



African American and Non-Hispanic White Births in Enhanced Prenatal Care Programs and WIC

## Journal of Health Disparities Research and Practice

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Volume 1 | Issue 2

Article 4

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2007

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#### Recommended Citation

Cain, Monica (2007) "African American and Non-Hispanic White Births in Enhanced Prenatal Care Programs and WIC," *Journal of Health Disparities Research and Practice*: Vol. 1: Iss. 2, Article 4. Available at: <https://digitalscholarship.unlv.edu/jhdrp/vol1/iss2/4>

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### Abstract

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### Keywords

African American women; Birth disparities; Birth weight; Low; Enhanced prenatal care; Low birth weight; Medicaid; Poor; Prenatal care; WIC; Women; White

## **African American and Non-Hispanic White Births in Enhanced Prenatal Care Programs and WIC**

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### **Abstract**

North Carolina uses Maternity Care Coordination (MCC), an enhanced prenatal care program, to improve birth outcomes for high risk women. The WIC program provides similar services to achieve the same goal. Women in North Carolina Medicaid can choose to participate in either, both, or neither the MCC and WIC programs. The study compares the percentages of low birth weight (LBW)—less than 2500 grams—births and maternal risk characteristics of women: (1) participating in the MCC program only, (2) participating in WIC only, or (3) participating in both programs, to those women who receive conventional Medicaid prenatal care. The analysis is further stratified to compare the percentage of LBW births and maternal risks between and among African American and non-Hispanic white women. The study finds that women participating in WIC only had the lowest percentage of LBW births. African American women participating in the MCC and/or WIC programs had significantly fewer LBW births than their non-participating counterparts. Among non-Hispanic whites, however, the percentage of LBW births for women participating in MCC or MCC/WIC were similar to women receiving conventional Medicaid prenatal care.

**Key Words:** Medicaid, WIC, enhanced prenatal care, low birth weight, African American, birth disparities

### **Introduction**

The disparity in low birth weight (LBW) births among infants born to African American women and white women in the United States remains wide. According to the National Center for Health Statistics, LBW births in 2000 accounted for 13% of births to African American women but only 6.5% of white births.<sup>1</sup> This 2-to-1 disparity was not observed for other ethnic/racial groups when compared to white births (Hispanic 6.4%, American Indian 6.8%, and Asian and Pacific Islander 7.3%).

To address the issue of poor birth outcomes, especially among low-income, minority women, comprehensive prenatal care programs have been incorporated into many states' Medicaid programs. These prenatal care programs are enhanced beyond the scope of the traditional medical model to include services such as health education, psychosocial risk assessment, Special Supplemental Food Program for Women, Infants, and Children (WIC) enrollment, and other types of health promotion and social services interventions.

Studies of the effectiveness of enhanced prenatal care programs have shown mixed results.<sup>2-6</sup> For example, Buescher et al.<sup>2</sup> found significantly fewer LBW births, very low birth weight births, and infant deaths among enhanced prenatal care participants in North Carolina. Korenbrot et al.<sup>3</sup> also reported similar results for LBW births in California's Comprehensive Perinatal Service Program. Herman et al.<sup>4</sup> however, found no differences in low and very low birth weight rates between study and control groups in Washington, D.C.

Evaluations of the effectiveness of enhanced prenatal care programs among minority women have also been mixed.<sup>7-11</sup> Willis et al.<sup>7</sup> found a significant difference in very low birth weight rates, but no difference in low birth weight or pre-term births, between African American women participating in California's Black Infant Health program and the control group. An evaluation by Norbeck et al.<sup>8</sup> of the impact of augmented social support services within a prenatal care program found significantly fewer LBW births among participating versus non-participating African American women. The randomized trial by Klerman et al.<sup>9</sup> found no differences in LBW or pre-term births between the African American study and control groups, while Reichman and Florio<sup>10</sup> found evidence of improved birth outcomes among African American women, but none among white women, who participated in New Jersey's HealthStart program.

