who enter the program in their first trimester. Although this limitation is real, an effort to deal with this bias in this study was made by implementing a prospective, longitudinal design and by using a combination of quantitative and qualitative data.

effect of the WIC Program on the food security status of pregnant clients.

The recent IOM Report on Dietary Assessment in the WIC Program concluded that insufficient evidence existed to set a cutoff point for determination of what level of food insecurity would identify participants most likely to benefit from program participation. The results of the present study indicate that any level of food insecurity, as identified by the currently available instrument, is indicative of a potential to benefit. Indeed, there was less effect on the prevalence of food insecurity with severe hunger than on food insecurity without hunger or with moderate hunger, although the numbers were too small to conclude much about the dynamics. We speculate that for households on the margin of monetary and management resources, WIC may provide the boost at a critical time to move into a more secure situation, while food insecurity with severe hunger may indicate a level of constraint too severe to be addressed effectively by this program alone.

Conclusions

A 50-percent reduction in the rate of food insecurity was observed for this group of pregnant, first-time WIC participants who were in the program for 1 year. For participants whose food security status improved, it appears that the core components of the WIC Program had at least some beneficial effect. More educated participants and those who enrolled in public health insurance were more likely than others to experience improved food security status over time; other demographic variables, including ethnicity, household income, and immigration status, were not strongly related. While these results are not conclusive, they do provide some evidence for the positive

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