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SOCIOECONOMIC AND BIRTH-RELATED FACTORS ASSOCIATED WITH CHILD PARTICIPATION IN WIC

by

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ABSTRACT

The North Carolina Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) experiences a large drop in child participation at the one-year recertification period. This study investigates demographic, socioeconomic, birth-related, and social and health service program participation differences that may explain why some infants continue to participate after the first birthday and others drop out. To develop the study, composite birth data were matched with WIC participation and enrollment data and analyzed. Findings suggest that mothers with lower income and education levels, minorities, mothers with greater social and health service ties, and those having low birth weight babies are more likely than others to renew participation.

INTRODUCTION

The North Carolina Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) provides nutrition education and select nutritious foods to low-income and nutritionally-at-risk pregnant women, new mothers, and children under the age of six. One problem for the North Carolina WIC program, like other state WIC programs, is that a high proportion of its infants do not return to be recertified at age one.

Since infancy and early childhood is the most critical time of life in terms of nutrition (Garza and Cowell, 1990), the present study examines demographic and social service participation differences between infants who are recertified in the WIC program around their first birthday and infants who are not. Differences between these two groups should provide insight into why some mothers recertify their infants and others do not. In addition, the present study will help North Carolina's WIC program to target populations for WIC services and retention.

Previous studies on WIC participation have focused on such issues as the effects of WIC prenatal participation on pregnancy outcomes (Buescher, et al., 1993).[1] Other studies have focused on targeting and coverage (Yip, et al., 1991), effect of WIC participation on breastfeeding practices (Popkin, et al., 1995), and newborn Medicaid costs (Buescher, et al., 1993; Schramm 1985, 1986). Little systematic research has been done to explore the reasons why some infants continue to participate into their second year of life and why some drop out.

Most WIC infants, whether they are breast-fed or not, enter the WIC program at or near the time of birth. Upon enrollment, infants are eligible to receive infant formula; and, beginning at four months of age, can receive infant cereal and juice as well. Infants who enter the program prior to six months of age must be recertified around the time of their first birthday to continue receiving benefits.

This recertification can be done at the 11th, 12th or 13th month of age. If recertification is not sought during this three-month period, an infant will be dropped from the program. Infants recertified at one year change administrative classification from infant to child. Those children are then eligible to receive a different food package that contains milk and other foods instead of infant formula.

A primary factor that may determine a mother's decision to continue participation is related to the cost of the infant food package. Since infant formula is expensive, infant formula increases the incentive for many mothers to enroll their infants in WIC at birth. But as infants reach their first birthday, mothers usually switch their infants to milk, which is much less expensive. As a result, the financial incentive to recertify may be reduced. This is certainly a plausible economic explanation for why many infants drop out after the first year. Nevertheless, little is known about the reasons for infant participation after one year of age.

In the present study, four research questions were formulated to address issues of infant participation.

- What proportion of infants who participate in WIC are recertified at their first birthday?
- Do recertified infants have different birth outcome histories than those who "drop out"?
- Do recertified infants differ demographically from the ones who drop out? If so, how?
- Do mothers of recertified infants have different social and health services participation histories than those who drop out?

The research strategy to examine these questions is to: first, identify a cohort of infants who participated in WIC, match their records with birth and other social and health service records and track them through their first recertification period; second, using descriptive statistics, compare the group of recertified infants with the group of non-recertified infants and from these descriptive statistics, develop a socioeconomic model of infant participation; and third, estimate the odds of an infant recertifying, based on certain demographic, socioeconomic, birth-related, and social and health service participation histories of the mother.

[1] Also see Mathematica Policy Research, 1990; Schramm, 1985, 1986; Kotelchuck, et al. 1984; Stockbauer, 1987; Edozien, 1979; Kennedy, et al., 1982.

DESCRIPTIVE METHODS

A 1992 birth/WIC cohort was identified and tracked over time. The cohort was developed through a four-stage process. In the first stage, any infant who participated in WIC in 1992 and was born in 1992 was placed in a separate data set. Of 104,517 infants who participated in 1992 in WIC, 53,311 were selected because they were born in 1992 and entered the program at six months of age and younger.

In the second stage of data compilation, the 1992 WIC participant file was merged with a 1992 composite birth file. This composite file contains information from the birth certificate, Medicaid, Health Services Information System, and prenatal WIC records. This file was employed because it provides birth information as well as social and health service participation information about the mother.

