# Racial/Ethnic Disparities in Antiretroviral Treatment Among HIV-Infected Pregnant Medicaid Enrollees, 2005–2007

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*Objectives.* We examined racial/ethnic differences in prenatal antiretroviral (ARV) treatment among 3259 HIV-infected pregnant Medicaid enrollees.

*Methods.* We analyzed 2005–2007 Medicaid claims data from 14 southern states, comparing rates of not receiving ARVs and suboptimal versus optimal ARV therapy.

*Results.* More than one third (37.3%) had zero claims for ARV drugs. Three quarters (73.4%) of 346 Hispanic women received no prenatal ARVs. After we adjusted for covariates, Hispanic women had 3.89 (95% confidence interval = 2.58, 5.87) times the risk of not receiving ARVs compared with Whites. Hispanic women often had only 1 or 2 months of Medicaid eligibility, perhaps associated with barriers for immigrants. Less than 3 months of eligibility was strongly associated with nontreatment (adjusted odds ratio = 29.0; 95% confidence interval = 13.4, 62.7).

*Conclusions.* Optimal HIV treatment rates in pregnancy are a public health priority, especially for preventing transmission to infants. Medicaid has the surveillance and drug coverage to ensure that all HIV-infected pregnant women are offered treatment. States that offer emergency Medicaid coverage for only delivery services to pregnant immigrants are missing an opportunity to screen, diagnose, and treat pregnant women with HIV, and to prevent HIV in children. (*Am J Public Health.* 2013;103: e46–e53. doi:10.2105/AJPH.2013.301328)

HIV/AIDS disproportionately affects African American, Hispanic, and other minority populations in the United States.[1] In 2009, 44% of new HIV infections occurred in Black or African American and 20% in Hispanic or Latino persons. The infection rate among African Americans was 6 times the rate for non-Hispanic Whites, and the infection rate for Hispanics was nearly 4 times as high.[2–4] Survival rates after HIV diagnosis are much lower in African Americans and Hispanics than in non-Hispanic Whites.[5] HIV infection was among the leading causes of death for African American and Hispanic persons aged 10 to 54 years in 2009.[6]

Women represented 24% of all HIV cases diagnosed in 2009.[7] More than half of these new HIV diagnoses were in African American women, and 16% in Hispanic women.[8] The HIV infection rate among Hispanic or Latino women in 2009 was more than 4 times as high as that of Whites (11.8 of 100 000 vs 2.6 of 100 000). Each year, between 6000 and 7000 HIV-infected women give birth in the United States.[9] Perinatal transmission is the most common mechanism for children to become infected with HIV, and nearly all AIDS cases in US children are attributable to mother-to-child (or vertical) transmission.[10,11] Treating HIV-positive pregnant women with antiretroviral (ARV) drugs can decrease mother-to-child transmission rates from 25% to 2%.[12]

Antiretroviral therapy cannot cure HIV infection, but it can prolong survival time, reduce morbidity, improve quality of life, and preserve immunologic function. By suppressing viral load, ARV can also prevent horizontal transmission.[13] Pregnancy adds an additional public health reason for treating HIV, which is to reduce the risk of vertical perinatal transmission to the infant.[14,15] Antiretroviral drug therapy is recommended for the prevention of perinatal HIV transmission for all pregnant women, especially during the third trimester, regardless of whether there are indications for ARV drug therapy for maternal health.[13–15] Previous studies have shown racial/ethnic disparities in utilization of ARV during pregnancy on the basis of race/ethnicity,[16,17] but did not specifically address treatment rates among low-income, Medicaid-enrolled pregnant women.

Limited data are available for analyzing access to ARV treatment of HIV-infected pregnant women.[18,19] Medicaid claims data include a large number of low-income, HIV-infected, pregnant women,[20] covering roughly one third of all births and more than half of all births among African American mothers. Moreover, Medicaid claims data provide a detailed longitudinal record of health care utilization, diagnosis, and prescription drug usage across the full range of medical settings. Geographically, the South is a region of the United States with worse health outcomes, significant racial/ethnic disparities, and a large HIV burden of disease.[21,22] Therefore, the purpose of this study was to describe racial/ethnic disparities in ARV treatment of low-income Medicaid-eligible HIV-infected women, with a focus on minority populations in southern states.

