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Paper prepared for the conference “Income Volatility and Implications for Food Assistance Programs II” jointly sponsored by the National Poverty Center, Gerald R. Ford School of Public Policy, University of Michigan and the Economic Research Service, U.S. Department of Agriculture, November 16-17, 2006, Washington, D.C.

This research was supported by the Ford Foundation Research and Training Program on Poverty and Public Policy at the University of Michigan to the first author. The second author thanks the Robert Wood Johnson Health & Society Scholars program for its financial support.

The authors would like to thank Sheldon Danziger and Brian Cadena for their helpful comments and feedback.

## Abstract

This paper investigates how diverse family structures and income volatility are associated with food assistance participation among a sample of young low-income families (n=2,333). Using the Fragile Families and Child Well-being data, the study draws on a rich set of demographic, health, and economic hardship correlates of program participation, along with macroeconomic and policy variables, to investigate Food Stamp and WIC participation during a period of increased caseloads and economic volatility. Results suggest several maternal characteristics, but not child health or maternal health characteristics, predict food assistance program participation. Aside from previous participation in food assistance programs when the child was 12 months old, measures of economic hardships, such as experiencing food insecurity and being on public health insurance are associated with participation in the Food Stamp and WIC program, respectively, 18 months later. Stable marriage predicts WIC participation; however couples in a volatile family structure or stable family structure (other than marriage) are more likely to participation in the FSP. While an increase in income over time decreases FSP participation, a decrease in income increases WIC participation. Last, living in a state with high FSP participation rates increases the probability of FSP participation, yet decreases participation in the WIC program. Several policy recommendations and steps for future research are made.

Keywords: Food Stamp Program, WIC, Fragile Families, macroeconomic factors, Huber-White sandwich estimator, state fixed effects, Linear Probability Models (LPM)

## Food Assistance Program Participation among Fragile Families

The Food and Nutrition Service (FNS) administers the nutrition assistance programs of the U.S. Department of Agriculture, including both the Food Stamp Program (FSP) and the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). Though the goals of food assistance programs are to provide children and needy families better access to food and a more healthful diet, the FSP and WIC have differing structures, population targets, and eligibility requirements. FSP helps low-income households buy the food they need for a nutritionally adequate diet, and as the cornerstone of the Federal food assistance programs, it provides crucial support to needy households and to those making the transition from welfare to work. Determining eligibility for Food Stamps is complex, but is primarily based upon household income, the number of individuals who reside and eat together, and the availability of assets. Income limits are generally set to less than 130 percent of the federal poverty threshold.

WIC, on the other hand, is a Federal grant program to States that provides not only food assistance, but also nutritional counseling and health and social service referrals to low-income pregnant and post-partum women, infants, and young children. To be eligible for WIC, individuals must meet income guidelines (have income less than 185 percent of the poverty threshold), a State residency requirement, and be determined to be at “nutrition risk” by a health care professional. Those who participate, or have family members who participate, in certain other means-tested benefits programs such as the FSP or Temporary Assistance to Needy Families automatically meet the income-eligibility requirement. Whereas the FSP is a Federal entitlement program, WIC participation is limited by Federal funding and thus may not be able to serve all eligible persons. However, research suggests that no waiting lists for WIC exist in any of the states (Currie, 2003).

Nonparticipation in Federal and state means-tested programs is relatively common, with findings indicating that nonparticipation in FSP and WIC are quite high. A recent report (Barrett & Poikolainen, 2006) suggests that in 2004, of the 38 million individuals who were eligible for Food Stamps in an average month, 23 million, or 60 percent participated, leaving 15 million eligible individuals who chose to not participate. However, despite serving 60 percent of the eligible population, it provided 71 percent of the benefits that all eligible individuals could receive because those eligible for the highest benefits participated at higher rates than other eligibles.

WIC estimates present a similar story. In 2003, estimates from the Current Population Survey (CPS) indicated that almost 13.5 million people were eligible, with 63 percent of these eligibles children between the ages of one and four (FNS, 2006). Participation rates differ based on the individual, with children having the lowest rate (45 percent of eligible children), and infants having the highest rate (83 percent of eligible infants). Pregnant women, breastfeeding women, and post-partum women have participation rates of 70 percent, 68 percent, and 79 percent respectively.

Recent participation rates as those reported above, do not illustrate the variability in participation over the last ten to 15 years. Currie (2003), for example, estimates that of the population with incomes less than 130 percent of the Federal poverty threshold (those most likely to be eligible), in 1990, 1995, and 1998, 41 percent, 49 percent, and 39 percent respectively participated in the FSP. Similarly, FNS estimates suggest that following large declines in food stamp participation between 1994 and 1999, food stamp caseloads increased by 26 percent between 2000 and 2003. These large declines in participation in the 1990's (on order of 40 percent caseload reductions) coupled with the significant increases seen since 2000,

happened concurrently with changes in both food stamp policies and macroeconomic characteristics.

Despite increases in food stamp take-up, this period of economic instability was characterized by a smaller percentage of the potentially eligible households participating in the program. The number of eligible women, infants, and children for WIC, on the other hand have not changed much over time, however the participation rates did in a similar fashion to FSP rates. In 1994 47 percent of eligibles participated, with this proportion increasing to 61 percent in 1999 (FNS, 2006). Since the year 2000 the participation rate has remained relatively stable around 57 percent overall, with variation in rates between participants (women, infants, and children).

The end of the 1990s was characterized as the “age of affluence,” with a flourishing economy and extremely tight labor markets (Newman, 1999). This time period is known for rising income levels for workers at all wage levels, reductions in poverty rates, a soaring stock market (Mishel, Bernstein, & Allegretto, 2005); as well as a bottomed-out unemployment rate of 3.8 percent in April 2000, down from 5.6 percent in 1996 (Bureau of Labor Statistics, 2006). This strong economy in the later half of the 1990’s is often cited as a driving force in the reductions seen in FSP participation rates.

The trends described above are especially salient when nearly one out of five children in the U.S. resides in a household that is food-insecure, with a rate for poor children nearly double that for other children (Nord, Andrews, & Carlson, 2002). Given that the goals of the food stamp program are to end hunger and improve nutrition and health, and the goal of WIC is to safeguard the health of low-income women, infants, and children up to age five who are at

nutritional risk, numerous eligible children may not be receiving the benefits of the food assistance programs, and in return these programs may not be meeting their goals.

### Background

Given the changes and levels of participation rates in both the FSP and WIC, it is important to understand what characteristics, at the individual level, might be responsible for differences in food assistance program take-up. To do so, a necessary first-step is to identify the characteristics of those who actually participate in the programs. According to program data from 2004, the majority (50 percent) of Food Stamp participants are children, with the balance of recipients made up of working-age women (28 percent), working-age men (13 percent), and those over age 60 (eight percent) (Poikolainen, 2005). Twenty-nine percent of the food stamp households have earnings, and the majority (84 percent) did not receive cash welfare benefits; however 23 percent received Social Security benefits. Despite not receiving TANF benefits, FSP participant households earn little, as 88 percent are below the poverty line and 40 percent of all households have incomes below 50 percent of the Federal poverty threshold. The average monthly gross income for Food Stamp participant households was \$643, receiving an average of \$196 in monthly food benefits. In addition to extremely low levels of income, these households have few asset resources on which to draw, averaging about \$143 in resources (including the non-excluded portion of vehicles and the entire value of checking and savings accounts as well as any other savings).