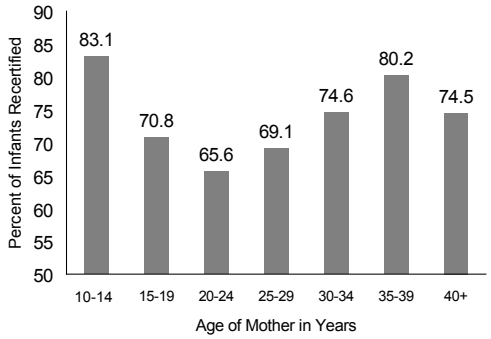
Infant records from each file were matched using name and other identifiers. The matching process successfully matched 88.3% of the 1992 WIC infants with the birth records, producing a 1992 Birth/WIC Cohort. In the third stage of the data compilation process, infants who were in their 11th, 12th, or 13th month of age and recertified between December 1992 and January 1994 were subsetted from the original WIC files.

In the fourth stage, the subset of infants who were recertified were matched with the 1992 Birth/WIC cohort using WIC ID number. The product of stage four is a data set that contains 47,079 records. The records contain data on 32,536 infants successfully matched with recertification records and 14,543 infants whose records did not match. Cross-tabulations were generated so the recertification group could be compared with the non-recertification group.

DESCRIPTIVE FINDINGS

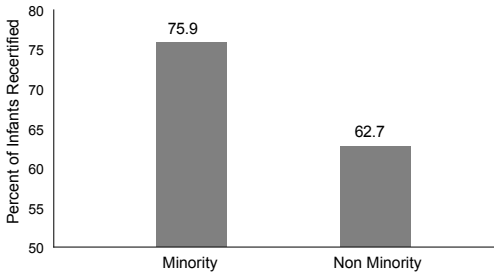
Of the 47,079 infants who were born in 1992 and entered the program within their first six months of life, 69.1 percent recertified at their 11th, 12th, or 13th month of age. This recertification rate of 69.1 percent can be used as a baseline for comparing the recertification rates for various demographic, perinatal, and socioeconomic

Figure 1
Recertification Rate of Infants by Age of Mother



groups. Due to the large number of births included in this study, chi-square tests of significance for all variables cross-tabulated with recertification were found to be significant at the $p<.001$ level of significance. Figure 1 shows the recertification rate for seven age grouping of mothers. Findings show a higher proportion of younger and older mothers recertify their infants. Women between the ages of 20 and 24 have the lowest recertification rate (65.6%) among the seven age groups.

Figure 2
Recertification Rates of Infants by Race of Mother



The proportion of women who recertify also differs by race of mother (Figure 2). Mothers of a racial minority[2] recertify at a higher rate than non-minority mothers. Almost 76 percent of minority mothers recertified their infants while only 62.7 percent of non-minority mothers recertified their infants.

[2] Racial minority is defined as a race other than white.

Figure 3
Recertification Rate of Infants by Birth Weight of Infant

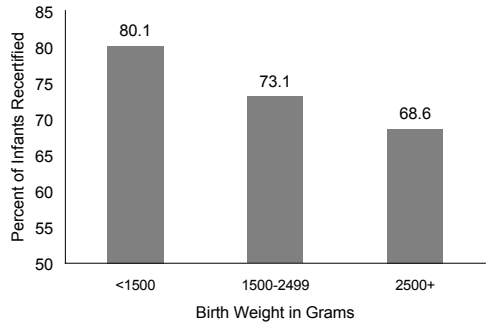


Figure 4
Recertification Rate of Infants by Gestational Age of Infant

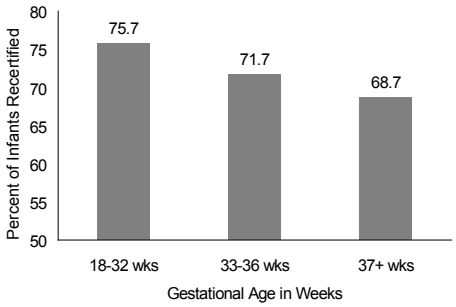


Figure 5
Recertification Rate of Infants by Number of Siblings

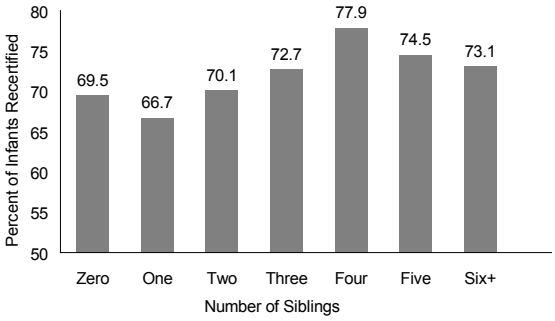


Figure 6
Recertification Rate of Infants by Adequacy of Prenatal Care Utilization