## METHODS

We used a retrospective cohort design to identify and analyze race/ethnicity-based disparities in access to ARV among HIV-infected pregnant women before delivery. We examined use of ARV therapies during a 14-week predelivery period. The 14-week period represents the trimester when all HIV-infected women should receive ARV therapy for maternal health and especially for the prevention of vertical perinatal transmission.

The data for this analysis came from 3 years (2005–2007) of Medicaid Analytic Extract (MAX-file) data from 14 southern states:

Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, Missouri, North Carolina, South Carolina, Tennessee, Texas, and Virginia. Individuals from these states represent one third of all US Medicaid enrollees, nearly half (48%) of all African American US Medicaid enrollees, and one fifth (21%) of all US Hispanic Medicaid enrollees. One MAX personal summary file contains person-level data for all enrollees in each state for each calendar year. These demographic and enrollment data are linked to each person's claims data in the inpatient, outpatient, pharmacy, and long-term care files by a Medicaid Statistical Information System identification number.

### Patient Selection

The study period was January 1, 2005, to December 31, 2007. We only included women whose delivery code status indicated a maternal delivery stay and giving birth during the period of April 1, 2005, to December 31, 2007, to ensure that all participants would have prescription data for the 14-week predelivery period. We defined AIDS/HIV status as an *International Classification of Disease, Ninth Revision, Clinical Modification* (*ICD-9-CM*) code of 042, V08, and 795.71 in any of the 9 fields that capture diagnoses.[23]

We identified the delivery date for each participant, and designated the 14 weeks before delivery as the period of interest with regard to prenatal HIV treatment. After we excluded women with both Medicare and Medicaid coverage (dual-eligibles), we had a cohort of 3259 pregnant women with HIV/AIDS (Figure A, available as a supplement to this article at http://www.ajph.org).

We used the National Drug Code variable in prescription drug claims to identify the use of ARV.[24] Five types of Food and Drug Administration–approved ARV drugs are currently recommended and available:

1. nucleoside reverse-transcriptase inhibitors, which include zidovudine, didanosine, stavudine, lamivudine, abacavir, emtricitabine, and tenofovir;
2. nonnucleoside reverse-transcriptase inhibitors, which include efavirenz, nevirapine, delavirdine, and etravirine;
3. protease inhibitors, which include atazanavir, darunavir, fosamprenavir, indinavir, nelfinavir, ritonavir, saquinavir, tipranavir, and lopinavir;
4. entry inhibitors, which include enfuvirtide and maraviroc; and
5. an integrase inhibitor (raltegravir).

Antiretroviral therapy during pregnancy must be individualized according to the pregnant women's ARV history and the presence of comorbidities. A combination ARV regimen, which is defined as highly active antiretroviral therapy (HAART) with at least 1 nucleoside reverse-transcriptase inhibitor and at least 2 other agents, is recommended during pregnancy for either treatment or prophylaxis.[17] "Suboptimal" treatment is defined as patients who received some or any ARV treatment, but not a recommended HAART regimen. Patients who had no claims for ARV drugs during the 14-week predelivery period were defined as the "no-ARV" treatment group.

We determined rural or urban status by merging the MAX data with county-level data from the Area Resource File (ARF).[25] The ARF aggregates publicly available data from multiple sources about socioeconomic and environmental characteristics. We used Federal Information Processing Standard codes for patient's county of residence to merge the ARF and MAX files.[26] The 2003 Rural/Urban Continuum codes from the Department of Agriculture's Economic Research Service[27] are used in the ARF to classify counties into 3 groups: large metropolitan area with 1 million residents or more, small metropolitan area with fewer than 1 million residents, and nonmetropolitan (rural) areas.

Cesarean delivery is also a strategy for preventing mother-to-child transmission,[27] especially for women receiving inadequate ARV. We identified cesarean delivery if women had any *ICD-9-CM* procedure code equal to 74 in the inpatient claims.

According to Centers for Disease Control and Prevention (CDC) and World Health Organization guidelines,[28,29] the stage of HIV progression should inform decisions on ARV treatment. Medicaid claims data do not include information on CD4+ count and viral load, but we captured the presence of AIDS-defining clinical conditions as defined by CDC[30] by searching for corresponding *ICD-9-CM* codes in the primary or secondary diagnosis fields of each HIV-positive pregnant woman.