WIC participant characteristics differ from those in the FSP because of age restrictions associated with this program, whereas the FSP is available to low-income households, regardless of age, disability, or nutritional need. In 2004 about 50 percent of WIC enrollees nationally were children, 26 percent were infants, and the remaining 24 percent were women (U.S.D.A., 2006).

Hispanics make up the modal group of participants (39 percent), with Whites (35 percent) and Blacks (20 percent) making up the majority of the balance. Migrant farm-worker families, in turn, constitute just under one percent of the WIC participant population. Compared to the U.S. population, WIC participants are much poorer and on average have incomes substantially lower than the WIC eligibility requirements. Around 60 percent of WIC participants have household income at or below the poverty threshold, with the national poverty rates about 13 percent; whereas 29 percent of the WIC participants had household incomes that were at or below 50 percent of the Federal poverty threshold. Finally, as expected, WIC participants have high levels of nutritional risk, with 62 percent having dietary risks (e.g. inappropriate nutrient intake) at certification. Forty-one percent of participants have anthropometric risks (e.g. low weight for height), while 16 percent and 10 percent have clinical and biochemical risks (e.g. hemoglobin below FNS criteria) respectively (risks are not mutually exclusive, as participants can have one or more risks at assessment during certification). While many of the economic characteristics of these households are not surprising given the eligibility requirements, what is striking is that the majority of participants receiving Food Stamps and WIC have incomes and assets that are significantly below the income caps for eligibility.

Recent empirical work suggests that several demographic characteristics are significantly associated with Food Stamp receipt, with much less known about characteristics associated with WIC receipt. In general this research indicates that non-participation is more likely among those eligibles who are more economically advantaged, both for Food Stamps as well as WIC. Much of this work compares the characteristics of those who participate with those who are eligible for program benefits but do not take-up the program.

Compared to those in the Food Stamp caseload, non-participating eligibles had higher average household income, and were more likely to have income from earnings and Social Security income (e.g. Bartlett & Burstein, 2004; Cunnyngham, 2002; Gleason, Schochet, & Moffitt, 1998). Further, TANF participation is more common among participants than the non-participating eligible population. Non-whites and those with less than a high school education are more likely to participate, as are those with larger families and very young children (Cancian et al, 2001; Ponza et al, 1999). Additionally, despite having incomes below the poverty threshold, non-participants are more likely to own a car (Zedlewski & Gruber, 2001), those in urban areas are less likely to participate compared to their rural counterparts (McConnell & Ohls, 2000), and food insecurity is positively associated with participation (Huffman & Jensen, 2006).

Less is known about the characteristics of those participating in WIC versus those who are eligible but do not take-up. Bitler, Currie, and Scholz (2002) find conditional on income that being Hispanic and being married are positively associated with WIC take-up whereas residing in an urban community and educational attainment is negatively associated with WIC participation. Other analysis indicates that children on WIC are more likely to have health insurance compared to eligible children not on WIC, primarily as a result of Medicaid (Burstein, et al 2000).

Another set of literature stemming from welfare reform policies of the mid 1990's, suggest that differential impacts for immigrants may also exist with respect to food assistance program participation. Caseloads for welfare and other benefit programs fell dramatically in the wake of welfare reform (Blank, 2002), with the declines steeper for immigrants than for native-born citizens (Fix & Passel, 1999) even when immigrant families remain eligible for assistance. In fact, most (80%) children in immigrant families, having been born here, are U.S. citizens, and

are therefore eligible for government assistance on the same basis as all other U.S. citizens (Hernandez, 2004). A phenomenon, which has been termed the “chilling effect,” is thought to reflect immigrants’ confusion about their eligibility for assistance or their fear that benefit use will adversely affect their chances for citizenship or even their opportunities to re-enter or stay in the U.S. (e.g. Capps, 2001; Fix & Passel, 1999). For example, parents who are not citizens may not be aware of their U.S.-born children’s eligibility for important benefits or may face other administrative barriers to accessing programs after leaving welfare. This is a particular problem among low-income parents with low education, as this population has a high proportion of non-citizen parents (Hernandez, 2004). Welfare reform policies originally made most legal immigrants ineligible for food stamps until they attained citizenship. These components of the law were never fully implemented, however, as the Agriculture Research, Extension and Education Reform Act of 1998 restored Food Stamp benefits to nearly 1/3 of the pre-enactment immigrants who became ineligible after 1996 (Carmody & Dean, 1998). As a result of these changes, immigrant families faced a vastly different policy environment—one marked by a confusing and ever-changing set of rules concerning their eligibility to access social institutions and public assistance (Zimmerman & Tumlin, 1999). This confusion about eligibility and fears about immigration status may also exist with respect to FSP and WIC participation years later.

Extant literature suggests that marital status is an important determinant of participation in the FSP and WIC, namely where being married is associated with low food stamp participation rates whereas it is associated with higher WIC participation. There is, however, a lack of work examining cohabitation, bringing to mind the question of whether it is simply the presence of another adult that impacts the likelihood of participation; or because it is more difficult to capture the income of cohabitators these families may look more like single mothers

and thus behave in ways different than their married counterparts. The analysis herein will document the extent to which an important lifecourse event, family structure change, influences program participation among new parents supplementing the current empirical literature.

This paper adds to the existing research on who participates in the FSP and WIC in several other important ways. By examining a rich set of demographic, health, and economic hardship correlates of participation, that are not readily available in data sets commonly used to study food assistance program participation<sup>1</sup>, this paper will help identify factors associated with participation during a period of increased caseloads and economic volatility. This knowledge is particularly relevant given the data examined herein consists of a low-income population with children, those who are most likely to be food-insecure.

Finally, this paper will simultaneously examine these associations with important information on economic and policy variables. Controlling for economic and policy variables will not only provide researchers and policymakers with information on the impact of these variables, but also by controlling for them, the individual- and family-level influences can be evaluated. This stylistic analysis will enable us to understand some of the factors associated with selection into food assistance programs, qualities that are important from a policy perspective.

Taken together this analysis will improve our understanding of the selection factors for food assistance program participation, adding to the extensive and high-quality literature on FSP participation and a lesser literature on WIC participation. In turn, this analysis will also aid researchers who question the importance of food stamps and other nutrition programs on child and adult physical health.

## Method

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<sup>1</sup> Nationally representative datasets commonly used to study food assistance program participation are the Survey of Income and Program Participation (SIPP), the Current Population Survey (CPS), and the Panel Study of Income Dynamics (PSID).

## Sample

Data for this paper are drawn from the *Fragile Families and Child Wellbeing Study* (FFCW), a longitudinal study that examines the conditions and capabilities of new unmarried parents and the welfare of their children. The FFCW study follows a cohort of 4,898 births (3,711 nonmarital and 1,187 married marital) born in U.S. cities between 1998 and 2000. Cities were selected using a stratified random sample of populations of 200,000 or more and were grouped according to their policy environments and labor market conditions in order to ensure diversity in context. When the weighted, the data is representative of all non-marital births in the 77 cities with populations over 200,000 in 1999<sup>2</sup>.

