

# Factors Associated with Rates of Participation in WIC by Eligible Pregnant Women

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## Synopsis .....

*The relationship between sociodemographic, biological, and prenatal care characteristics, and participation rates of pregnant women in the Special*

*Supplemental Food Program For Women, Infants, and Children (WIC) was studied by interviewing 200 postpartum patients in a Buffalo, NY, hospital between October 1988 and January 1989.*

*Among the 136 women eligible for the program, 94 (69 percent) participated during their index pregnancies. WIC participation was found to be highly associated with source of prenatal care and having made more frequent prenatal visits. WIC was related to having fewer children and earlier initiation of prenatal care. Multivariate analysis showed that program participation remained highly associated with the source of prenatal care and the number of prenatal visits, when combined with other factors considered, such as age, education, marital status, number of living children, and timing of initial prenatal visit.*

*The results suggest the need for a WIC enrollment effort directed to providers of prenatal care, who would be urged to encourage women to seek early and adequate prenatal care through the program.*

ONE GOAL of the Special Supplemental Food Program For Women, Infants, and Children (WIC), sponsored by the U.S. Department of Agriculture, is to improve birth outcomes for low-income, high-risk pregnant women. The program provides food supplements, nutrition education, and referrals to health care and social services for participants.

Research suggests that WIC participation is positively associated with attaining standards for birth weight and fetal size for gestational age (1-3). Studies have found that WIC participation is associated with substantial savings in Medicaid costs for the care of mothers and newborns (4, 5). Other reported correlates of WIC participation include improved blood hemoglobin and hematocrit levels (6) and adequate prenatal care (3, 7) during pregnancy.

Little is known about the determinants of WIC participation for eligible pregnant women. Few studies have been published on the reasons for nonparticipation, but in one study the researchers determined that 58 percent of eligible pregnant women receive WIC benefits (8). Reasons for the lack of enrollment include such barriers to participation as child care and transportation difficulties

(7) and a perceived lack of benefits of program participation (9). Women's prior WIC participation was found to be associated with early program enrollment for subsequent pregnancies (10), but household size, a proxy for higher parity, was not. Some of the reasons why women have not enrolled in WIC include objection to the types of food offered in the WIC package, negative cultural attitudes of those from other countries, and embarrassment about receiving a "handout" (11).

The purpose of our descriptive study was to identify factors associated with prenatal WIC participation for a cross-sectional sample of women who delivered at western New York's primary perinatal referral hospital, located at Buffalo. Specifically, this study assessed the association between WIC participation and certain background characteristics; health histories; and such aspects of prenatal care as the source, timing, and frequency of care.

## Methods

**Study population.** The study sample of 200 women was recruited during a 3-month period from the pe-

rinatal referral center, which provides tertiary care for 24 area hospitals having a total of 24,000 deliveries annually. This hospital serves a diverse group of women receiving their prenatal care from private physicians, the hospital's Womens Clinic, the Erie County Health Department's Maternal and Infant Care Clinics, a community clinic, or a source located outside Erie County. Virtually all private obstetricians in Erie County have admitting privileges at the hospital. While some use the hospital for all their patients, others deliver only their high-risk pregnant women at the center.

Postpartum mothers eligible for inclusion in the study had prior physician approval to be interviewed, as required by the hospital's Institutional Review Board; a baby admitted to the general newborn nursery; a singleton birth; residency in Erie County; and the ability to communicate in English.

During the study period, there were 1,102 live births at the hospital. Of these, 937 (85 percent) were admitted to the general newborn nurseries. Of 26 physicians who regularly delivered patients at the hospital, 18 (69 percent) granted permission for their clients to be interviewed. There were no apparent differences between physicians who granted permission to interview their patients and those who did not. On the interview days, among 937 women, 110 (12 percent) did not have physician permission for the interview; 29 additional women (3 percent) did not meet other study inclusion criteria. Of the 937 women, 798 (85 percent) met all requirements for inclusion in this study.