The Special Supplemental Food Program for Women, Infants, and Children is a nutrition program for low-income pregnant, breastfeeding, and postpartum women; the program also provides services to infants and children up to five years old. The WIC program provides three types of services: (1) supplemental foods, (2) nutrition education, and, (3) referrals to health and social services. While there is overlap in the services provided through enhanced prenatal care and WIC, the primary, additional benefit that accrues to women who enroll in the WIC program is the receipt of vouchers for purchase of supplemental foods during pregnancy and infant formula post-partum. Women who choose to receive conventional Medicaid prenatal care may also decide to partici-

pate in WIC in order to access this additional benefit. Many studies have associated WIC participation during pregnancy with improved birth outcomes<sup>12-15</sup> while other studies describe the cost savings in maternal and infant health care costs derived from participation in WIC.<sup>16-18</sup>

The North Carolina Maternity Care Coordination (MCC) program is an early model of Medicaid prenatal care coordination initiated in 1988. MCC has the objective of reducing barriers to Medicaid clients' use of health and social services. The program is geared toward helping eligible women receive care related to nutrition, psychosocial counseling, and other resource needs. For example, women in MCC are encouraged to seek services for which they are eligible such as transportation, housing assistance, and job training. Counseling may include social and emotional support, stress reduction methods, and adoption of healthy behaviors. Referral for WIC enrollment is emphasized, and most women enrolled in MCC also receive nutritional counseling through WIC.<sup>18</sup> In North Carolina Medicaid, a woman may choose to participate in both MCC and WIC, MCC only, WIC only, or neither.

Although a number of studies have separately evaluated the effects of MCC and WIC in North Carolina,<sup>2, 16, 18, 19</sup> no study has made comparisons of LBW rates across both programs. Further, this study compares the risk characteristics of women who participate in the MCC and/or WIC programs with those women who do not. Finally, no study has explored whether there is a differential impact of these programs within racial subgroups. These unknowns create a void of information for policymakers who make funding, expansion, and enhancement decisions based on program efficacy. Preliminary findings are needed, therefore, to guide future analytical strategies in this area.

To address these needs, this study uses a descriptive analysis of North Carolina Medicaid to determine whether: (1) MCC, WIC, or both programs report a difference in LBW births and maternal risk characteristics compared to women receiving conventional Medicaid; (2) African American and non-Hispanic white women have differences in LBW births, risk characteristics, and program participation levels; (3) African American women have differences in LBW births and risk characteristics depending on program participation; and (4) non-Hispanic white women have different LBW birth rates and risk characteristics depending on program participation.

## Methods

The study analyzed data compiled by the North Carolina State Center for Health Statistics called the Composite Linked Birth File. The file

consists of linked records of birth certificate data, Medicaid-paid infant claims, MCC and WIC enrollment information, and any associated infant death certificates.

The data file consists of a census of all births in the state of North Carolina in years 2000–2002. The total number of North Carolina resident live births is 120,247, 118,112, and 117,307 for years 2000, 2001, and 2002, respectively.<sup>20</sup> Approximately 40 percent of North Carolina women who delivered during the study period were enrolled in Medicaid ( $n=149,741$ ). About 50% of these women participated in the MCC program.

Various selection criteria are used to address sample bias. First, this study uses only Medicaid-paid births to African American and non-Hispanic white women aged 15–45 years (excludes 1%), and excludes births to women of other racial/ethnic origin (17%). Second, births to women who enrolled in the MCC/WIC programs after 32 weeks' gestation are excluded to avoid the bias related to attributing program effects for women who were late joiners (1%). Third, only live singleton births are included because of the high rate of low birth weight associated with multiple births (3%). And fourth, births to women who received no prenatal care or received so-called "emergency Medicaid" are excluded since these would have most likely fallen into the non-participating group, resulting in biased outcomes for the control group (3%). In addition, records with missing data for any study variables are excluded (1%). The resulting observations used in this study are 109,106 Medicaid births for years 2000–2002.

Study variables include age, years of education, marital status, tobacco use during pregnancy, and selected medical risk factors. A composite measure of maternal medical risks identifies women diagnosed with one or more of the following conditions: anemia, cardiac disease, lung disease, diabetes, genital herpes, hydramnios, hemoglobinopathy, hypertension chronic, hypertension pregnancy-related, eclampsia, incompetent cervix, previous infant greater than 4000 grams, renal disease, Rh sensitization, uterine bleeding, or other medical risk in this pregnancy. In addition, less than adequate prenatal care, as measured by the Kessner Index<sup>21</sup> and reported on the birth certificate, is used as a study variable.