All mothers and the majority of the fathers were interviewed soon after birth of their children. Follow up interviews were conducted when the child was 12, 30, and 48 months old (Reichman, Teitler, Garfinkel, & McLanahan, 2001)<sup>3</sup>. Response rates for mothers were 85% at baseline, 91% at 12-month-follow up, and 89% at the 30-month follow-up. To examine the characteristics associated with FSP and WIC participation among a low-income population, these analyses focus on mothers who participated at the 12-, and 30-month follow-up surveys and provided information on demographic, household, socioeconomic characteristics ( $n = 4,629$ ). Mothers who were not part of the nationally representative sample were also excluded (1,284 observations) to ensure our analysis is representatives of non-marital births in large urban centers. Mothers who reported multiple births (95 observations) or were not living with the child

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<sup>2</sup> There are 20 cities in the data set, however 4 cities (Oakland, CA; Detroit, MI; Newark, NJ; Milwaukee, WI) are not part of the nationally representative sample. The 16 cities that are used in the analyses and part of the nationally representative sample are: San Jose, CA; Jacksonville, FL; Chicago, IL; Indianapolis, IN; Baltimore, MD; Boston, MA; New York, NY; Toledo, OH; Philadelphia, PA; Pittsburgh, PA; Nashville, TN; Corpus Christi, TX; Austin, TX; San Antonio, TX; Norfolk, VA; Richmond, VA.

<sup>3</sup> The 48-month data is not yet publicly available.

at either wave (92 observations) were also excluded from our analyses.<sup>4</sup> Mothers with missing values on the dependent variables (program participation) at either interview were also excluded (433 observations). For observations that were missing less than one percent of the covariates, observations were dropped (392 observations), whereas for observations that were missing greater than one percent, (e.g., mothers' race – 2 percent; own reliable car – 9 percent) dummy flags were constructed for those covariates (Nepomnyaschy, forthcoming). The final analysis resulted in a sample of 2,333 mothers.

#### *FSP and WIC Participation.*

At the 12-month and 30-month surveys mothers reported on whether or not they had participated in the Food Stamp Program and WIC in the past year (or since the child's first birthday at the 30-month follow-up). Two dichotomous variables were created, with one variable representing FSP participation and one representing WIC participation at the 30-month survey.

#### *Independent Variables*

A number of child and mother demographic characteristics and household measures were reported by mothers, along with child and maternal health, economic hardship measures, indicators of family structure, and household income characteristics. These variables are used in the regression analyses to control for factors found in the existing literature to be associated with food assistance participation.

*Child, maternal, and household characteristics.* Child's gender was asked at time of birth (girl omitted) and child's age in months was measured at the 12-month survey. Mother's race measured at baseline includes Non-Hispanic White, Hispanic, Non-Hispanic other race (e.g.,

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<sup>4</sup> These exclusion criteria were followed because a) the survey follows only one focal child and b) we are interested in program participation in families where children reside.

groups Asian, American Indian, and other), whether this variable was missing, and Black as the omitted. Mother's age in years was measured at the 12-month follow-up as well as her education, employment, and citizenship. Education is captured with three dichotomous variables: less than high school, high school, and any college (omitted) (Osborne & Knab, 2006). Employment is a continuous variable that captures the number of weeks worked in the past year.

Three dummy variables are used to measure mother's citizenship and are created from two questions posed in the birth and 12-month surveys. Mothers are asked if they were born in the U.S., and if they state that they were, they are considered U.S. born. For those mothers who state that they were not born in the U.S. they are asked in what year they came to the U.S., and therefore are further distinguished as foreign born and arriving in the U.S. before 1996 and foreign born and arriving in the U.S. after 1996 (omitted)<sup>5</sup>. Because all children were born in the U.S. they are eligible for programs, but due to changes in the welfare reform legislation, those entering the U.S. after 1996 may face a different policy environment and eligibility. Finally, the number of minors living in the household was measured at the 12-month survey and ranges from one to four<sup>6</sup>.

Additionally, we include state-level fixed effects to account for any time-invariant state-level effects that might be associated with program participation.

*Child and maternal health.* Measures of the child's health were measured at baseline with the exception of breastfeeding which was measured at the 12-month follow-up, and are all based on mother reports. Mother's reported if the child's health in general is excellent, very good, good, fair, or poor at baseline. Responses range from one to five with a higher value indicating

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<sup>5</sup> The survey does not adequately assess mothers' citizenship, and therefore no distinctions can be made. All children, however, because they were born in the U.S. are by definition citizens.

<sup>6</sup> Because of skewness, this variable was top coded at four, where four indicates there were four or more children residing in the household. These children are not necessarily the mothers,' but could be her nieces/nephews, brothers/sisters, or other family or non-family member of the household

poorer health, and this variable is recoded to indicate “poor health”. Following Currie and Stabile (2002), if the mother stated that the child is in “good”, “fair”, or “poor” health they are coded as in “poor” health. Children’s health is also measured with an indicator as to whether or not they were low birth weight (LBW). Children who weighed less than 2,500 grams at birth were classified as LBW, whereas children who weighed greater than 2,500 grams not LBW (omitted). Mothers also reported whether their child had any physical disabilities, and a dichotomous variable indicating whether or not she responded in the affirmative was created (having no physical disabilities is omitted). Finally, mothers report on whether or not the child was *ever* breastfed (never breastfed is omitted).

Two indicators were used to measure mother’s health at the 12-month follow-up. The first indicator is the self-rated measure, identical to the measure of children’s health. Mothers who stated that they were in “fair” or “poor” health were coded as having “poor” health. The second indicator of mother’s health is a measure of depression derived from the Composite International Diagnostic Interview Short Form (CIDI-SF) (Walters et al., 2002). This measure is designed to determine feelings of sadness and depression, loss of interest in hobbies and pleasurable activities, and being tired or low on energy. A dichotomous measure of depression was created where mothers who endorsed three or more symptoms were classified as probable cases of depression, while mothers who endorsed two or less symptoms were coded as not-probable (omitted)<sup>7</sup>.

*Economic hardship.* Seven variables were created to depict various types of economic hardship including material hardship, food insecurity, financial support, agency support, health insurance, housing, and transportation. Seven items, taken from the 12-month survey, regarding experiencing household hardship in the past 12 months were used to measure material hardship

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<sup>7</sup> For more information refer to CRCW (2006).

(Kenney, 2003). These seven items include (1) receiving free food or meals, (2) not paying the full amount of rent or mortgage, (3) having been evicted from home or apartment for not paying the rent or mortgage, (4) not paying the full amount of gas, oil, or electricity bill, (5) service turned off by the gas or electric company, (6) telephone service disconnected, and (7) not visiting a doctor or going to the hospital because of cost<sup>8</sup>. Responses to these items were summed and a dichotomous variable was created based on experiencing any hardships with experiencing no hardships as omitted.

Since the Fragile Families 12-month survey questionnaire does not include measures of food insecurity, two items were used as a proxy for food insecurity. Families were considered food insecure if either the mother or child experienced hunger in the past 12 months (Knab, McLanahan, Garfinkel, 2006), where neither experienced hunger is omitted.