**Data collection.** A structured questionnaire was developed for the purposes of the study, and pre-tested with 22 women from the study hospital and a second center in Buffalo. Questions pertaining to the financial, nutritional, and medical requirements for WIC eligibility were identical to those used to determine WIC eligibility by the New York State WIC Program. Because of restrictions imposed by the hospital routine, interviews were conducted during the mornings on 48 days between November 1988 and January 1989, excluding weekends and holidays. Potential study participants were identified on interview days using these procedures.

- The interviewer visited on alternate days the two postpartum units where mothers roomed whose babies were in the general newborn nurseries.
- Patients who had physician and nursing staff approval to be interviewed were identified each day from the floor's census list. Some women who

initially were too ill to be interviewed were included later.

- The interviewer, with only room numbers to identify possible study participants and alternating between corridors, asked women at random to participate in a personal interview to be conducted in private in their rooms.
- Additional efforts were made to interview patients who were out of their rooms, had visitors or their baby in the room, or were talking on the telephone.
- Informed consent was obtained before the interview.
- Interviews lasted 15 to 60 minutes; 2 to 6 interviews were completed each interview day.

Of the 798 women, 17 (2 percent) refused to be interviewed, and the final sample consisted of 200 women (25 percent) who met all study criteria. The sample was the number of women who could be interviewed within a 3-month time frame by the solo researcher. The final number of hospital deliveries for the 3-month period was verified at the end of the study by reviewing hospital maternity admission records for the two floors.

A trained professional nurse (LRK) conducted all interviews and checked the questionnaires for completeness before data was entered. Biological and sociodemographic information was validated by abstracting available items from medical records, such as age, gravidity, history of diabetes, and anemia, and comparing them to the responses given in the interviews. Overall, there was a relatively high degree of agreement between self-reported and sociodemographic information. When discrepancies were encountered, the hospital record was used.

**Operational definitions.** To be eligible for WIC, pregnant women first had to meet the New York State WIC financial criterion of living during their pregnancy at the time of the study in families whose incomes were within 185 percent of the Federal poverty level, or in families with one or more members receiving Medicaid, food stamps, Aid For Dependent Children, or free or reduced cost school lunches. The WIC Program defines a family as "a group of related and nonrelated individuals living together as one economic unit" (12).

Women not receiving other means-tested benefits were asked, "Indicate the gross family income. This means total income BEFORE deductions such as income tax, and Social Security, etc. Include the wages of ALL working 'family' members AND

**Table 1. Sociodemographic characteristics of 136 pregnant low-income women and their rates of participation in WIC**

Characteristic	Participants (N = 94)		Nonparticipants (N = 42)		All (N = 136)
	Number	Percent	Number	Percent	Number
<b>Age (in years):</b>					
18 or younger.....	20	69	9	31	29
Older than 18.....	74	69	33	31	107
<b>Ethnicity or race:</b>					
White.....	30	67	15	33	45
Other <sup>1</sup> .....	64	70	27	30	91
<b>Education:</b>					
4-11 years.....	35	63	21	37	56
12 or more.....	59	74	21	26	80
<b>Marital status:</b>					
Single <sup>2</sup> .....	61	66	31	34	92
Married.....	33	75	11	25	44
<b>Family size:<sup>3</sup></b>					
1-3 persons.....	61	71	25	29	86
4-8 persons.....	33	66	17	34	50
<b>Previous live birth:</b>					
Yes.....	54	62	33	38	87
No.....	40	82	9	18	49
<b>Living children:<sup>5</sup></b>					
1-2.....	68	76	22	24	90
3 or more.....	26	57	20	43	46
<b>Household income:<sup>6</sup></b>					
Less than \$14,000..	53	69	24	31	77
\$14,000-\$30,000...	41	69	18	31	59

<sup>1</sup> Includes black, Hispanic, American Indian, and oriental.