Study results are organized in Tables 1–4 as follows. First, LBW births and maternal risk factors are reported for all women in the sample by program participation. The results are reported as sample means, and, where noted, differences are statistically significant using a chi-square test. Second, a comparison is made between African American and non-Hispanic white women for LBW births, maternal risk factors,

and program participation. Next, the descriptive statistics are reported by program participation in separate tables for African American and non-Hispanic white women.

## Results

Table 1 reports the means of LBW births and maternal risk factors among live singleton births to North Carolina women receiving Medicaid in years 2000–2002 by program participation. Women who participated in WIC only or both WIC and MCC, had a significantly lower percentage of LBW births than did women participating in neither program. A significantly higher percentage of women participating in any program were unmarried. A significantly larger percentage of women only in MCC received less than adequate prenatal care, while in contrast, among those who participated in WIC only or both WIC and MCC, a significantly smaller percentage of women received less than adequate prenatal care.

**Table 1. Means of Low Birth Weight Births and Maternal Risk Factors among Live Singleton Births to North Carolina Women Receiving Medicaid in Years 2000–2002 by Program Participation** (Standard Deviations are in Parentheses)

VARIABLES	NEITHER MCC NOR WIC (n=22,483) (21%)	MCC ONLY (n=7,901) (7%)	WIC ONLY (n=33,106) (30%)	BOTH MCC AND WIC (n=45,616) (42%)
Low Birth Weight (<2500 grams)	10.9% (.312)	11.0% (.313)	8.6% (.280)**	9.8% (.298)*
Age	24.7 (5.512)	23.0 (4.921)	23.9 (5.441)	22.8 (5.231)*
Education in Years	12.2 (3.255)	11.7 (3.944)	11.9 (3.007)	11.6 (3.392)
Unmarried	43.6% (.496)	55.9% (.496)**	62.6% (.484)**	73.3% (.442)**
Medical Risks	30.7% (.461)	33.8% (.473)*	31.3% (.464)	34.4% (.475)*
Less than Adequate Prenatal Care	17.2% (.378)	20.3% (.402)* **	13.0% (.336)**	14.4% (.351)**
Smokes Cigarettes	26.9% (.443)	29.5% (.456)*	26.0% (.439)	26.7% (.442)

\*\* Significant ( $p < .01$ ) difference between program participation category and neither MCC nor WIC program participation category.

\* Significant ( $p < .05$ ) difference between program participation category and neither MCC nor WIC program participation category.

Table 2 reports the means of LBW births, maternal risk factors, and program participation among live singleton births to North Carolina women receiving Medicaid in years 2000–2002 by race. The percentage of LBW births is significantly higher for African American women compared to non-Hispanic white women, as are maternal risk factors.

Specifically, a significantly larger percentage of African American women are unmarried and had at least one of the medical risk diagnoses compared to non-Hispanic white women. In addition, a significantly larger percentage of African American women received inadequate prenatal care than did non-Hispanic white women.

Program participation means by race are presented in the lower portion of Table 2. A significantly lower percentage of African American women participated in neither program compared to non-Hispanic white women. A significantly lower percentage of African American women chose to participate in WIC only, while a significantly higher percentage of African American women participated in both MCC and WIC than did non-Hispanic white women.

**Table 2. Means of Low Birth Weight Births, Maternal Risk Factors, and Program Participation among Live Singleton Births to North Carolina Women Receiving Medicaid in Years 2000–2002 by Race** (Standard Deviations are in Parentheses)

VARIABLES	AFRICAN AMERICAN (n=47,664)	NON-HISPANIC WHITE (n=61,441)
Low Birth Weight (<2500 grams)**	12.3% (.328)	7.8% (.268)
Age	23.4 years (5.388)	23.6 years (5.384)
Education in Years	11.8 years (3.315)	11.7 years (3.290)
Unmarried**	81% (.387)	48% (.499)
Medical Risks**	35.6% (.478)	30.1% (.459)
Less than Adequate Prenatal Care**	19.2% (.394)	11.6% (.321)
Smokes Cigarettes**	14.2% (.349)	36.4% (.481)
Neither MCC nor WIC**	15.7% (.363)	24.4% (.429)
MCC Only	7.5% (.264)	7.0% (.255)
WIC Only*	28.4% (.451)	31.8% (.465)
Both MCC and WIC**	48.3% (.499)	36.7% (.482)

\*\* Significant ( $p < .01$ ) difference between African American and non-Hispanic white women in North Carolina Medicaid.