Financial support is a dichotomous variable for whether mothers reported receiving financial support from other people besides than the father (did not receive financial support omitted).

Mothers also reported whether they or their children are currently covered by Medicaid or another public, federal, or state health assistance program that pays for medical care (not Medicaid covered omitted—includes those with private insurance and the uninsured).

Home ownership was also used as a means of determining economic hardship, as well as a proxy measure for assets. Four mutually exclusive variables were created to measure home ownership: mothers could either own their own home, live in government assisted housing, live with friends or family members, or rent the home in which they and the child reside (omitted).

Finally, mothers indicated whether they (or their spouse when applicable) had a car they could

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<sup>8</sup> The simple additive scale has been used previously by Mayer and Jencks (1989). To further test the appropriateness of using these items together, a reliability test was conducted on the 7 items and an alpha of .62 was computed.

rely on. Three mutually exclusive variables were created to measure if the family had a reliable car (omitted), had no reliable car, or if this variable was missing.

*Family structure and income volatility.* Mothers' marital status and income were recorded in both the 12-month and 30-month surveys. Mothers were asked whether they were married to the focal child's biological father or another man, cohabiting with the focal child's biological father or another man, or single at both interviews. Several mutually exclusive dichotomous variables were created to measure changes in family structure. If mothers were married, cohabiting, or single at both interviews, they were considered either in a stable marriage (omitted), a stable cohabiting relationship, or a stable single relationship, respectively. Mothers who were single at the 12-month survey but then either reported being in a cohabiting relationship or a marriage at the 30-month survey were classified as forming a union. Finally, those who reported being married or cohabiting at the 12-month interview but indicated they were single in the 30-month interview were classified as dissolving a union<sup>9</sup>.

Income volatility was also measured using mothers' responses in both the 12-month and 30-month survey, and is created from several questions in each survey. First, mothers were asked to add up their household income before taxes from all sources (from everyone living in the household) including income from jobs and public assistance, as well as any other sources such as rent, interest, etc. Mothers who responded to this question provided a continuous measure of income. However, some mothers indicated that they did not know or were unsure, and were then asked a follow-up question designed to elucidate their income by providing nine potential ranges in which their income fell. These ranges were (1) less than 5,000; (2) 5,001 to 10,000; (3) 10,001 to 15,000; (4) 15,001 to 20,000; (5) 20,001 to 25,000; (6) 25,001 to 30,000;

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<sup>9</sup> Variables that explored more finite changes in family structure were not created because of small cell sizes. For example, not enough of the same cases reported being married at the 12-month survey and reported being single at the 30-month survey.

(7) 30,001 to 40,000; (8) 40,001 to 60,000; and (9) more than 60,001. Those who provided a continuous measure of income were placed into the above-mentioned range. To measure income volatility (change over time), a mother was reported to have increases (decreases) in income between the 12-month survey and the 30-month survey if the category of income in which she belonged increased (decreased). Mothers who reported incomes in the same range at both surveys were considered to have had no changes in income (omitted)<sup>10</sup>.

*Macroeconomic conditions and policy variables.* Finally, models also control for area unemployment and FSP participation rate characteristics that existed at the time of the 12-month survey (between 1999 and 2001). Area unemployment rates are the annual unadjusted local area unemployment rates provided by the Bureau of Labor Statistics for a given metropolitan area (<http://data.bls.gov/cgi-bin/surveymost?la>).

The USDA's Food and Nutrition Service (FNS) calculates state-by-state participant access rates (PARs) for the Food Stamp Program. The PARs measure the extent to which low-income people (eligibles) are participating in the food stamp program. PARs are one of the criteria for monetary awards that USDA makes under the high performance bonuses established in the 2002 Farm Bill. Because of difficulties in precisely estimating participation rates (see <http://www.fns.usda.gov/oane/MENU/Published/FSP/FSPPartState.htm>), this paper will use the State's location in the distribution compared to other states. For example, in 2003 25 percent of the states had rates above 62 percent and 25 percent had rates below 51 percent, with the balance falling somewhere in between. This method to ranking the states was applied in one of these

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<sup>10</sup> This operationalization, unfortunately, misses some important income changes in both directions. For example, a mother could have actually had income of 5,001 in the 12-month survey and 10,000 in the 30-month survey and this 100 percent increase in income would have been considered "no change" based on our formulation. Similarly, a mother could have had an actual income of 5,001 in the 12-month survey and 5,000 in the 30-month survey and is thus coded as having a decrease in income, when this decline is about one dollar.

three mutually exclusive and collectively exhaustive categories: the state is in the top 25 percent, the state is in the middle 50 percent (omitted), or the state is in the bottom 25 percent.

## Results

### *Sample Description*

Table 1 presents the weighted means and standard deviations of all variables in the analysis, in both the entire sample ( $N = 2,333$ ) as well as the descriptive statistics for just those who participate in FSP ( $n = 878$ ) and just those who participate in WIC ( $n = 1,251$ ). Fifty-six percent of the children in our sample are boys, and are on average 14 months old at the 12-month survey. Mothers on average are 28 years of age at the 12-month survey, with equal proportions non-Hispanic White, Hispanic, and Black. Forty-two percent of the mothers had taken some college courses and 58 percent were married at the 12-month interview. Mothers on average worked 21 weeks the previous year, and 38 percent of the sample had household incomes below \$20,000. Fifty-five percent of the sample was married at both interviews and approximately 40 percent had either an increase or no change in household income. About one-quarter of the sample participated in the FSP at the 12-month and 30 month-survey, with 17 percent of those who participated at 12-months also reporting participation at 30-months (data not shown). Fifty-nine percent of the sample reported participating in WIC in the 12-month survey, whereas this declines to 47 percent of the sample in the 30-month survey, with 42 percent participating at both interviews (data not shown).

*FSP participants.* Table 1 also presents the weighted descriptive statistics for those sample members who participated in the FSP in the 30-month survey. Not surprisingly, participants are disadvantaged compared to the total sample. Namely, mothers who participate are younger and more likely to be Black. Further, FSP participants both have less education and

worked fewer weeks the previous year, and are more likely to be cohabiting or single at both interviews.

*WIC participants.* Finally, Table 1 presents the weighted means and standard deviations for those sample members who participated in WIC in the 30-month survey. Again, like FSP participants, WIC mothers were younger than the total sample, but were more likely to be Hispanic. Further, WIC mothers were more likely to be married at both points in time, and they were more likely to have not been born in the U.S.

### *Regression Analyses*

To examine the relationship between individual and household characteristics and FSP and WIC participation, we estimate five main regression models (Tables 2 and 4), and three additional robustness check models (Tables 3 and 5). Because the outcome (whether the mother indicated that she or her children participated in FSP or WIC) is dichotomous, we employ linear probability models (LPM). While our analyses are robust to logistic regression, we present LPMs because of the ease of interpretation of the coefficients. In Model 1, we examine the association between the child, maternal, and household characteristics and participation, and add in child and mother health as well as economic hardship to Model 2. In Model 3 the variables from Model 2 are included as are the dichotomous variables representing family structure changes, whereas Model 4 includes the variables from Model 2 as well as the income volatility measures. Finally Model 5 includes all of the control variables from Model 2 as well as the family structure change variables and income volatility measures.