We used diagnoses listed in the Elixhauser Comorbidity Index to assess medical comorbidity, by using an algorithm described in detail by Quan et al.[31] to capture the chronic medical conditions most commonly occurring in hospitalized persons.[32] We classified the Elixhauser Comorbidity Index into 2 groups on the basis of the presence or absence of medical comorbidities other than HIV or pregnancy ($0 = \text{no}; \geq 1 = \text{yes}$).

We summed the duration of Medicaid enrollment (captured in the MAX file's months-eligible variable) from 3 years of aggregated Medicaid claims data. We then classified enrollment into 2 groups on the basis of the number of months of Medicaid enrollment ($< 3$ months and $\geq 3$ months).

### Analytic Procedures

We measured numerical variables by race/ethnicity with analysis of variance. We compared frequency variances among different racial/ethnic groups and different treatment groups by using the $\chi^2$ test.

Multinomial logistic regression models used HAART as the comparison group. We used the univariate and multivariate model to estimate the relationship between covariates and different treatment groups. We estimated the unadjusted odds ratio for accessing no ARV versus HAART and suboptimal treatment versus HAART through multinomial logistic regression with race/ethnicity and other variables as a single independent variable. We repeated the multinomial logistic regression model with adjustment for multiple covariates, which included maternal age at birth, state, rural or urban status, presence of AIDS-defining condition, and Medicaid enrollment months status. Using non-Hispanic White as the reference group, we estimated a 95% confidence interval for African Americans, Hispanics, and "other" racial/ethnic group. We set the level of statistical significance at .05 and all tests were 2-tailed. We conducted analyses with SAS version 9.2 (SAS Institute, Cary, NC).

## RESULTS

Table 1 describes the characteristics of the study population of the 3259 HIV-infected

pregnant women by race/ethnicity. Whites represented 14.0%, African Americans represented 72.6%, and Hispanics represented 10.6% of Medicaid-covered HIV-infected pregnant women. There were no significant differences in maternal age of pregnancy among races/ethnicities nor were there differences in cesarean delivery rates. Only 5.1% of African Americans, 4.6% of Whites, and 2.6% of Hispanics had an AIDS-defining condition at delivery. More than half of minority women lived in a large metropolitan area, whereas 41.1% of non-Hispanic White women lived in a large metropolitan area.

The average number of Medicaid-eligible months for pregnant women within the 36-month observational period was 8.0 months. Hispanic women averaged only one third the number of Medicaid-eligible months compared with non-Hispanic White and African American women. Almost half (43.6%) of Hispanic women had very brief enrollment around the time of delivery (< 3 Medicaid-covered months), which was more than 10 times the proportion seen among non-Hispanic White (3.9%) and African American (3.1%) women.

Table 2 shows treatment rates as the percentage of women in each group receiving HAART, suboptimal ARV treatment, and no ARV treatment of each of the demographic strata. Hispanic women had the highest percentage (73.4%) of receiving no ARV treatment within the 14-week predelivery period. Patients living in large metropolitan areas had higher proportions (40.4%) of not receiving any ARV treatment than women in small metropolitan or rural areas. HIV-infected pregnant women with less than 3 months of enrollment in Medicaid over the 3-year study period had the highest proportion (95.0%) of not receiving ARV treatment during pregnancy.

In Table 3, the multinomial logistic regression models (no ARV vs HAART and suboptimal treatment vs HAART) showed that race/ethnicity was a significant factor in influencing the risk of not receiving ARV treatment. Hispanic or Latino women had 8.47 (95% confidence interval = 5.86, 12.25) times the risk of no ARV versus HAART compared with non-Hispanic Whites. The odds ratios for "other" race/ethnicity and African American were 3.55 and 1.49, respectively. Patients who had only 1 or 2 months of enrollment (Medicaid-eligible months < 3) had 43.1-times higher odds of not receiving ARV treatment versus HAART than were those who had 3 or more months of enrollment. The presence of an AIDS-defining condition was not a factor that influenced receiving ARV. Pregnant women with other medical comorbidities had slightly higher odds of receiving ARV, but this was not statistically significant. Patients who lived in a large metropolitan area were less likely to receive ARV treatment than were patients who lived in a small metropolitan area and those who lived in rural areas. The suboptimal treatment versus HAART model showed a similar pattern as did the no-ARV versus HAART model.