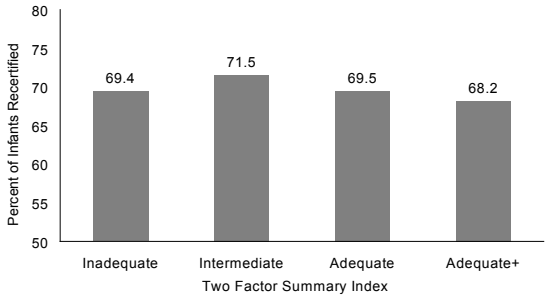


Figure 7
Recertification Rate of Infants by Mother's Level of Education

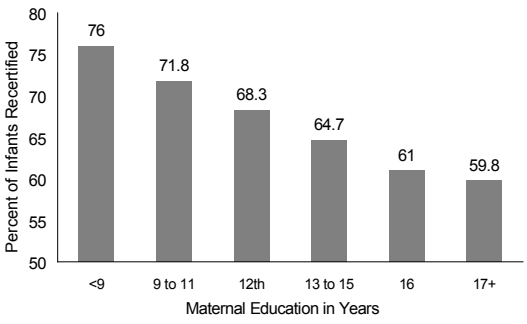
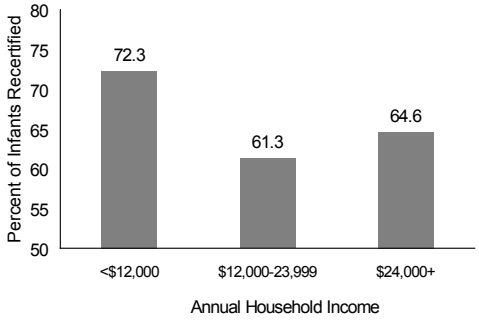


Figure 8
Recertification Rate of Infants by Annual Household Income



Recertification rates show a decline with increasing infant birth weight and gestational age (Figures 3 and 4). Eighty percent of infants weighing under 1500 grams, 73 percent of infants weighing 1500-2499 grams, and 68.6 percent of infants weighing 2500 grams or above were recertified. Infants between 18 and 32 weeks of gestation have a recertification rate of 75.7 percent, those between 33 and 36 weeks of gestation have a recertification rate of 71.7 percent, and infants 37 weeks of gestation and longer have a recertification rate of 68.7 percent.

Differences in recertification rates are also observed for different family sizes. A slight curvilinear relationship is formed between the number of siblings an infant has and the infant's recertification (Figure 5). The recertification rate increases up to four siblings and declines thereafter.

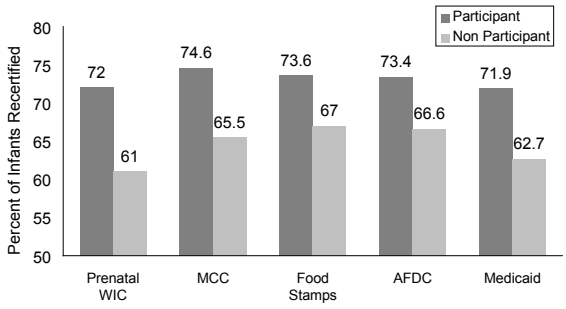
The Adequacy of Prenatal Care Utilization Index (APCU), developed by Kotelchuck (1994), was used to assess the relationship between adequacy of prenatal care use and recertification. For APCU, the two-factor summary index was used. This index is a composite assessment of the month of pregnancy in which prenatal care began and the expected number of prenatal care visits based on estimated gestational age at birth. Findings for APCU are illustrated in Figure 6. Little difference exists in the recertification rate across levels of adequacy. The rate of recertification is highest for the intermediate group (71.5%). However, this is only a percentage point or two higher than the other APCU categories.

Findings for mother's education show an inverse relationship between mother's education and recertification (Figure 7). The recertification rate declines with each increase in the level of education. Mothers with less than a 9th grade education have a recertification rate 7.7 percentage points higher than mothers with a high school diploma, 15 higher than mothers with a college degree, and 16.2 higher than mothers with a graduate or professional degree.