Three additional robustness check models (Tables 3 and 5) were estimated in Models 6 - 8. These models included macroeconomic factors including the average annual unemployment rate for the metropolitan area and state-level FSP participation rates. Model 6 includes all the

variables from Model 5 as well as the area unemployment rate, whereas Model 7 includes all the variables from Model 5 as well as state-level FSP participation rate. Model 8 controls for variables in Model 5 and includes both area unemployment rate and state-level FSP participation rate.

All analyses (except for Model 1) control for an indicator variable representing whether or not the mother said she was participating in the food assistance program at the 12-month survey. Including the baseline value of the participation measure as an independent variable provides a proxy for (1) unmeasured genetic influences; (2) any selection characteristics that discriminate mothers with different characteristics that are related to participation (but only to the extent that these unobserved characteristics are perfectly captured or determined by the baseline value of the outcome); and (3) prior participation, which would at least partially reflect the effects of earlier family decisions (Cain, 1975). It is important to note that inclusion of essentially a lagged dependent variable in the present analysis might not necessarily control for random unobserved aspects of well-being—especially unobserved characteristics that vary over time—that could bias the effects of family structure and income volatility. This approach also does not control for parental or family level unobserved characteristics. This could potentially bias the estimates for family structure and income on participation.

Descriptive statistics and regression results were calculated using the weights provided by the FFCW 30-month survey, and the regressions are adjusted for the complex survey design of the FFCW. All regression analyses correct the standard errors using the Huber-White sandwich estimator of the variance to account for multiple observations within a city (clustering on the city identifier). Finally, all analyses include state-level fixed effects to control for variation between states.

*FSP participation.* Table 2 reports the findings for the five regression models for FSP participation. F-tests after the regression were conducted to estimate whether the coefficients on control variables were significantly different from each other (e.g. whether or not non-Hispanic differed from Hispanic, etc.) rather than just significantly different from the omitted group. Same letter subscripts indicate differences between coefficients at  $p < .05$ .

Model 5 indicates that non-Hispanic White mothers are 4 percentage points less likely to participate in the FSP compared to Black mothers. Mothers that have less than a high school education are nine percentage points more likely to participate in the FSP compared to mothers who have any college education, and are also more likely to participate than mothers who received a high school education. For every additional week employed households are less than one percentage point less likely to participate in the FSP. Mothers who immigrated to the United States before 1996 are less likely to participate in the FSP compared to U.S born mothers.

None of the child or maternal health measures are significantly associated with FSP participation in any of the models presented in Table 2. However, experiencing food insecurity or participating in the FSP when the child was 12 months old increases FSP participation when the child is 30 months of age by nine and 36 percentage points respectively. Regardless of family structure, children residing with married parents are less likely to live in household that participate in the FSP. Finally, an increase in income decreases participation in the FSP by eight percentage points.

Because states differ in their policy and economic environments, we used area unemployment rates and state-level FSP participation rates from the USDA and FNS as means to control for characteristics that might influence participation rates at the family-level and these findings are reported in Table 3. Results are robust to inclusion of these variables, and these

variables are themselves significantly associated with FSP participation at the individual-level. Specifically, families who live in states who are in the top quartile of FSP participation are four percentage points more likely to participate in the FSP.

*WIC participation.* Table 4 presents the findings from five regressions modeling WIC participation. Model 5 indicates that for every additional month in age for the child and every additional year in mother's age, households are approximately one percentage point less likely to participate. Mothers of other race are 12 percentage points less likely than Black mothers to participate, and U.S. born mothers are 15 percentage points less likely to participate in WIC compared to mothers who immigrated to the United States after 1996.

Maternal health plays a significant role in WIC participation as mothers who display symptoms of depression are three percentage points less likely to participate in the WIC program. Public health insurance and food assistance participation (both FSP and WIC) when the child is 12 months old increases participation in WIC when the child is 30 months old by 25 percentage points (and 10 and 34 respectively). Similarly, mothers who receive housing assistance are also more likely to participation in WIC.

Mothers who are single at both the 12-month and 30-month survey are four percentage points less likely to participate in WIC compared to mothers who are married at both points in time. Declines in income are also significantly associated with WIC participation.

Robustness checks presented in Table 5 suggest that results are fairly similar with the exception that child age, mother depression, and government assisted housing are no longer significant in predicting WIC participation. On the other hand, households who live in states that are in top quartile of state-level FSP participation are eight percentage points less likely to participate in the WIC program.

## Discussion

The present study examined the relationship between individual, family, and macroeconomic and policy factors and food assistance program participation among new low-income parents. An important contribution of this study is its use of a unique dataset that has not been used to examine food assistance participation; a dataset that has excellent measures of individual-level characteristics namely detailed demographic, health behavior, and economic hardship measures. Further, this study represents a complement to existing analysis focused on using the Survey of Income and Program Participation, the Current Population Survey, and the Panel Study of Income Dynamics which have traditionally been used to study food assistance programs and important in understanding selection in programs. These data also include an over-sample of low-income families with children, thus better representing the food insecure and the target population of the food stamp program.

In general we find several maternal characteristics and measures of economic hardship to be pertinent in predicting food assistance program participation. Results suggest that households where a mother has less than a high school education, that are food insecure, participated in the food stamp program at 12 months, and live in states with high participation rates are more likely to participate in the food stamp program; while employment and increase in income decrease participation. For WIC, households are less likely to participate with every additional year in mother's age, mothers of other race, and mothers born in the U.S.

Interestingly, we find little support for the relationship between child or maternal health and food assistance program participation. Although some of these children may have been born at a lower birth weight or had been nutritionally at-risk when they were first born, over time child health may not be as strong of an indicator, or a means, of food assistance participation

once economic hardship and macroeconomic and policy factors are accounted for. However, children's health must be further investigated as an *outcome* of food assistance program participation. Future research should investigate children's health from families who participated in the food assistance program compared to those who do not.

We do, however, find an association between mother's mental health (measured as depression) and reduced likelihood of WIC participation, a reduction of approximately six percent. Extant literature suggests an association between depression and food insecurity as well as eating habits. Additionally, while there is little evidence that maternal depression can serve as an indicator of benefit from WIC participation, an Institute of Medicine (Institute of Medicine, 1996) report suggests that it is likely that depressed women and their families would benefit from participation in the WIC program. Our findings indicate that depression is reducing the likelihood of participation, and that despite depression not currently in use as a nutrition risk criterion in the WIC program, it could be worthy of investigation.

Just as previous research has noted (e.g. Gunderson & Oliveira, 2001), food insecurity is associated with increased probability of FSP participation in the Fragile Families sample. Our findings suggest that food insecurity is associated with a 16 percent increase in FSP participation, controlling for all other factors. This finding adds to the literature suggesting that there is adverse selection into the Food Stamp Program, and that studies that examine the impact of FSP participation on outcomes need to account for this bias.

Our findings also point to the role of Medicaid (and state public health insurance programs) and participation in WIC. Specifically, reported public insurance enrollment is associated with a 53 percent (25 percentage point) increase in WIC participation rates. This conclusion supports previous findings that Medicaid policies that affected take up among infants

had long term effects on participation in the WIC program (Bitler & Currie, 2004). Bitler and Currie hypothesize that (1) higher Medicaid cutoffs for infants affect childhood WIC participation because most children who use WIC begin as infants, and Medicaid confers automatic eligibility for WIC, and (2) that states that used State Child Health Insurance Programs (SCHIPs) expansions also expanded eligibility for WIC among children, leading to expanded WIC coverage among children of higher income levels than those of the typical WIC participant.