<sup>2</sup> Includes single, separated, and divorced.

<sup>3</sup> Number of related and nonrelated persons, including the woman, who lived in same economic unit during the pregnancy.

<sup>4</sup>  $P \leq 0.05$ .

<sup>5</sup> Living children includes the baby from the index pregnancy.

<sup>6</sup> Estimated from the census tract of residence, 1980 data.

such benefits as Social Security payments, pensions, Unemployment Insurance and other types of income" (12). In order to obtain an additional comparable measure, mean household income was estimated for all women by using 1980 census tract data for residence during pregnancy.

Secondly, to be eligible for WIC, women needed to have a medical or nutritional risk factor identified, such as anemia, diabetes, young age, history of miscarriage, or previous low birth weight or premature infant. Prematurity was defined as less than 38 weeks gestation, using the last menstrual period method. Gravidity was defined as the number of pregnancies a woman experienced, regardless of outcome; living children included the index birth, the birth at the time of the study. Early prenatal care was defined as having a physician or clinic visit during the first trimester (13 weeks), and prenatal care was considered adequate if 11 or more visits were completed.

**Data analysis.** Descriptive statistics (measures of central tendency and percent differences) were used

for univariate analysis. Subsequently, we used chi-square analysis to compare categorical variables and Student's t-test to compare continuous variables. Multiple regression analysis (13) explaining WIC participation rates was performed for source of prenatal care, with adjustment for covariables of interest in the univariate analyses. The magnitude of the contribution of individual variables was based on the partial correlation coefficients, with appropriate *P* values. The SPSS-PC Statistical Program was used for all data analyses (A).

## Results

The final study sample was a diverse group of 200 postpartum mothers who were, for the most part, white, parous women from poor households and whose mean age was 24.5 years. Of these, 136 interviewed (68 percent) were identified as financially, as well as nutritionally and medically, eligible by New York State WIC criteria to have received WIC during their pregnancies. These women became the focus of the study.

Of the 136 women eligible, 94 (69 percent) were WIC participants during their index pregnancies, while 42 (31 percent) were not. All but 11 WIC-eligible women (92 percent) qualified financially for WIC, having received other means tested benefits while pregnant, such as Aid for Families with Dependent Children, Medicaid, and food stamps, and therefore they were not asked specifically about household income. Participation time in the other social service programs was not ascertained. We identified at least one nutritional or medical risk factor for all those women found to be financially eligible for WIC. Of the 42 eligible nonparticipants in WIC, 38 (91 percent) lived within the Buffalo city limits.

As shown in table 1, age, ethnicity, education, marital status, family size, and estimated family income did not appear to influence WIC participation. However, 82 percent of the women having their first live birth were enrolled in WIC ( $P \leq 0.05$ ). WIC participants were more likely to have had two or fewer children (76 percent) than WIC nonparticipants ( $P \leq 0.05$ ).

Table 2 describes when women first suspected that they were pregnant and the timing and amount of prenatal care obtained. WIC participants reported suspecting pregnancy on average 1 week earlier than nonparticipants. Participants were more likely to seek prenatal care earlier than nonparticipants, 12.6 weeks and 15.9 weeks ( $P \leq 0.05$ ). Program participants averaged more prenatal

visits, 11.3 visits, than nonparticipants, 8.7 visits ( $P \leq 0.01$ ).

As shown in table 3, there were dramatic differences in WIC participation according to where prenatal care was received ( $P \leq 0.0001$ ). The hospital clinic and private physicians enrolled 53 percent of their eligible clients in WIC during the pregnancies. Two women received no prenatal care and were assigned to the hospital clinic group. Much higher rates of enrollment were observed for health department clinics (98 percent) and a community-sponsored clinic (77 percent).

Further analyses were performed to compare selected sociodemographic characteristics and pregnancy histories of mothers by source of prenatal care. Data from the similar county and community clinics were combined. Table 4 shows the differences in the characteristics of the women receiving prenatal care from three sources, the hospital clinic, community clinics, and private physicians. Those differences mainly reflect the characteristics of the women served. Because this study was not designed to assess the variability within physicians' private practices, the private care group was dropped from further analysis.