Annual household income was also cross-tabulated with recertification status (Figure 8). Annual household income under $12,000 has the highest recertification rate followed by household income above $24,000 and household income between $12,000 and $24,000. Tests of significance between two proportions show the recertification rate for household income $24,000 and above is significantly different from the rate for household income under $12,000 (p.<.001) and from the rate for household income between $12,000 and $23,999 (p. <.05). There were 757 cases with missing data for income.

Findings for mother's participation in social service or health-related services prior to the infant's WIC enrollment show that mothers with previous social or health service participation are substantially more likely to recertify their infants (see Figure 9). It should be noted that there were 8,286 cases with missing data for AFDC and 8,461 with missing data for Food Stamps.

Figure 9
Recertification Rate of Infants by Previous Maternal Social Service Participation



DISCUSSION OF DESCRIPTIVE FINDINGS

The findings provide answers to the research questions generated above. In sum, infants who are recertified have different birth outcome histories, demographic characteristics, and mothers with different histories of social and health services participation. Findings suggest that mothers of lower educational attainment, minorities, mothers having social and health service ties, and those having low birth weight and low gestational age babies are more likely to recertify their infants than are other mothers.

These results provide a description of the differences between the recertification and non-recertification groups and point to the significance of socioeconomic status as a predictor for recertification. Findings suggest that those mothers who are the most socioeconomically disadvantaged are more likely to recertify. Recertification rates decrease with increasing maternal education and those with household incomes of less than $12,000

recertify at a rate 7.7 percentage points higher than those with household incomes greater than $24,000. Given the importance of socioeconomic status suggested by the descriptive statistics, relationships among demographics, birth outcomes, and social and health service histories are examined below.

A SOCIOECONOMIC MODEL OF RECERTIFICATION

The relationships among various demographic, birth, and social and health service participation factors and WIC recertification status are specified in a socioeconomic model of recertification. The relationships are illustrated in Figure 10 and briefly discussed below.

A mother's demographic background influences her level of socioeconomic status (SES). The relationship between demographic background and one's level of socioeconomic status has clearly been established in the status attainment literature in sociology (see Bielby 1981). Specifically, individual characteristics such as education, race, and age each influence an individual's socioeconomic status.

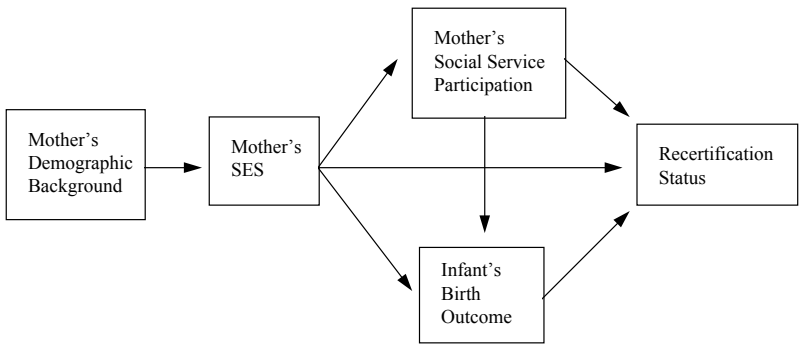
The affect of education on SES can be seen in the process of salary and wage negotiation. Individuals who possess higher levels of educational attainment have advantages in the labor market over individuals who possess lower levels of educational attainment. High levels of educational attainment qualify individuals for jobs higher in quality and skill than individuals with low educational attainment. As a result, high educational attainment enables individuals to negotiate for higher salaries in the job market than others, increasing their level of socioeconomic status.

One's socioeconomic status is also a function, in part, of one's race. Race can have a significant influence on an individual's SES, depending upon the race of the individual and the geographic location. As a direct result of discriminatory processes that operate within labor markets, race can serve as an advantage or disadvantage in hiring processes, salary negotiations, promotions, and many other facets of employment. For instance, being black and living in the South has historically presented a "human capital" liability. Salaries and wages are often discounted for blacks. As a consequence, inequalities in SES are generated between whites and blacks (see Tomaskovice-Devey, 1993; Bonacich, 1972).

Age also influences one's socioeconomic status. As people age, their opportunities for skill, education, and work-related tenure increase. In turn, these increases potentially contribute to a person's level of socioeconomic status.