Finally, the findings indicate important differences between the U.S. born and immigrant populations within the Fragile Families dataset. First, we found that mothers who were foreign born and arrived in the U.S. prior to 1996 are less likely to participate in the FSP compared to both U.S. born mothers as well as immigrants who arrived in the U.S. after 1996. Historically, immigrant mothers have been less likely than US-born mothers to receive cash welfare and Food Stamps (Fix & Passel, 1999; Padilla, Radley, Hummer, & Kim, 2004). However, given disproportionately higher levels of need, immigrants made up an increasingly larger percentage of the welfare caseload in the years leading up the 1996 reforms (Bean, Van Hook, & Glick, 1997; Borjas & Hilton, 1996). Following welfare reform, eligible children of immigrant non-citizens experienced more persistent and higher levels of food insecurity than the children of citizens, despite a decrease in participation in the FSP. For example, between 1996 and 2001, non-citizen participation in the FSP dropped from 7.1 percent to 3.7 percent, while Food Stamp participation by citizen children with a non-citizen parent dropped 75 percent between 1994 and 1998 (Fix & Passell, 1999). Thus changes in the welfare reform policies may have led to confusion regarding eligibility for public assistance and this in part may reflect their lower rates of Food Stamp participation. This is especially important as following welfare reform, eligible children of immigrant non-citizens experienced more persistent and higher levels of food

insecurity than the children of citizens, and this be a result of their lower rates of Food Stamp participation (Van Hook & Balistreri, 2006).

Second, we found that U.S. born mothers are less likely to participate in WIC compared to immigrants who arrived in the U.S. after 1996. This finding could be attributable to differences in WIC eligibility compared to other government programs in that U.S. citizenship is not a requirement, and illegal immigrants are in fact eligible. These differences in participation in the FSP and WIC are especially interesting as receipt of nutrition assistance through FNS does not make an immigrant a “public charge.”

### *Family Structure*

As one might have expected given findings in the existing literature, the associations between family structure and food assistance program participation differed for FSP and WIC. The dynamic family structure measures created from the available data including cohabitation at both surveys, single at both surveys, dissolving a union (whether a marriage or cohabiting relationship) and forming a union (whether a marriage or cohabiting union) all differed from in their FSP participation compared to mothers who were married at both surveys. Specifically, mothers in all family structures were more likely to participate compared to married mothers. Further testing suggested that mothers who were in a cohabiting relationship at both points in time are not significantly different than mothers who are single at both points in time. Thus, cohabiting couples look like single households when participating in the FSP.

On the other hand, those mothers in stable cohabiting relationships did not significantly differ in their WIC participation compared to those who are consistently single or those who are in stable married relationships. However, mothers in stable married relationships significantly differ from those who are single at both surveys in their WIC participation, with participation

rates nine percent higher. These findings mirror those of Bitler, Currie, and Scholz (2002) who find that households with married respondents were more likely to participate in WIC than those with single respondents which may reflect a lowered ability to deal with the transactions costs associated with program participation.

### *Income Volatility*

As one might expect, changes in income influence participation in food assistance programs. Findings from the analyses with income changes from the 12-month to the 30-month interviews suggest that families that experience increases in income concomitantly experience declines in FSP participation, whereas families who experience decreases in income experience increases in WIC participation. Even when controlling for rich individual and family-level correlates of food assistance program participation, income volatility is significant driving force in determining participation.

### *Macroeconomic and Policy Variables*

Food assistance program participation, both Food Stamps and WIC, is not correlated with area unemployment rates. This finding parallels Bitler, Currie, and Scholz (2002) who found that WIC participation was not strongly correlated with state-level indicators of economic need such as poverty or the unemployment rate. It is important to note that our measures of unemployment are at the statistical metropolitan area as opposed to the state level unemployment which often masks great differences across urban and rural areas. However, this finding differs from other studies that document the role of the economy in Food Stamp participation. These studies suggest that one percentage-point increase in the unemployment rate led to a three to four percent increase in Food Stamp caseloads (Hanson & Gunderson, 2002). What is important to

note, however, is that these studies did not control for the individual-level demographic, health, and hardship variables that we are able to with the Fragile Families data.

We also find that state participation rates are associated in the expected direction with Food Stamp participation. In particular, those families who reside in states with the highest participation rates are more likely to participate in Food Stamps compared to families living in any other state, regardless of their participation rates. Those families residing in states with the lowest participation rates do not statistically differ in FSP participation compared to families residing in the middle-performing states.

Finally, we find that families residing in the states with the highest participation rates, unlike Food Stamp participation, are *less* likely to participate in WIC compared to those living in states with the lowest participation rates. While using FSP participation rates to proxy for WIC participation rates is not accurate (Commission on Behavioral and Social Sciences and Education, 2001) because the requirements for FSP are much more stringent, the negative association is unexpected.

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Table 1 Range, Weighted Mean or Percentages and (Standard Deviations) of Study Variables for total sample, food stamp participants, WIC participants

	Range	Total Sample (n = 2333)	Food Stamp (n = 878)	WIC (n = 1251)
<i>Child Characteristics</i>				
Male		56%	59%	58%
Age (months)	(9-30)	13.62 (.11)	13.65 (.18)	13.39 (.15)
<i>Mother &amp; Household Characteristics</i>				
Age (years)	(15-47)	28.20 (.34)	25.07 (.36)	26.14 (.33)
Non-Hispanic White		31%	12%	15%
Hispanic		31%	33%	40%
Black		30%	51%	37%
Non-Hispanic of other race		5%	2%	4%
Less than high school education		26%	45%	34%
High school education		32%	35%	43%
Any college		42%	20%	24%
Cohabiting at 12 months		22%	43%	31%
Single at 12 months		19%	37%	24%
Married at 12 months		58%	20%	45%
Employment (weeks)	(0-52)	21.08 (1.10)	15.91 (1.45)	16.50 (1.38)
Income < \$20,000		38%	75%	55%
Born in U.S.		75%	85%	66%
Immigrant (pre 1996)		18%	9%	22%
Immigrant (post 1996)		7%	6%	12%
Number of children in the household	(1-4)	2.11 (.05)	2.38 (.08)	2.14 (.06)
<i>Children's Health</i>				
Poor health		14%	19%	19%
Low birth weight		8%	8%	8%
Physical disability		2%	3%	2%
Breastfed		64%	51%	57%
<i>Mother's Health</i>				
Poor health		12%	17%	15%
Depression		14%	17%	13%
<i>Economic Hardship</i>				
Material hardship		32%	45%	42%
Food insecurity		4%	8%	7%
Financial support		34%	46%	41%
Agency support		35%	67%	44%
Public health insurance		50%	83%	77%
Home ownership		28%	2%	10%
Home government assistance		9%	21%	15%
Home other assistance		6%	10%	8%
Rent		57%	67%	67%
Reliable car		60%	29%	49%
No reliable car		34%	59%	44%
<i>Family Structure Volatility</i>				
Stable cohabiting		14%	25%	20%
Stable single		13%	25%	16%
Stable marriage		55%	16%	42%
Union dissolution		8%	18%	9%
Union formation		9%	15%	12%
<i>Income Volatility</i>				
Increase in income		39%	40%	43%
Decrease in income		21%	33%	30%
No change in income		40%	27%	27%
<i>Program Participation at 12 months</i>				
Food stamp		24%	65%	36%
WIC		59%	86%	89%
<i>Program Participation at 30 months</i>				
Food stamp		26%	---	41%
WIC		47%	75%	---

