

# Ectopic pregnancy rates and racial disparities in the Medicaid population, 2004–2008

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**Objective:** To assess 2004–2008 ectopic pregnancy rates among Medicaid recipients in 14 states and 2000–2008 time trends in three states and to identify differences in rate by race/ethnicity.

**Design:** Secondary analysis of Medicaid administrative claims data.

**Setting:** Not applicable.

**Patient(s):** Women ages 15–44 enrolled in Medicaid in Arizona, California, Colorado, Florida, Illinois, Indiana, Iowa, Louisiana, Massachusetts, Michigan, Minnesota, Mississippi, New York, or Texas in 2004–2008 (n = 19,135,106) and in California, Illinois, and New York in 2000–2003.

**Intervention(s):** None.

**Main Outcome Measure(s):** Number of ectopic pregnancies divided by the number of total pregnancies (spontaneous abortions, induced abortions, ectopic pregnancies, and all births).

**Result(s):** The 2004–2008 Medicaid ectopic pregnancy rate for all 14 states combined was 1.40% of all reported pregnancies. Adjusted for age, the rate was 1.47%. Ectopic pregnancy incidence was 2.3 per 1,000 woman-years. In states for which longer term data were available (California, Illinois, and New York), the rate declined significantly in 2000–2008. In all 14 states, black women were more likely to experience an ectopic pregnancy compared with whites (relative risk, 1.46; 95% confidence interval, 1.45–1.47).

**Conclusion(s):** Ectopic pregnancy remains an important health risk for women enrolled in Medicaid. Black women are at consistently higher risk than whites. (Fertil Steril® 2014;102:1671–6. ©2014 by American Society for Reproductive Medicine.)

**Key Words:** Ectopic pregnancy, health status disparities, Medicaid

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Ectopic pregnancy poses a serious health risk to women. Defined as implantation of a fertilized ovum outside the uterine endometrium, the condition can cause hemorrhage and death if not treated promptly. Approximately 4% of pregnancy-related deaths in the United States (1998–2005) are due to ectopic pregnancy (1). Primary risk factors for

ectopic pregnancy include smoking and a history of chlamydia (2), and other factors such as prior tubal surgery or assisted reproductive technologies also increase risk. As with other causes of maternal morbidity and mortality (1, 3, 4), African American women face higher rates of ectopic pregnancy than whites (5, 6). The relationship between race and socioeconomic status in

maternal health is poorly understood. Some studies demonstrating racial disparities have not taken socioeconomic status into account (7), while others have found race to be significant even controlling for socioeconomic status (3, 8).

In recent years, quantifying ectopic pregnancy in the United States has become difficult because ectopic pregnancies treated during multiple outpatient visits cannot be reliably identified and tracked using traditional surveillance data; this has left administrative claims data as an important surveillance tool (9). Medicaid is an important data source for maternal health epidemiology since it includes low-income women, a population at high risk for maternal morbidity and

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mortality (3, 10). We previously reported ectopic pregnancy rates among Medicaid beneficiaries in three large states—California (2.07% of all reported pregnancies), Illinois (2.43%), and New York (2.38%)—from 2000 through 2003 (6). These rates were generally higher than those reported in other studies based on insurance data, including the MarketScan nationwide database of commercial insurers (1.6% in 2002–2007 if all ectopic pregnancy diagnoses were counted, or 0.64% if only those with a documented treatment were included) (11), Kaiser Permanente Northern California (2.07% in 1997–2000) (12), and Group Health Cooperative in Idaho and Washington state (1.36% in 2005–2007) (13). We also found that within the Medicaid population, African American women had a significantly higher risk of ectopic pregnancy than whites in the three states studied (California, Illinois, New York); trends for other race/ethnicity groups varied by state. Ectopic pregnancy rates in the Medicaid population from other states and more recent years are unknown.

We conducted this study to assess recent ectopic pregnancy rates and incidence (2004–2008) in a 14-state population that includes an estimated 58% of the US population of female Medicaid beneficiaries of reproductive age (14). We also aimed to assess whether there was a time trend in rates among women in California, Illinois, and New York, the three states we had previously studied, from 2000 to 2008. Finally, we examined disparities by race/ethnicity in this large population of low-income women.