After we adjusted for covariates, maternal age, state, comorbidity status, and AIDS-defining conditions, race/ethnicity remained a factor that influenced access to ARV during the 14-week predelivery period. Hispanic women were still 3.89 times more likely to have received no ARV versus HAART during pregnancy compared with non-Hispanic White women. African American women had 58% higher odds of no ARV versus HAART compared with Whites. Short duration of Medicaid enrollment was still the most important factor to affect nonreceipt of ARV treatment. Patients with less than 3 months of enrollment had

**TABLE 1—Characteristics and Treatment of 3259 HIV-Infected Pregnant Women Enrolled in Medicaid: 14 Southern States, 2005–2007**

| Variable | White, No. (%) or Mean ±SD | Black, No. (%) or Mean ±SD | Hispanics, No. (%) or Mean ±SD | Other, No. (%) or Mean ±SD | *P* |
|---|---|---|---|---|---|
| Total | 457 (14.0) | 2367 (72.6) | 346 (10.6) | 89 (2.7) | |
| Maternal age, y | 26.4 ±5.7 | 26.4 ±5.9 | 26.3 ±5.7 | 26.8 ±6.3 | .94 |
| Metro index[a] | | | | | |
| Large metro | 188 (41.1) | 1238 (52.3) | 195 (56.4) | 41 (46.1) | <.01 |
| Small metro | 169 (37.0) | 714 (30.2) | 95 (27.5) | 30 (33.7) | |
| Nonmetro | 100 (21.9) | 415 (17.5) | 56 (16.2) | 18 (20.2) | |
| AIDS conditions | 21 (4.6) | 120 (5.1) | 9 (2.6) | 5 (5.6) | .24 |
| Comorbidity | 199 (43.5) | 886 (37.4) | 110 (31.8) | 36 (40.5) | <.01 |
| Cesarean delivery | 245 (53.6) | 1349 (57.0) | 184 (53.2) | 46 (51.7) | .28 |
| Mos enrolled in Medicaid[b] | 21.2 ±10.7 | 22.9 ±10.8 | 8.6 ±9.9 | 15.1 ±12.5 | <.01 |
| Enrolled in Medicaid < 3 mo[b] | 18 (3.9) | 74 (3.1) | 151 (43.6) | 17 (19.1) | <.01 |
| Treatment | | | | | |
| HAART[c] | 228 (49.9) | 888 (37.5) | 51 (14.7) | 23 (25.8) | <.01 |
| Suboptimal treatment[d] | 95 (20.8) | 701 (29.6) | 41 (11.9) | 18 (20.2) | |
| No ARV | 134 (29.3) | 778 (32.9) | 254 (73.4) | 48 (53.9) | |

*Note.* ARV = antiretroviral therapy; HAART = highly active antiretroviral therapy.
[a]Large metro = metropolitan area with 1 million residents or more; small metro = metropolitan area with fewer than 1 million residents; nonmetro = rural area.
[b]Eligible months over 3 years of Medicaid claim data.
[c]HAART included at least 1 nucleoside reverse-transcriptase inhibitor and at least 2 other agents.
[d]Suboptimal treatment = some or any ARV treatment prescription other than HAART.

**TABLE 2—Antiretroviral Drug Treatment Rates Among 3259 HIV-Infected Pregnant Women Enrolled in Medicaid: 14 Southern States, 2005–2007**

| Covariates | Total No. | HAART,[a] No. (%) | Suboptimal Treatment,[b] No. (%) | No ARV, No. (%) | *P* |
|---|---|---|---|---|---|
| Total | 3259 | 1190 (36.5) | 855 (26.2) | 1214 (37.3) | |
| Race/ethnicity | | | | | |
| Non-Hispanic White | 457 | 228 (49.9) | 95 (20.8) | 134 (29.3) | <.01 |
| Non-Hispanic Black | 2367 | 888 (37.5) | 701 (29.6) | 778 (32.9) | |
| Hispanic | 346 | 51 (14.7) | 41 (11.9) | 254 (73.4) | |
| Other | 89 | 23 (25.8) | 18 (20.2) | 48 (53.9) | |
| Metro index[c] | | | | | |
| Large metro | 1662 | 553 (33.3) | 437 (26.3) | 672 (40.4) | <.01 |
| Small metro | 1008 | 406 (40.3) | 257 (25.5) | 345 (34.2) | |
| Nonmetro | 589 | 231 (39.2) | 161 (27.3) | 197 (33.5) | |
| AIDS condition | | | | | |
| Yes | 155 | 57 (36.8) | 46 (29.7) | 52 (33.6) | .51 |
| No | 3104 | 1133 (36.5) | 809 (26.1) | 1162 (37.4) | |
| Comorbidity | | | | | |
| Yes | 1231 | 431 (35.0) | 356 (28.9) | 444 (36.1) | .02 |
| No | 2028 | 759 (37.4) | 499 (24.6) | 770 (38.0) | |
| Cesarean delivery | | | | | |
| Yes | 1824 | 695 (38.1) | 506 (27.7) | 623 (34.2) | <.1 |
| No | 1435 | 495 (34.5) | 349 (24.3) | 591 (41.2) | |
| Months enrolled in Medicaid[d] | | | | | |
| < 3 mo | 260 | 7 (2.7) | 6 (2.3) | 247 (95.0) | <.01 |
| ≥ 3 mo | 2999 | 1183 (39.5) | 849 (28.3) | 967 (32.2) | |