Table 2 Linear Probabilities of Participating in the Food Stamp Program: Individual and Family Factors (n = 2333)

	Model 1	Model 2	Model 3	Model 4	Model 5
<i>Child Characteristics</i>					
Male	.03	.02	.03	.02	.03
Age (months)	.00	.00	.00	.00	.00
<i>Mother &amp; Household Characteristics</i>					
Age (years)	-.00***	-.00	-.00	-.00	-.00
Non-Hispanic White	-.12*** <sub>a</sub>	-.04	-.04 <sub>a</sub>	-.04	-.04*
Hispanic	-.10 <sub>b</sub>	-.04	-.03	-.03	-.02
Non-Hispanic of other race	.03 <sub>a,b</sub>	.05	.06 <sub>a</sub>	.02	.03
Less than high school education	.06** <sub>c</sub>	.06** <sub>a</sub>	.06*** <sub>b</sub>	.09*** <sub>a</sub>	.09*** <sub>a</sub>
High school education	-.02 <sub>c</sub>	-.02 <sub>a</sub>	-.02 <sub>b</sub>	-.02 <sub>a</sub>	-.02 <sub>a</sub>
Cohabiting at 12 months	.24***	.15** <sub>b</sub>		.16** <sub>b</sub>	
Single at 12 months	.20***	.06 <sub>b</sub>		.09* <sub>b</sub>	
Employment (weeks)	-.00**	-.00	-.00	-.00	-.00*
Income < \$20,000	.26***	.11***	.09**		
Born in U.S.	.12 <sub>d</sub>	.07 <sub>c</sub>	.06 <sub>c</sub>	.01 <sub>c</sub>	.01 <sub>b</sub>
Immigrant (pre 1996)	-.02 <sub>d</sub>	-.02 <sub>c</sub>	-.03 <sub>c</sub>	-.06 <sub>c</sub>	-.07 <sub>b</sub>
Number of children in the household	.02**	-.01	-.01	-.00	-.01
<i>Children's Health</i>					
Poor health		.02	.01	.03	.01
Low birth weight		-.12	-.12	-.12	-.12
Physical disability		.03	.05	.09	.10
Breastfed		.04	.04	.03	.03
<i>Mother's Health</i>					
Poor health		-.02	-.02	-.02	-.02
Depression		-.04	-.04	-.04	-.05
<i>Economic Hardship</i>					
Material hardship		.04	.04	.04	.04
Food insecurity		.11**	.11**	.10**	.09**
Financial support		.02	.02	.02	.02
Agency support		.04	.04	.04	.04
Public health insurance		.04	.05	.05	.06
Home ownership		-.05 <sub>d</sub>	-.04 <sub>d,e</sub>	-.05	-.05 <sub>c</sub>
Home government assistance		.05	.06 <sub>d</sub>	.05	.06
Home other assistance		.04 <sub>d</sub>	.05 <sub>e</sub>	.04	.05 <sub>c</sub>
No reliable car		.05	.04	.05	.05
Food stamp participation at 12 months		.33***	.33***	.36***	.36***
WIC participation at 12 months		.03	.03	.04	.04
<i>Family Structure Volatility</i>					
Stable cohabiting			.11* <sub>f</sub>		.12** <sub>d</sub>
Stable single			.09** <sub>g</sub>		.12*** <sub>e</sub>
Union dissolution			.26*** <sub>f,g,h</sub>		.26*** <sub>d,e,f</sub>
Union formation			.07** <sub>h</sub>		.09** <sub>f</sub>
<i>Income Volatility</i>					
Increase in income				-.08** <sub>d</sub>	-.08* <sub>g</sub>
Decrease in income				.02 <sub>d</sub>	.01 <sub>g</sub>
Constant	.44	-.29	-.04	.07	.06

Note. Estimated coefficients imply probabilities. Same letter subscripts indicate differences between groups at  $p < .05$ . State fixed effects are included in the models. Omitted categories include Black, any college, married at 12 months, immigrant (post 1996), rent, reliable car, stable marriage, stable income.

\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$

Table 3 Linear Probabilities of Participating in the Food Stamp Program: Individual, Family, and Macroeconomic and Policy factors (n = 2333)

	Model 6	Model 7	Model 8
<i>Child Characteristics</i>			
Male	.03	.03	.03
Age (months)	.00	.00	.00
<i>Mother &amp; Household Characteristics</i>			
Age (years)	-.00	-.00	-.00
Non-Hispanic White	-.04*	-.04	-.04
Hispanic	-.02	-.02	-.02
Non-Hispanic of other race	.03	.03	.03
Less than high school education	.09*** <sub>a</sub>	.09*** <sub>a</sub>	.09*** <sub>a</sub>
High school education	-.02 <sub>a</sub>	-.02 <sub>a</sub>	-.02 <sub>a</sub>
Cohabiting at 12 months			
Single at 12 months			
Employment (weeks)	-.00*	-.00*	-.00*
Income < \$20,000			
Born in U.S.	.01 <sub>b</sub>	.01 <sub>b</sub>	-.01 <sub>b</sub>
Immigrant (pre 1996)	-.06 <sub>b</sub>	-.07 <sub>b</sub>	-.07 <sub>b</sub>
Number of children in the household	-.01	-.01	-.01
<i>Children's Health</i>			
Poor health	.01	.01	.01
Low birth weight	-.12	-.12	-.12
Physical disability	.10	.10	.10
Breastfed	.03	.03	.03
<i>Mother's Health</i>			
Poor health	-.02	-.02	-.02
Depression	-.05	-.05	-.05
<i>Economic Hardship</i>			
Material hardship	.04	.04	.04
Food insecurity	.09**	.09**	.09**
Financial support	.02	.02	.02
Agency support	.04	.04	.04
Public health insurance	.06	.06	.06
Home ownership	-.05 <sub>c</sub>	-.05 <sub>c</sub>	-.05 <sub>c</sub>
Home government assistance	.06	.06	.06
Home other assistance	.05 <sub>c</sub>	.04 <sub>c</sub>	.05 <sub>c</sub>
No reliable car	.05	.05	.05
Food stamp participation at 12 months	.36***	.36***	.36***
WIC participation at 12 months	.04	.04	.04
<i>Family Structure Volatility</i>			
Stable cohabiting	.12** <sub>d</sub>	.12** <sub>d</sub>	.12** <sub>d</sub>
Stable single	.12*** <sub>e</sub>	.12*** <sub>e</sub>	.12*** <sub>e</sub>
Union dissolution	.26*** <sub>d, e, f</sub>	.26*** <sub>d, e, f</sub>	.26*** <sub>d, e, f</sub>
Union formation	.09** <sub>e, f</sub>	.09** <sub>e, f</sub>	.09** <sub>f</sub>
<i>Income Volatility</i>			
Increase in income	-.07* <sub>f</sub>	-.07* <sub>g</sub>	-.08* <sub>g</sub>
Decrease in income	.01 <sub>f</sub>	.01 <sub>g</sub>	.01 <sub>g</sub>
<i>Macroeconomic and Policy Factors</i>			
State unemployment rate	.00		.01
Top quartile of state FS participation rate		.04** <sub>h</sub>	.04** <sub>h</sub>
Bottom quartile of state FS participation rate		-.06* <sub>h</sub>	-.06 <sub>h</sub>
Constant	.04	.12	.09