## MATERIALS AND METHODS

We received Medicaid Analytic Extract data files from the Centers for Medicare and Medicaid Services (CMS) under an approved Data Use Agreement. The study's Institutional Review Board acknowledged the study as exempt from review since it constituted a secondary analysis of deidentified data. The authors had no conflicts of interest. We examined Medicaid claims for all female beneficiaries 10–55 years of age in Arizona, California, Colorado, Florida, Illinois, Indiana, Iowa, Louisiana, Massachusetts, Michigan, Minnesota, Mississippi, New York, and Texas, 2004–2008. We selected these states to maximize the number of enrollees, geographic spread, and racial diversity, given that we could purchase data for 14 states. These data files include person-level information on Medicaid enrollees and encounter-level information for Medicaid claims from all sources of care, including inpatient, outpatient, physician services, radiology, and clinic visits. We did not examine long-term care files or pharmacy prescription claims for this study since our previous research found these did not contribute valuable information about ectopic pregnancy. We included women aged 15–44 in our analysis to make it comparable to other studies of women of reproductive age.

The analysis was conducted in the same manner as was previously reported for Medicaid 2000–2003 rates in three states (6). We identified ectopic pregnancy cases from both inpatient and outpatient claims containing the *International Classification of Diseases* 9th revision (ICD9) diagnosis code 633.xx as principal diagnosis. We calculated the ectopic preg-

nancy rate among beneficiaries aged 15–44 as the number of ectopic pregnancies (by principal diagnosis code) divided by the number of total pregnancies, identified using ICD9 diagnosis codes for all pregnancy-related care and outcomes. The denominator included codes for spontaneous and induced abortion (63x.xx), pregnancy complications (64x.xx), normal and complicated birth (65x.xx and 66x.xx), routine and high-risk prenatal care (V22.xx and V23.xx), outcome of delivery (V27.xx), and antenatal screening (V28.xx). Encounters with one of these codes in any diagnosis field—principal, secondary, or other—were included in the denominator. This strategy was designed to produce the most conservative (lowest) estimate of the ectopic pregnancy rate, because the case definition for the numerator required a principal diagnosis of ectopic pregnancy, whereas any possible pregnancy would be captured in the denominator. For both the numerator and denominator counts, repeat pregnancy-related encounters within 9 months (270 days) were considered part of the same pregnancy. Repeat pregnancy-related encounters for the same beneficiary after 9 months were treated as a new pregnancy episode, and each pregnancy episode (in 9-month groupings of claims) was counted separately. Age-adjusted and race-adjusted ectopic pregnancy rates were computed using the female, ages 15–44, Medicaid population for the named 14 states as the standard population. We also calculated the incidence of ectopic pregnancy as the number of ectopic pregnancies divided by the number of person-years (female Medicaid beneficiaries ages 15–44).

We examined ectopic pregnancy rates by race/ethnicity using the race/ethnicity variable in Medicaid files, which is coded as white, black, Hispanic, Asian, American Indian/Alaskan native, native Hawaiian/Pacific Islander, or multiracial. Because the outcome variable was a rate, we used Poisson multivariable regression models to estimate the relative risks for ectopic pregnancy by race/ethnicity within each state, adjusting for age, and for all states combined, adjusting for age and state. We tested for a time trend in the rate of ectopic pregnancy, from the year 2000 to the year 2008, for the three states (California, Illinois, New York) for which we had previously reported 2000–2003 rates.

Finally, we conducted post hoc exploratory analyses to identify possible explanations of state-level variation in ectopic pregnancy rates. We tested for correlation between state Medicaid ectopic pregnancy rate and various factors that we speculated might be associated. We used Spearman's rank correlation coefficient,  $\rho$  (rho), with state as the unit of analysis. First, we explored the timing of enrollment in Medicaid relative to ectopic pregnancy episodes to test whether ectopic pregnancy rates are attributable to local Medicaid enrollment practices (such as greater or less likelihood of a woman signing up for Medicaid when she learns she is pregnant). We also searched publicly available state-level variables that might contribute to state variation in ectopic pregnancy: rates of chlamydia (15) and smoking (16) among women, median household income (17), income inequality (Gini coefficient) (18), and population density (19). We also assessed whether the rate of chlamydia diagnosis within our Medicaid state data (% of female Medicaid beneficiaries ages 15–44 who had any claim with an ICD9

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