\* Significant ( $p < .05$ ) difference between African American and non-Hispanic white women in North Carolina Medicaid.

Table 3 reports the means of LBW births and maternal risk factors among live singleton births to North Carolina African American women receiving Medicaid in years 2000–2002 by program participation. A significantly lower percentage of LBW births occurred among African American women who chose to participate in MCC only, WIC only, or both programs, compared to non-participants. When comparing mater-



nal risk factors, however, higher risk status appears to be associated with women who participate in at least one of these programs. For example, a significantly higher percentage of African American women who participated in the programs were unmarried compared to non-participating women. In addition, a significantly higher percentage of African American women who participated in either MCC only or both MCC and WIC had at least one medical risk diagnosed during the pregnancy compared to women who did not participate. A significantly higher percentage of African American women participating only in MCC smoked cigarettes during pregnancy compared to non-participants. Among African Americans, a significantly higher percentage of women participating only in MCC had less than adequate prenatal care compared to non-participating women. In contrast, a significantly lower percentage of African Americans received less than adequate prenatal care when enrolled in WIC only or both WIC and MCC compared to women who participated in neither program.

**Table 3. Means of Low Birth Weight Births and Maternal Risk Factors among Live Singleton Births to North Carolina African American Women Receiving Medicaid in Years 2000–2002 by Program Participation** (Standard Deviations are in Parentheses)

VARIABLES	NEITHER MCC NOR WIC (n=7,466) (16%)	MCC ONLY (n=3,595) (8%)	WIC ONLY (n=13,548) (28%)	BOTH MCC AND WIC (n=23,055) (48%)
Low Birth Weight (<2500 grams)	15.2% (.359)	13.9% (.345)*	11.1% (.313)**	11.7% (.322)**
Age	24.7 (5.442)	23.1 (4.842)	23.8 (5.505)	22.7 (5.271)*
Education in Years	12.3 (4.044)	11.7 (2.628)	12.1 (2.986)	11.8 (3.319)
Unmarried	65.1% (.476)	77.2% (.419)**	81.3% (.389)**	87.7% (.328)**
Medical Risks	34.5% (.475)	37.3% (.483)*	33.6% (.472)	36.9% (.482)*
Less than Adequate Prenatal Care	25.2% (.437)	27.3% (.445)*	16.1% (.367)**	17.6% (.381)**
Smokes Cigarettes	15.5% (.362)	19.2% (.393)*	11.6% (.321)*	14.4% (.352)

\*\* Significant ( $p < .01$ ) difference between program participation category and neither MCC nor WIC program participation category.

\* Significant ( $p < .05$ ) difference between program participation category and neither MCC nor WIC program participation category.

Table 4 reports the means of LBW births and maternal risk factors among live singleton births to North Carolina non-Hispanic white women receiving Medicaid in years 2000–2002 by program participation. For women participating in WIC only, a significantly lower percentage of LBW births occurred compared to women who participated in neither program. There is no statistical difference, however, in the percent-

ages of LBW births to participants in MCC only or both MCC and WIC compared to non-participants. A significantly higher percentage of non-Hispanic white women received less than adequate prenatal care when enrolled in MCC only, while a significantly lower percentage of women participating only in WIC received less than adequate prenatal care compared to non-participating women. Among non-Hispanic white women who participated in either program, a significantly higher percentage smoked cigarettes during pregnancy compared to non-participants.