Note. Estimated coefficients imply probabilities. Same letter subscripts indicate differences between groups at  $p < .05$ . State fixed effects are included in the models. Omitted categories include Black, any college, married at 12 months, immigrant (post 1996), rent, reliable car, stable marriage, stable income. \*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$

Table 4 Linear Probabilities of Participating in the WIC Program: Individual and Family Factors (n = 2333)

	Model 1	Model 2	Model 3	Model 4	Model 5
<i>Child Characteristics</i>					
Male	-.00	.00	-.00	.00	-.00
Age (months)	-.01	-.01	-.01*	-.01*	-.01*
<i>Mother &amp; Household Characteristics</i>					
Age (years)	-.02**	-.00	-.00	-.00*	-.00*
Non-Hispanic White	-.16*** <sub>a</sub>	-.04	-.04	-.04	-.05
Hispanic	-.02 <sub>a</sub>	-.00	.01	.01	.00
Non-Hispanic of other race	-.12	-.10	-.10	-.12*	-.12**
Less than high school education	.03 <sub>b</sub>	.05	.05	.07	.06
High school education	.14* <sub>b</sub>	.06	.06	.05	.05
Cohabiting at 12 months	.14*	.02		.02	
Single at 12 months	.05	-.03		-.02	
Employment (weeks)	-.00**	-.00	-.00	-.00	-.00
Income < \$20,000	.14**	-.01	-.00		
Born in U.S.	-.29* <sub>c</sub>	-.15**	-.13**	-.16***	-.15***
Immigrant (pre 1996)	-.14 <sub>c</sub>	-.05	-.04	-.05	-.04
Number of children in the household	-.01	-.04	-.04	-.04	-.04
<i>Children's Health</i>					
Poor health		.00	-.00	-.01	-.01
Low birth weight		-.07	-.07	-.06	-.06
Physical disability		-.11	-.13	-.08	-.09
Breastfed		-.00	-.00	.00	.00
<i>Mother's Health</i>					
Poor health		-.05	-.04	-.05	-.05
Depression		-.03	-.03*	-.03	-.03*
<i>Economic Hardship</i>					
Material hardship		.01	.01	.01	.02
Food insecurity		.20	.19	.18	.18
Financial support		.03	.03	.03	.03
Agency support		-.02	-.02	-.01	-.01
Public health insurance		.25***	.25***	.25***	.25***
Home ownership		-.07 <sub>a</sub>	-.07 <sub>a</sub>	-.06 <sub>a</sub>	-.07 <sub>a</sub>
Home government assistance		.10 <sub>a</sub>	.10 <sub>a</sub>	.08 <sub>a</sub>	.08 <sub>a</sub>
Home other assistance		.08	.07	.07	.07
No reliable car		-.10	-.10	-.12	-.11
Food stamp participation at 12 months		.10	.10	.10	.10*
WIC participation at 12 months		.35***	.35***	.34***	.34***
<i>Family Structure Volatility</i>					
Stable cohabiting			-.02		-.02
Stable single			-.04		-.04*
Union dissolution			-.07		-.10
Union formation			-.01		-.00
<i>Income Volatility</i>					
Increase in income				-.05 <sub>b</sub>	-.05 <sub>b</sub>
Decrease in income				.09*** <sub>b</sub>	.09*** <sub>b</sub>
Constant	1.33***	.65***	.64***	.68***	.67***

Note. Estimated coefficients imply probabilities. Same letter subscripts indicate differences between groups at  $p < .05$ . State fixed effects are included in the models. Omitted categories include Black, any college, married at 12 months, immigrant (post 1996), rent, reliable car, stable marriage, stable income. \*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$ .

Table 5 Linear Probabilities of Participating in the WIC Program: Individual, Family, and Macroeconomic and Policy Factors (n = 2333)

	Model 6	Model 7	Model 8
<i>Child Characteristics</i>			
Male	-.00	-.00	-.00
Age (months)	-.01*	-.01**	-.01
<i>Mother &amp; Household Characteristics</i>			
Age (years)	-.00*	-.00*	-.00*
Non-Hispanic White	-.05	-.05	-.05
Hispanic	.00	.00	.01
Non-Hispanic of other race	-.12*	-.12**	-.14*
Less than high school education	.06	.06	.07
High school education	.05	.05	.06
Cohabiting at 12 months			
Single at 12 months			
Employment (weeks)	-.00	-.00	-.00
Income < \$20,000			
Born in U.S.	-.15***	-.15***	-.15***
Immigrant (pre 1996)	-.04	-.04	-.05
Number of children in the household	-.04	-.04	-.04
<i>Children's Health</i>			
Poor health	-.01	-.01	-.02
Low birth weight	-.06	-.06	-.05
Physical disability	-.09	-.09	-.09
Breastfed	.00	.00	.00
<i>Mother's Health</i>			
Poor health	-.05	-.05	-.04
Depression	-.03*	-.05*	-.03
<i>Economic Hardship</i>			
Material hardship	.02	.02	.00
Food insecurity	.18	.18	.18
Financial support	.03	.03	.03
Agency support	-.01	-.01	-.00
Public health insurance	.25***	.25***	.26***
Home ownership	-.07 <sub>a</sub>	-.07 <sub>a</sub>	-.06
Home government assistance	.08 <sub>a</sub>	.08 <sub>a</sub>	.06
Home other assistance	.07	.07	.07
No reliable car	-.11	-.11	-.09
Food stamp participation at 12 months	.10*	.10*	.10*
WIC participation at 12 months	.34***	.34***	.34***
<i>Family Structure Volatility</i>			
Stable cohabiting	-.02	-.02	-.03
Stable single	-.04	-.04	-.06*
Union dissolution	-.09	-.10	-.12
Union formation	-.00	-.00	-.05
<i>Income Volatility</i>			
Increase in income	-.05 <sub>b</sub>	-.05 <sub>b</sub>	-.06 <sub>a</sub>
Decrease in income	.09*** <sub>b</sub>	.09*** <sub>b</sub>	.10*** <sub>a</sub>
<i>Macroeconomic and Policy Factors</i>			
State unemployment rate	.01		-.02
Top quartile of state FS participation rate		-.05**	-.08**
Bottom quartile of state FS participation rate		.12**	.03
Constant	.65***	.57***	.65***

Note. Estimated coefficients imply probabilities. Same letter subscripts indicate differences between groups at  $p < .05$ . State fixed effects are included in the models. Omitted categories include Black, any college, married at 12 months, immigrant (post 1996), rent, reliable car, stable marriage, stable income. \*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$