Mother's SES directly influences social and health service participation. Women of lower SES are more likely to participate in social and health service programs than are higher SES mothers. Since lower socioeconomic status women are less able to independently acquire resources necessary for ensuring health during pregnancy – such as nutritious foods, education, and prenatal care – they are more likely to seek assistance via government health and social service programs. Accordingly, lower-SES mothers have a higher incentive to participate in social and health service programs than higher-SES mothers. In the present study, among mothers with household incomes <$12,000, 78 percent participated in Prenatal WIC, 45.8 percent participated in MCC, and 81 percent had a delivery paid for by Medicaid. In comparison, among mothers with household incomes $12,000 and above, 64.1 percent participated in Prenatal WIC, 23.9 percent participated in MCC, and 42.2 percent had a Medicaid delivery.

Figure 10
A Socioeconomic Model of Recertification



Mother's SES has an influence on an infant's birth outcome. Women who are socioeconomically disadvantaged (i.e., in terms of income) are more likely to have poor birth outcomes than are socioeconomically advantaged women. Lower SES women are less able to provide adequately for themselves nutritionally and medically during pregnancy. Thus, they risk developing nutritional deficiencies and/or poor weight gain that can have unfavorable effects on fetal development and maternal health (Wotherington-Roberts and Pitkin, 1990). Consequently, these mothers are at greater risk of a poor birth outcome than are more socioeconomically advantaged mothers. In the present study, 10.4 percent of mothers with household incomes <$12,000 gave birth to low birth weight (<2500g) infants compared with 7.9 percent of mothers with household incomes $12,000 and above.

Socioeconomic status directly influences recertification status. Within the WIC population, mothers who are at a greater socioeconomic disadvantage are more likely to find economic advantages to shift from the infant food package to the child food package at the one- year recertification period. Conversely, those mothers who are more socioeconomically advantaged may value the economic benefits less.

Social and health service participation has a direct effect on birth outcomes. Participation in social and health service programs such as AFDC, MCC, Food Stamps, and Prenatal WIC provide socioeconomically disadvantaged families with economic and health-related resources that potentially increase a family's well-being and improve birth outcomes. For instance, women who participate in WIC during pregnancy can improve their nutrition, which, in turn, has positive effects on birth outcomes. Studies have shown that women who participate in WIC during the prenatal period have more favorable birth outcomes such as increased birth weight (Kennedy, et al. 1982; Metcoff, et al. 1985; and Buescher, et al., 1993) and higher gestational age at time of delivery (New York State Dept. of Health, 1990) than do women who do not participate. In the present study, 12 percent of mothers who did not participate in Prenatal WIC had low birth weight infants compared with 8.9 percent of mothers who did participate in Prenatal WIC.

Social Service participation history has a direct effect on recertification status. A mother's decision to apply for recertification is influenced in part by her social and health service participation history. Based on rational choice and social learning theories, it is reasonable to argue that women who found it beneficial to participate in social and health service programs in the past are likely to find it beneficial to participate in programs in the future. In addition, WIC has traditionally reached out through other social and health service agencies.

Birth outcomes influence recertification status. Often, infants who have poor birth outcomes experience multiple health problems during infancy. These infants who participate in WIC are recognized as medically "high-risk" infants and are followed more closely and receive more persistent follow-up than low-risk infants. As a result, high-risk infants may be encouraged more strongly by local WIC agents to recertify than are medically low-risk infants. In addition, medically high-risk infants often are required to remain on infant formula past the first year. Since children in this situation must continue to receive formula, an expensive item, there is the added economic incentive for medically high-risk infants to recertify.

ANALYTICAL METHODS

Given that recertification status is a dichotomous dependent variable, logistic regression analysis is employed to assess the probability or odds of an infant recertification as a function of a set of characteristics of the mother and infant. A logistic model (reflected in Figure 11) is constructed to assess the level of support for the theoretical model presented above.

As mentioned above, low maternal education (less than 12 years) is used as an indicator of a mother's demographic background. However, since 26 percent of the mothers in the WIC cohort are 19 years of age and younger, mother's educational attainment is, in part, a function of age. To account for this relationship, if a mother is less than age 19 and has an educational level appropriate for her age, then she is not considered to have low maternal education in this dichotomous variable. Prenatal WIC indicates whether or not the mother participated in WIC during pregnancy. Medicaid birth

indicates whether the delivery was paid for by Medicaid. MCC indicates participation or non-participation in the Maternity Care Coordination program. Birth weight is defined as a two-category variable, categorizing births <2500 grams and births 2500 grams and above.