Finally, when women using the hospital clinic were compared to those using community clinics, few demographic differences were observed between clinic group users. Forty-seven percent of the community clinic clients and 68 percent of the hospital clinic clients reported that they lived with their own children during their pregnancies ( $P \leq 0.05$ ). Normal weight gain during pregnancy was reported by 73 percent of the hospital clinic clients and 45 percent of the community clinic client subjects ( $P \leq 0.05$ ).

**Multivariate analysis.** By making it possible to control for other factors, multiple regression analyses permitted a more comprehensive view of the effect of the source of the prenatal care on WIC participation rates. Table 5 shows correlation coefficients and two multiple regression models of variables identified from the previous univariate analyses.

When all variables were considered together in model 1, the factor most strongly associated with participation was the type of site where a woman received her prenatal care (multiple partial correlation = 0.44,  $P \leq 0.0001$ ). The impact of the number of prenatal visits was diminished, but it remained a significant factor in the model (multiple partial correlation = 0.25,  $P \leq 0.01$ ). Only variables found statistically significant in model 1

Table 2. Variables in prenatal care of 136 pregnant low-income women and their rates of participation in WIC

Variable	Participants (N = 94)		Nonparticipants (N = 42)	
	Mean	SD	Mean	SD
Week of pregnancy when condition was first suspected .....	5.4	3.2	6.4	5.1
Week of pregnancy when prenatal care was begun..	12.6	6.9	15.9	<sup>1</sup> 9.7
Number of prenatal visits ...	11.3	4.2	8.7	<sup>2</sup> 4.4

<sup>1</sup>  $P \leq 0.05$ . <sup>2</sup>  $P \leq 0.01$ . NOTE: SD = standard deviation.

Table 3. Sources of prenatal care for 136 pregnant low-income women and their rates of participation in WIC

Site	Participants		Nonparticipants		All Number
	Number	Percent	Number	Percent	
Hospital clinic <sup>1</sup> ....	31	53	28	47	59
County clinic <sup>2</sup> .....	40	98	1	2	41
Community clinic ...	13	77	4	23	17
Private physician ...	10	53	9	47	19

<sup>1</sup> Two patients received no prenatal care, but were delivered by the hospital clinic staff.

<sup>2</sup> County clinics were managed by the Erie County Health Department.

NOTE: Prenatal care site was significantly associated with WIC participation rates ( $P \leq 0.0001$ ).

were separately considered in model 2. The effect of the source of prenatal care did not change, but the number of prenatal visits increased in importance in model 2. The remaining variables contributed little to the total explained variance of WIC participation ( $R^2 = 33$  percent in models 1 and 2).

## Discussion

We addressed a growing concern that numbers of WIC-eligible women were not participating in the program during their pregnancies, despite the importance of good nutrition and nutrition counseling as components of prenatal care (14). Encouraging full use of the program is a key factor in responding to prevailing concerns about high infant mortality rates, poor birth outcomes, and limited fiscal resources at the Federal, State, and local levels.

The findings suggest that monitoring sources of prenatal care and encouraging more prenatal visits may be important in increasing WIC participation. The number of prenatal visits are related indirectly to initiating prenatal care and rates of participation. Closer examination of the frequency and timing of prenatal care are warranted.