**Table 4. Means of Low Birth Weight Births and Maternal Risk Factors among Live Singleton Births to North Carolina Non-Hispanic White Women Receiving Medicaid in Years 2000–2002 by Program Participation** (Standard Deviations are in Parentheses)

VARIABLES	NEITHER MCC NOR WIC (n=15,017) (24%)	MCC ONLY (n=4,305) (7%)	WIC ONLY (n=19,558) (32%)	BOTH MCC AND WIC (n=22,561) (37%)
Low Birth Weight (<2500 grams)	8.7% (.282)	8.6% (.280)	6.8% (.252)**	7.8% (.269)
Age	24.7 (5.545)	22.9 (4.986)*	23.9 (5.395)	22.8 (5.188)*
Education in Years	12.1 (2.777)	11.7 (4.772)	11.7 (3.010)	11.45 (3.456)
Unmarried	32.9% (.470)	38.1% (.485)**	49.5% (.499)**	58.6% (.492)**
Medical Risks	28.8% (.452)	30.8% (.461)*	29.6% (.456)	31.8% (.465)*
Less than Adequate Prenatal Care	12.9% (.336)	14.5% (.351)*	10.7% (.309)*	11.1% (.313)
Smokes Cigarettes	32.5% (.468)	38.1% (.485)**	36.0% (.480)*	39.1% (.487)**

\*\* Significant ( $p < .01$ ) difference between program participation category and neither MCC nor WIC program participation category.

\* Significant ( $p < .05$ ) difference between program participation category and neither MCC nor WIC program participation category.

## Discussion

The study results reveal a significantly lower percentage of LBW births for women in North Carolina Medicaid who participated in WIC only or both WIC and MCC compared to women who received conventional Medicaid prenatal care. In addition, a significantly lower percentage of women enrolled in WIC only or both WIC and MCC received less than adequate prenatal care compared to non-participants.

African American women deliver more LBW infants than do non-Hispanic whites in the general North Carolina population,<sup>20</sup> and the study results mirror this disparity within the North Carolina Medicaid population. In this study, the percentage of LBW births to African Americans is almost double that of LBW births to non-Hispanic white women. Significant differences in observed maternal risk factors between African

American and non-Hispanic white women strongly suggest a need to control for these factors in subsequent studies that compare program outcomes by race.

In discussing the results presented in Tables 3 and 4, it is important to keep in mind that Medicaid women who are perceived to be at risk for a poor birth outcome are most likely to be referred by their provider to MCC, WIC or both programs. It is not surprising, therefore, that participating women exhibit higher risk status when compared to non-participants. The statistically significant differences in percentages of unmarried status, having one or more medical risks, and smoking among participating women compared to non-participating women bear this out.

With that in mind, what is surprising is the extent to which MCC, WIC, or a combination of the programs have made inroads into lowering the percentages of LBW births among higher risk African American women. The percentage of LBW infants born to African American women participating in both MCC and WIC is 3.5% points less than women not participating in either of these programs (11.7% vs. 15.2%). In addition, the percentages of LBW births among African American women participating in MCC only (13.9%) and WIC only (11.1%) are significantly lower than non-participating women (15.2%). In contrast, the percentage of LBW infants born to non-Hispanic white women participating in both MCC and WIC is only 0.9% less than the control group (7.8% vs. 8.7%), a non-significant difference. Non-Hispanic white women who participate only in MCC had no difference in LBW births compared to their non-participating counterparts. Only those women participating only in WIC had a lower percentage of LBW births compared to non-participants. Once again, the significant differences in observed maternal risks between participating and non-participating women within each racial sub-group suggest a need to control for these factors in future studies comparing program outcomes.

Women participating only in MCC had a higher percentage of less than adequate prenatal care. These unexpected results are particularly surprising given the program's emphasis on improving prenatal care access. This paradox warrants further study to explore ways to improve the adequacy of prenatal care within the program to further reduce the percentage of LBW births for these women.

WIC-only participants had a significantly lower percentage of LBW births than all other levels of program participation. This result was observed for the entire Medicaid sample, for African Americans, and for non-Hispanic whites. For African American women, combining WIC

with MCC services resulted in fewer LBW births than did receiving MCC services alone. Participation in MCC may serve as the catalyst for joint WIC enrollment (42% of the sample), a program goal of North Carolina MCC; only 7% of the Medicaid sample received only MCC services.

It is likely that some of the observed differences in LBW births result from women self-selecting into the alternate prenatal care programs. As stated earlier, future research will need to control for observed differences in maternal risk characteristics across programs and by race. Moreover, unobserved characteristics of these women may enter into their choice to participate in MCC only, WIC only, MCC and WIC, or neither program. Selection bias is a limitation of this study that points to an expanded analytical approach in future research. Possible extensions include using econometric methodologies to test and correct for favorable or unfavorable selection into programs, but these methods lead to fulfilling objectives beyond those of the present study.