*Note*. ARV = antiretroviral therapy; HAART = highly active antiretroviral therapy.
[a]HAART included at least 1 nucleoside reverse-transcriptase inhibitor and at least 2 other agents.
[b]Suboptimal treatment = some or any ARV treatment prescription other than HAART.
[c]Large metro = metropolitan area with 1 million residents or more; small metro = metropolitan area with fewer than 1 million residents; nonmetro = rural area.
[d]Eligible months over 3 years of Medicaid claim data.

29-times-higher odds of having received no ARV versus HAART during the 14-week predelivery period.

## DISCUSSION

There are 3 main findings of this study. First, we found a substantial portion of the entire population of Medicaid-enrolled women with HIV who did not receive any ARV treatment during pregnancy, let alone optimal recommended HAART regimens. Second, we found significant racial/ethnic disparities in pharmacy claims for ARV medication among low-income pregnant women with HIV infection. Minority status, especially being Hispanic, was significantly associated with the odds of not receiving any ARV medication during the 14-week predelivery period. Finally, in attempting to explain the lower treatment rates among Hispanic women, we found a very low duration of enrollment (months eligible) in Medicaid for many pregnant women of Hispanic ethnicity.

Antiretroviral therapy improves survival and functional health of the individual, as well as decreases risk of transmission to others.[33,34] Unfortunately, only 28% of US persons with HIV are receiving effective treatment according to the CDC—some who remain undiagnosed, some who have not accessed HIV care, some who drop out of care, and some whose treatment is not effectively reducing their viral loads.[35] In the context of pregnancy, ARV dramatically reduces perinatal transmission from mother to infant. Effective programs of maternal ARV treatment during pregnancy have resulted in marked declines in the incidence of HIV in childhood.[36]

Medicaid provides insurance coverage for roughly one third of births in the United States, and more than half of all births to African American women.[37] Medicaid also provides insurance coverage for half of all the patients with HIV, and 90% of children with HIV.[38] Because the scope of Medicaid benefits includes both perinatal care and prescription drug coverage in all 50 states, Medicaid claims can provide an important surveillance system for HIV treatment during pregnancy. Medicaid programs may also be seen as a potential public health resource for improving rates of ARV treatment during pregnancy and for decreasing mother-to-child transmission of HIV.

Although the breakthrough of effective ARV (starting with protease inhibitors in 1996) has led to substantial declines in HIV mortality nationwide, the unequal diffusion of these lifesaving treatments has actually led to a widening of racial/ethnic disparities in HIV mortality.[39] Even among those who are receiving some ARV treatment, only 70% of African American men have good suppression of HIV viral loads, compared with 84% of Whites and 79% of Hispanics.[40]

Within the low-income Medicaid population there are significant racial/ethnic differences in treatment rates, even though enrollees in any given state all have insurance that covers the same drug formulary, the same provider panels, and the same payment rates.[41] Therefore, perhaps it is encouraging that in our current analysis of the 2005–2007 Medicaid population in 14 high-disparity southern states, the Black–White treatment gap during pregnancy was not significant. On the other hand, the fact that nearly 3 out of 4 Hispanic or Latino women with HIV in pregnancy did not receive any ARV treatment is stunning, because this portends a future increase in the number of HIV-infected Hispanic or Latino children (all US citizens by birth) whose disease could have been entirely prevented. Access to and use of proven ARV treatment among pregnant women makes a difference. The fact that these women were covered by Medicaid at least at the moment of delivery also suggests a missed opportunity for outreach, screening, and prophylactic treatment.