In many areas, WIC services and prenatal care

**Table 4. Characteristics of 136 women receiving prenatal care through WIC, by source of care**

Characteristic	Hospital (N = 59)		Community (N = 58)		Private (N = 19)	
	Number	Percent	Number	Percent	Number	Percent
Age 18 years or younger	12	20	16	28	1	5
Education <sup>1</sup>	25	42	28	48	2	16
Nonwhite <sup>3</sup>	45	76	44	76	4	10
Single <sup>5</sup>	44	75	43	74	5	26
Family income less than \$14,000	36	61	38	66	3	16
Family size 4 or more <sup>7</sup>	23	39	20	35	8	42
3 or more living children <sup>8</sup>	4	10	3	11	1	6
Youngest child 21 months or younger	15	36	12	41	5	31
3 or more children	31	52	26	45	13	68
Previous live birth	42	71	29	50	16	84
Care began in first trimester	29	49	34	59	17	90

<sup>1</sup> Not high school graduate.  
<sup>2</sup>  $P \leq 0.05$ .  
<sup>3</sup> Includes black, Hispanic, American Indian, and oriental.  
<sup>4</sup>  $P \leq 0.0001$ .  
<sup>5</sup> Includes single, separated, and divorced.  
<sup>6</sup>  $P \leq 0.001$ .  
<sup>7</sup> Number of related and nonrelated persons, including the woman, living together during the index pregnancy.  
<sup>8</sup> Category of living children includes baby from the index pregnancy.  
<sup>9</sup>  $P \leq 0.01$ .

**Table 5. Regression analysis of characteristics of participation in WIC by 117 pregnant, low-income women**

Characteristics	Simple correlation coefficient	Partial regression coefficient <sup>1</sup>	
		Model 1 <sup>2</sup>	Model 2 <sup>3</sup>
Age	-0.03	-0.03	...
Marital status	0.01	-0.06	...
Education	0.15	0.15	0.15
Number of children living	0.14	-0.03	...
Week of pregnancy when prenatal care began	<sup>4</sup> -0.28	-0.05	...
Source of prenatal care	<sup>5</sup> 0.43	<sup>5</sup> 0.44	<sup>5</sup> 0.46
Number of prenatal visits	<sup>5</sup> 0.32	<sup>4</sup> 0.25	<sup>5</sup> 0.32
Multiple correlation coefficient	...	<sup>5</sup> 0.58	<sup>5</sup> 0.57

<sup>1</sup> Partial regression coefficients are adjusted for the other variables listed for the model.  
<sup>2</sup> Model 1 considers all variables together.  
<sup>3</sup> Model 2 considers variables found statistically significant in model 1.  
<sup>4</sup>  $P \leq 0.01$ .  
<sup>5</sup>  $P \leq 0.0001$ .  
 NOTE: In the regression analyses, WIC participation is indicated by no = 0, yes = 1. Source of prenatal care is indicated by hospital clinic = 0, combined community and county clinic = 1.

are not routinely coordinated. In one study, among five sample States in which income eligibility for prenatal care and for the WIC program were identical, WIC enrollment was 58 percent of eligible women, apparently reflecting barriers to coordination that sometimes exist between different social service programs (8). The recent report by the National Commission to Prevent Infant Mortality found that the delivery system for high-risk women and children is a patchwork of programs that are seldom coordinated or integrated (15). In our study we found that women were required to pick up their WIC food vouchers from locations other than the clinics where they obtained their prenatal care. Perhaps increased efforts to coordinate prenatal and WIC services at a single site would improve WIC participation rates.

One possible explanation for the difference found in WIC enrollment patterns is that the Maternal and Infant Care Clinics, and the community-run clinic, but not the hospital clinic, had a nutritionist on the staff to facilitate prenatal WIC enrollment. Active recruitment of pregnant women to enroll in WIC and followup of the application process are necessary to overcome possible policy or system barriers. A nutritionist has been added to the hospital clinic staff. A followup study comparing sources of care and WIC enrollment might be indicated.

First trimester prenatal care is important for maternal and infant well being (8). With optimal benefit from the WIC Program obtained by women who are enrolled early in their pregnancies (2), earlier prenatal care should facilitate more timely WIC enrollment.