Another limitation of the study is the lack of information on the duration of WIC participation for Medicaid women in the sample. Earlier studies found that the longer the period of WIC participation during prenatal care, the better the birth weight outcome.<sup>12-13</sup> The study data do not describe the length of WIC participation during the prenatal period, rather the start date only.

This study is limited to a specialized sample of women in North Carolina Medicaid and cannot be generalized to other states' programs. The study is further limited to a comparison of African Americans and non-Hispanic whites and does not extend to other racial/ethnic groups which are excluded from the sample. The age range of the sample includes African American teenagers, known to have age-related LBW risks that differ,<sup>22</sup> but included here to capture a significant subgroup that is a target of North Carolina Medicaid initiatives. Finally, the late MCC/WIC enrollment cut-off at 32 weeks leads to a potentially wide range of participation lengths that may affect results.

## Conclusion

This study was conducted to determine if differences in LBW births and maternal risk characteristics exist for women who participate in enhanced prenatal care, WIC, or both programs compared to women who receive conventional Medicaid prenatal care. A comparison was also made of LBW birth rates, risk characteristics, and program participation levels between African American and non-Hispanic white women. Among African American women, LBW birth rates and risk character-

istics were compared by program participation. A separate comparison was made for non-Hispanic white women by program participation.

Women who participate in these programs generally exhibited characteristics associated with greater risk for LBW births. Despite this, African American women had a significantly lower percentage of LBW births when they participated in MCC, WIC, or both, compared to African American women who did not. In contrast, there was no evidence that non-Hispanic white women enrolled in MCC only or both MCC and WIC had fewer LBW births compared to the non-participating control group.

Women enrolled only in WIC had a lower percentage of LBW births, and a lower percentage of these women received less than adequate prenatal care compared to all other program participation levels. In contrast, women in MCC only or conventional Medicaid without WIC services had higher percentages of LBW births and less than adequate prenatal care. These preliminary results point toward WIC enrollment as a link to improved birth weight and adequate prenatal care.

The findings reveal an interesting, differential impact on LBW births by race and program participation. Efforts to encourage African American women to participate in MCC and/or WIC appear to be effective. It is unclear whether promoting MCC participation alone among non-Hispanic white women has the effect of reducing the percentage of LBW births. However, the state's efforts to link WIC enrollment with MCC participation appears to be important for all women in the Medicaid sample.

In light of these study results, policy recommendations can be made. WIC services have been previously shown to improve birth outcomes,<sup>12-15</sup> and the findings reported here suggest similar results. MCC participation provides a threshold for entering the WIC program in North Carolina Medicaid, so efforts to encourage WIC enrollment within enhanced prenatal care programs should be further emphasized. This effort may also mitigate the level of inadequate prenatal care among women participating in enhanced prenatal care programs without WIC services.

African American women participating in enhanced prenatal care, with or without WIC, fared better than their counterparts in conventional Medicaid prenatal care. States may consider initiating targeted, programmatic changes that leverage any favorable impact that these programs demonstrate among African Americans. The Better Babies Project in Washington, D.C.,<sup>4</sup> the Black Infant Health Program in California,<sup>7</sup> and other state programs initiated as race-specific maternity care coordination programs are examples of this approach.