Hispanic children have also been disproportionately affected by the AIDS epidemic,

**TABLE 3—Relationship Between Covariates and HIV Treatment Groups Among 3259 HIV-Infected Pregnant Women Enrolled in Medicaid: 14 Southern States, 2005–2007**

| Covariates | No ARV vs HAART[a] | | Suboptimal Treatment[b] vs HAART[a] | |
|---|---|---|---|---|
| | Crude OR (95% CI) | Adjusted OR (95% CI) | Crude OR (95% CI) | Adjusted OR (95% CI) |
| Race/ethnicity | | | | |
| White (Ref) | 1.00 | 1.00 | 1.00 | 1.00 |
| African American | 1.49* (1.18, 1.88) | 1.58* (1.23, 2.02) | 1.90* (1.46, 2.46) | 1.85* (1.42, 2.41) |
| Hispanic | 8.47* (5.86, 12.25) | 3.89* (2.58, 5.87) | 1.93* (1.20, 3.11) | 1.77* (1.08, 2.89) |
| Other | 3.55* (2.07, 6.10) | 2.69* (1.50, 4.82) | 1.88 (0.97, 3.64) | 1.89 (0.97, 3.70) |
| Metro index[c] | | | | |
| Large metro (Ref) | 1.00 | 1.00 | 1.00 | 1.00 |
| Small metro | 0.70* (0.58, 0.84) | 0.78* (0.62, 0.98) | 0.80* (0.66, 0.98) | 0.76* (0.60, 0.97) |
| Nonmetro | 0.70* (0.56, 0.88) | 0.77* (0.59, 0.99) | 0.88 (0.70, 1.12) | 0.83 (0.64, 1.08) |
| Comorbidity | | | | |
| No (Ref) | 1.00 | 1.00 | 1.00 | 1.00 |
| Yes | 1.02 (0.86, 1.20) | 1.23* (1.02, 1.47) | 1.26* (1.05, 1.50) | 1.34* (1.11, 1.62) |
| AIDS conditions | | | | |
| No (Ref) | 1.00 | 1.00 | 1.00 | 1.00 |
| Yes | 0.89 (0.61, 1.31) | 1.01 (0.67, 1.52) | 1.13 (0.76, 1.68) | 1.08 (0.72, 1.62) |
| Months enrolled in Medicaid[d] | | | | |
| ≥ 3 mo (Ref) | 1.00 | 1.00 | 1.00 | 1.00 |
| < 3 mo | 43.12* (20.25, 91.79) | 29.01* (13.43, 62.69) | 1.19 (0.40, 3.56) | 1.33 (0.44, 4.03) |

*Note.* ARV = antiretroviral therapy; CI = confidence interval; HAART treatment = highly active antiretroviral therapy; OR = odds ratio. Crude ORs, adjusted ORs, and 95% CIs from multinomial logistic regression.
[a]HAART included at least 1 nucleoside reverse-transcriptase inhibitor and at least 2 other agents.
[b]Suboptimal treatment = some or any ARV treatment prescription other than HAART.
[c]Large metro = metropolitan area with 1 million residents or more; small metro = metropolitan area with fewer than 1 million residents; nonmetro = rural area.
[d]Eligible months over 3 years of Medicaid claim data.
*$P < .05$.

and the proportion infected through prenatal transmission was significantly higher than in any other ethnic group.[42,43] The CDC reported that in 2005, 67 out of 68 new cases of childhood HIV occurred via perinatal transmission. Nineteen of these 67 cases were among Hispanic and Latino children.[44]

The CDC projects that without perinatal ARV prophylaxis, 1 in 4 infants (25%) born to HIV-infected mothers would develop childhood HIV. With effective ARV during prenatal care plus elective cesarean delivery for women with high viral loads, this can be reduced to 2%.[45] There is the possibility that some mothers in our claims data received last-minute ARV therapy during labor and delivery, along with prophylactic treatment of the infant, which might not have been captured in the outpatient pharmacy claims. If so, this could be expected to reduce transmission rates from 25% to 10%[46] (still 5 times higher than the 2% achievable with optimal prenatal treatment). In our 14-state Medicaid sample, the difference between 2% and 10% mother-to-child transmission rates would represent the difference between 6 or 7 HIV-infected babies and 33 HIV-infected babies. It is likely that many of these mothers and infants did receive some perinatal in-hospital ARV treatment at the time of delivery, as their HIV diagnosis was recorded on a billed claim. However, if the "no-ARV treatment" group really did receive no treatment at all, even during labor and delivery, the number of Hispanic or Latino children infected with HIV during 2005 through 2007 in these 14 southern states would be projected (at a 25% perinatal transmission rate) to be 83 children.