One limitation of this study was that the length and timing of WIC participation could not be validated, since the medical records did not contain this information. Often the timing and frequency of prenatal care were not recorded on the mothers' charts. For the most part, however, the women's responses about their medical histories compared favorably with their hospital records. Given the study's design, and the fact that patients from only one hospital were interviewed, the findings may have limited generalizability. However, the problems associated with nonparticipation and program underutilization in this primarily inner city population may be comparable to those experienced elsewhere.

A second limitation of this study was that women were not interviewed whose newborns were in the hospital's neonatal intensive care unit, were stillborn, or had died. These women represent an

additional high-risk population for which WIC enrollment could have made a difference. Further study of this population is warranted. Since many low-income women obtain prenatal care from private physicians, WIC referral patterns of this group of health providers need further study.

We found serious underutilization of the prenatal component of WIC by almost one-third of the eligible women with babies in the general newborn nurseries. The WIC Program, a national program for more than 15 years, can have a positive influence on the improvement of health for pregnant women and their babies. More energetic recruitment efforts offering information and facilitating WIC enrollment by all prenatal care providers is warranted. Improving the system of coordination between agencies, keeping paperwork to a minimum, and following up women to determine their enrollment may improve the WIC Program's ability to provide services to high-risk pregnant women and their children.

**References**.....

1. Rush, D., et al.: The National WIC Evaluation: III. Historical study. *Am J Clin Nutr* 48: 412-428 (1988).
2. Kennedy, E. T., Gershoff, S., Reed, R., and Austin, J. E.: Evaluation of the effect of WIC supplemental feeding on birth weight. *J Am Diet Assoc* 80: 220-227 (1982).
3. Kotelchuck, M., Schwartz, J. B., Anderka, M. T., and Finison, K. S.: WIC participation and pregnancy outcomes: Massachusetts Statewide Evaluation Project. *Am J Public Health* 74: 1086-1092 (1984).
4. Schramm, W. F.: WIC prenatal participation and its relationship to newborn medicaid costs in Missouri: a cost/benefit analysis. *Am J Public Health* 75: 851-857 (1985).
5. New York State Department of Health: The New York

State WIC evaluation: the association between prenatal WIC participation and birth outcomes. Bureau of Nutrition, Albany, NY, 1990.

6. Kennedy, E. T., and Gershoff, S.: Effect of WIC supplemental feeding on hemoglobin and hematocrit of prenatal patients. *J Am Diet Assoc* 80: 227-230 (1982).
7. Citizens' Committee for Children of New York, Inc.: Assets: prenatal WIC services in New York City. New York, NY, 1989.
8. Institute of Medicine: Prenatal care: reaching mothers, reaching infants. National Academy Press, Washington, DC, 1988.
9. Haddad, L. J., and Willis, C. E.: An analysis of factors leading to early enrollment in the Special Supplemental Feeding Program For Women, Infants and Children. Bulletin 682. Massachusetts Agriculture Experimental Station, College of Food and Natural Resources, University of Massachusetts at Amherst, Amherst, MA, 1983.
10. Ku, L.: Factors influencing early prenatal enrollment in the WIC program. *Public Health Rep* 104: 301-306, May-June 1989.
11. U.S. Department of Agriculture: Targeting benefits to pregnant women in the WIC program. Phase I: report of the WIC benefit targeting project. Alexandria, VA, 1988.
12. New York State Department of Health WIC Program: Income certification form, DOH 676 (5/86). Albany, NY, 1986.
13. Kahn, H. A., and Sempos, C. T.: Statistical methods in epidemiology. Oxford University Press, New York, NY, 1989.
14. American Nurses Association: Access to prenatal care: key to preventing low birthweight. Report of Consensus Conferences. Kansas City, MO, 1987.
15. National Commission to Prevent Infant Mortality: One-stop shopping: the road to healthy mothers and children. U.S. Government Printing Office, Washington, DC, April 1991.

**Equipment**

- A. SPSS-PC+, version 3.0 for IBM PC/XT/AT. SPSS Inc., Chicago, IL, 1984-89.