## References

1. Martin, J. A.; Hamilton, B. E.; Ventura, S. J.; et al. 2002 (February 12). Births: Final Data for 2000. *National Vital Statistics Reports* 52(10). Hyattsville, MD: National Center for Health Statistics.
2. Buescher, P. A.; Roth, M. S.; Williams, D.; et al. 1991. An Evaluation of the Impact of Maternity Care Coordination on Medicaid Birth Outcomes in North Carolina. *Am J Public Health* 81:1625–1629.
3. Korenbrot, C. C.; Gill, A.; Clayson, Z.; et al. 1995. Evaluation of California's Statewide Implementation of Enhanced Perinatal Services as Medicaid Benefits. *Public Health Rep* 110:125–133.
4. Herman, A. A.; Berendes, H. W.; Yu, K. F.; et al. 1996. Evaluation of the Effectiveness of a Community-Based Enriched Model of Prenatal Intervention Project in the District of Columbia. *Health Serv Res* 31:609–621.
5. Clarke, L.; Miller, M. K.; Vogel, W. B.; et al. 1993. The Effectiveness of Florida's "Improved Pregnancy Outcome" Program. *J Health Care Poor Underserved* 4:117–132.
6. Nason, C.S.; Alexander, G.R.; Pass, M.A.; et al. 2003. An Evaluation of the Medicaid Managed Maternity Program: The Impact of Comprehensive Care Coordination on Utilization and Pregnancy Outcome. *J Health Hum Serv Adm* 26:239–267.
7. Willis, W. O.; Eder, C. H.; Lindsay, S. P.; et al. 2004. Lower Rates of Low Birth Weight and Pre-term Births in the California Black Infant Health Program. *J Natl Med Assoc* 96:315–324.
8. Norbeck, J. S.; DeJoseph, J. F.; and Smith, R. T. 1996. A Randomized Trial of an Empirically Derived Social Support Intervention to Prevent Low Birth Weight among African American Women. *Soc Sci Med* 43:947–954.
9. Klerman, L. V.; Ramey, S. L.; Goldenberg, R. L.; et al. 2001. A Randomized Trial of Augmented Prenatal Care for Multiple-Risk, Medicaid-Eligible African American Women. *Am J Public Health* 91:105–111.
10. Reichman, N. E.; & Florio, M. J. 1996. The Effects of Enriched Prenatal Care Services on Medicaid Birth Outcomes in New Jersey. *J Health Econ* 15:455–476.
11. Joyce, T. J. 1999. Impact of Augmented Prenatal Care on Birth Outcomes of Medicaid Recipients in New York City. *J Health Econ* 18:31–67.
12. Kotelchuck, M.; Schwartz, J. B.; Anderka, M. T.; et al. 1984. WIC Participation and Pregnancy Outcomes: Massachusetts Statewide Evaluation Project. *Am J Public Health* 10:1086–1092
13. Stockbauer, J. W. 1987. WIC Prenatal Participation and its Relation to Pregnancy Outcomes in Missouri: A Second Look. *Am J Public Health* 77:813–818.
14. Lazairu-Bauer, V.; Stratton, H.; Pruzek, R.; et al. 2004. A Comparative Analysis of Effects of Early versus Late Prenatal WIC Participation. *Matern Child Health J* 8:77–86.

15. Hickey, C. A.; Kreauter, M.; Bronstein, J.; et al. 2004. Low Prenatal Weight Gain among Adult WIC Participants Delivering Term Singleton Infants: Variation by Maternal and Program Participation Characteristics. *Matern Child Health J* 3:129–141.
16. Buescher, P. A.; Larson, L. C.; Nelson, M. D.; et al. 1993. Prenatal WIC Participation can Reduce Low Birth Weight and Newborn Medical Costs: A Cost-Benefit Analysis of WIC Participation in North Carolina. *Am J Public Health* 93:163–166.
17. Mathematica Policy Research Inc. 1990. *The Savings in Medicaid Costs for Newborns and their Mothers from Prenatal Participation in the WIC Program*. Washington, DC: Food and Nutrition Service, U.S. Department of Agriculture.
18. Buescher, P. A.; & Horton, S. F. 2000. Prenatal WIC Participation in Relation to Low Birth Weight and Medicaid Infant Costs in North Carolina: A 1997 Update. *CHIS Studies* 122:1–8.
19. Buescher, P. A.; & Ward, N. I. 1992. A Comparison of Low Birth Weight among Medicaid Patients in Public Health Departments and Other Providers of Prenatal Care in North Carolina and Kentucky. *Public Health Rep* 107:54–59.
20. North Carolina State Center for Health Statistics. Available at: <http://www.schs.state.nc.us>. Accessed June 30, 2006.
21. Kessner, D. M.; Singer, J.; Kalk, C. E.; et al. 1973. *Infant Death: An Analysis by Maternal Risk and Health Care*. Washington, DC: Institute of Medicine, National Academy of Sciences.
22. Geronimus, A. T. 1996. Black/White Differences in the Relationship of Maternal Age to Birthweight: A Population-Based Test of the Weathering Hypothesis. *Soc Sci Med* 42:589–597.

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