A systematic review found that Hispanics, especially foreign-born Hispanics, were at significant risk for delayed diagnosis or late diagnosis of HIV.[47] Undocumented Hispanic or Latino immigrants with HIV are at higher risk for opportunistic infections, HIV diagnosis,[48] and late diagnosis[49] compared with nonimmigrant Hispanics. Hispanic women also have lower rates of accessing recommended early prenatal care and postpartum care,[50] although overall perinatal outcomes are better than in other minority subgroups.

## Etiology of Disparities in Treatment and Outcomes

The etiology of these disparities in treatment and outcomes is multifactorial, including complex interactions between factors at the levels of the individual patient, provider (as well as the patient–provider dyad), institution, and systems.[51,52] At the individual level, language, cultural beliefs, and level of acculturation may be more specific predictors of treatment disparities than ethnicity itself.[53] Hispanic cultural beliefs, for example, may favor care-seeking from traditional and alternative healing sources as a way to balance multiple factors, including health beliefs, stigma, language barriers, lack of familiarity with the US health care system, and confidentiality.

Failure to test or to treat appropriately could also reflect provider bias or issues of relational trust or communication in the provider–patient dyad. At the hospital or practice levels, institutional barriers may include the lack of fluently bilingual specialists or other health care professionals or even qualified interpreters. Providers and hospitals with inadequate language interpreter services may inappropriately rely on family members to provide interpreting for medical encounters. This can lead to inadequate history-taking and assessment of HIV risk, as well as inadequate discussion of the risks and benefits related to ARV therapy.

At a structural or systems level, minority populations face greater challenges in obtaining access to health care. Hispanic populations, especially in the southeastern United States, experience less access to health care than non-Hispanic Whites.[52,53] Immigration status also affects routine use of physician care or preventive services.[54] There may also be a lack of geographically accessible services in Hispanic or Latino neighborhoods, or other access barriers such as hours of operation for working patients. Disparities in access to health care

services even exist between Spanish-preferring and English-preferring Hispanics.[55]

Immigrants have specific restrictions on their eligibility for Medicaid and other public benefits tied to their immigration status. According to the American Community Survey, 33.6% of legal immigrants have no insurance coverage,[56] even though the great majority of Hispanic or Latino individuals (including 85% of Mexican Americans) are US citizens or legal residents. Medicaid covers 4 out of 10 Hispanic or Latino persons with household incomes below the federal poverty level, but Medicaid's eligibility rules leave many low-income Hispanic or Latino persons without coverage. Specifically, 27% of Hispanic US citizens, 35% of naturalized citizens, and 44% of legal immigrants are uninsured.[57]

Research that uses claims data is useful for defining differences in treatment rates, but is poorly suited for answering the "why?" question, especially for factors involving choices made by the individual patient or provider. Claims data only report broad-brush personal characteristics such as age, gender, and race/ethnicity, but are unable to detect personal health beliefs or care-seeking preferences. They provide no data on patient trust or provider bias, or the causes of structural barriers such as institutional racism.

### Timing of Medicaid Enrollment

Our data do, however, identify at least 1 Medicaid-specific structural barrier to the effective perinatal treatment of HIV that disproportionately affects Hispanic and Latino women. This is the frequent occurrence of such brief enrollment in the Medicaid program as to make adequate prenatal care or adequate treatment of HIV impossible. The timing (initiation and duration) of Medicaid enrollment can limit Hispanic HIV-infected pregnant women access to ARV treatment, and their overall prenatal care utilization. We found a 10-fold racial/ethnic variation in the proportion of women who had less than 3 months of Medicaid enrollment (43.9% for Hispanic and Latina women vs 3.9% for non-Hispanic White women and 3.1% for African American women). The average number of Medicaid-eligible months in our 36-month observational period was 8.6 months for Hispanic and Latina women, versus 21.2 and 22.9 months for White and Black women, respectively.