RESULTS OF LOGISTIC ANALYSIS

Results of the logistic analysis are presented in Figure 11. As a guide to interpreting the results, keep in mind that an odds ratio of 1.00 means that two groups are equally likely to recertify. An odds ratio greater than 1.00 means that one group is more likely to than the other to recertify.

Figure 11
Logit Model of Odds Ratios Estimating Recertification as the Dependent Variable

Variables	Odds Ratio	95% Confidence Interval
Mothers ages 10-19[1]	1.03	0.98 1.08
Mothers ages 30+[1]	1.61*	1.51 1.72
Low Maternal Education	1.17*	1.11 1.22
Minority status	1.74*	1.67 1.81
Income <$12,000[2]	1.20*	1.14 1.26
Income $24,000+[2]	1.05	0.92 1.19
MCC	1.22*	1.16 1.28
Prenatal WIC	1.42*	1.35 1.49
Medicaid birth	1.25*	1.19 1.32
Low birth weight	1.20*	1.12 1.29

[1]Reference group is mothers ages 20-29.
[2]Reference group is mothers with income $12,000-$23,999.
*significant at p < .001

As a function of a large population size, the logistic regression analysis produced mostly highly statistically significant results. The variables in the model produced coefficients significant at p<.001 level, with two exceptions (see Figure 11). Given such a large number of significant variables, results are presented in terms of the magnitude of the variables' odds ratios.

Controlling for other variables, the odds of recertification for mothers 30 years of age and older are 1.61 times as great as mothers ages 20-29. Mothers with low maternal education are 1.17 times as likely to recertify their infants as mothers with higher education. Minorities are 1.74 times as likely to recertify their infants as nonminorities. Households with incomes <$12,000 are 1.2 times as likely to recertify their infants as households with incomes between $12,000 and $24,000.

Findings for MCC show that mothers who participate in Maternity Care Coordination during pregnancy are 1.22 times as likely to recertify their infants as mothers who do not participate, controlling for all other variables. Mothers who participated in WIC during pregnancy are 1.42 times as likely to recertify their infants in WIC, controlling for all other variables. In addition, mothers who had deliveries paid by Medicaid are 1.25 times as likely to recertify their infants as mothers who do not have Medicaid paid births. Findings for birth weight show that mothers who have low birth weight infants are 1.20 times as likely to recertify their infants as mothers who have normal birth weight babies.

DISCUSSION

A limitation of the logistic analysis was the inability to operationalize the theoretical model in terms of a simultaneous equation (path) model. Because the dependent variable is dichotomous, a path model using multiple regression was not an option. Even so, some relationships of the theoretical model in Figure 10 were supported in the logistic model. Household income <$12,000 was shown to be a strong predictor of recertification, even after controlling for demographic social and health services participation, and birth weight. However, the analysis did produce some unanticipated results as well.

The continued significance of race and age after controlling for other demographic, income, social and health service participation, and birth weight variables is noteworthy. Minorities are 77 percent more likely to recertify than nonminorities, holding all other variables in the model constant. One possible explanation for the continued association of race and recertification is that not all aspects of socioeconomic status are captured in the empirical model. Socioeconomic differences such as lower perceived job security among minorities may explain persistent racial disparities in recertification, controlling for such factors as income and education (see Thomas, 1993, 1995). As a result, many minorities may continue to place a higher value on continued WIC participation than nonminorities.

In addition, the magnitude of the odds ratio for the age variable, mothers ages 30+, is high. Controlling for education, income, social and health service participation, and birth weight, mothers ages 30+ were still found to be 61 percent more likely to recertify their infants than mothers between the ages 20-29.

CONCLUSION

This study has demonstrated descriptively and analytically that each of the factors examined are correlated with infant recertification around one year of age. Correlations in the analysis are in a direction one would hope to see; that is, those individuals who are at the greatest need of WIC services are recertifying at higher rates. In addition, findings tend to support the socioeconomic model of recertification presented in Figure 10, although the analysis suggests that demographic variables have a direct influence on recertification, independent of socioeconomic status.

The present study has several implications for North Carolina's WIC program. First, descriptive statistics identify demographic groups of infants that may need to be targeted for increased encouragement to continue participation in WIC past their first birthday. Second, previous social and health service participation by the mother is predictive of future participation of an infant. As such, greater emphasis may need to be placed upon promoting the value of continued child WIC participation among families who have not previously used governmental social and health services.

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