This would be consistent with women receiving Medicaid at the time of delivery under presumptive eligibility rules. Specifically, many states offer "emergency Medicaid eligibility" to women whose immigration status would render them otherwise ineligible to ensure access to hospital-based care, but only at the time of labor and delivery. These initiatives typically do not allow for Medicaid coverage during the prenatal period, when HIV could be diagnosed and effective prenatal treatment could be provided.

When pregnancy occurs, emergency Medicaid coverage at the time of labor and delivery (not for prenatal care) is often the only coverage offered to low-income undocumented immigrants, even though their US-born infants will be US citizens and immediately eligible for Medicaid. Under the 1996 Personal Responsibility and Work Opportunity Reconciliation Act,[58] immigrants' eligibility for Medicaid is tied to their length of residency in the United States except for lawful permanent residents who have resided in the United States for more than 5 years (and refugees, asylees, and other humanitarian immigrants eligible for federal Medicaid); other legal immigrants and undocumented immigrants are only eligible for emergency Medicaid, except in 22 states that use their own funds to provide health insurance coverage to some or all legal immigrants.[57] Even those who are eligible for Medicaid may be reluctant to apply for fear that it will jeopardize future citizenship or that they will need to repay Medicaid costs. Lack of bilingual Medicaid intake or case workers may also limit enrollment of potentially eligible Hispanic or Latino individuals.

Although Medicaid expenditures constitute a large and growing portion of state budgets, access to ARV treatment is actually associated with lower mean monthly direct health care costs.[59] The ability to prevent most cases of childhood HIV would not only prevent human suffering, but could also substantially reduce overall treatment costs. Each new case of HIV can be expected to generate $367 000 in health care costs over a lifetime. Emergency Medicaid coverage for pregnant women will have greater public health benefit if it begins at the first prenatal visit, especially for women with HIV. Expansion of Medicaid eligibility under the Affordable Care Act creates the potential for significant public health benefit, but must include outreach to specific subsets of the population that face social or linguistic barriers to enrollment.

State and local health departments conduct various perinatal HIV-prevention programs to decrease perinatal transmission and improve maternal health and survival, but these efforts are often not coordinated with state Medicaid programs that are covering a large proportion of the births to HIV-infected mothers. This would be a clear example of the opportunity to focus on "treatment as prevention,"[60] by using the health care coverage and data surveillance resources of state Medicaid programs to achieve a public health objective. Increasing ARV access and Medicaid eligibility during pregnancy among Hispanic or Latina women and other minorities could be specific components of a larger strategy to ensure that all Medicaid patients are afforded culturally relevant, evidence-based treatment of conditions with significant public health impact.[52]

There are important limitations to this study. Medicaid claims data are generated for administrative and reimbursement purposes rather than for clinical care or health services research, so they do not include individual covariates such as viral load, duration of illness, socioeconomic status, education level, country of origin, length of stay in the United States, or degree of social support, which may contribute to ARV access and health care utilization. Duration of Medicaid enrollment did not completely account for racial/ethnic differences. Even so, women of all racial/ethnic groups must meet similar low-income criteria to enroll in Medicaid within a given state. We could not control important clinical variables such as CD4+ count and viral loads for the analyses. Finally, the Medicaid claims data in this analysis only encompassed 14 southern US states, selected on the basis of their large minority populations and proportionate contribution to US racial/ethnic disparities.

### Conclusions

Notwithstanding these limitations, this study is one of the first to analyze racial/ethnic disparities in prenatal ARV treatment of HIV-infected pregnant women with

a multistate Medicaid population. Our data identify Hispanic or Latino women as a specific subgroup at risk for inadequate ARV therapy in pregnancy, but also point out a specific policy issue with regard to the systematic exclusion of many immigrants from Medicaid-covered care during the prenatal period. Finally, our data suggest the potential for Medicaid claims data to provide an ongoing surveillance system for adequacy of ARV treatment of HIV in pregnancy in high-disparity segments of the population. ■

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## Contributors

S. Zhang originated this study, ran data analyses, and drafted the article. C. Senteio assisted in developing the research question and drafting the article. J. Felizzola provided subject matter expertise (in HIV and in Latino health issues), and wrote or revised sections of the article. G. Rust provided expertise in Medicaid data analysis and health disparities, helped refine the research question and analysis plan, and helped to write and revise the article.

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## Human Participant Protection

This research was conducted with the approval of the institutional review board at Morehouse School of Medicine, which also waived the requirement for individual informed consent.

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