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Racial Disparities in Economic and Clinical Outcomes of Pregnancy Among Medicaid Recipients

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Abstract

To explore racial-ethnic disparities in adverse pregnancy outcomes among Medicaid recipients, and to estimate excess Medicaid costs associated with the disparities. Cross-sectional study of adverse pregnancy outcomes and Medicaid payments using data from Medicaid Analytic eXtract files on all Medicaid enrollees in fourteen southern states. Compared to other racial and ethnic groups, African American women tended to be younger, more likely to have a Cesarean section, to stay longer in the hospital and to incur higher Medicaid costs. African-American women were also more likely to experience preeclampsia, placental abruption, preterm birth, small birth size for gestational age, and fetal death/stillbirth. Eliminating racial disparities in adverse pregnancy outcomes (not counting infant costs), could generate Medicaid cost savings of \$114 to \$214 million per year in these 14 states. Despite having the same insurance coverage and meeting the

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Disparities in pregnancy outcomes continue to exist. Interventions that reduce or eliminate these disparities may represent economic return on investment.

Conflict of interest None of the authors have a conflict of interest.

same poverty guidelines for Medicaid eligibility, African American women have a higher rate of adverse pregnancy outcomes than White or Hispanic women. Racial disparities in adverse pregnancy outcomes not only represent potentially preventable human suffering, but also avoidable economic costs. There is a significant financial return-on-investment opportunity tied to eliminating racial disparities in birth outcomes. With the Affordable Care Act expansion of Medicaid coverage for the year 2014, Medicaid could be powerful public health tool for improving pregnancy outcomes.

Keywords

Disparities; Medicaid; Economic burden; Adverse maternal-child health outcomes and eliminating disparities

Introduction

Complications of pregnancy and adverse perinatal outcomes affect 13–20 % of women in the United States every year [1–3]. These adverse pregnancy outcomes not only include maternal outcomes such as preeclampsia, gestational diabetes mellitus, and maternal death, but also include adverse birth outcomes for the infant, such as preterm birth, small for gestational age, and fetal death/still birth. Longer-term consequences for women with an adverse pregnancy outcome include Type 2 diabetes, hypertensive disorders, and cardiovascular disease [4, 5]. For the infant, prematurity adds risks of chronic bronchopulmonary disease and severe chronic neurologic sequelae, such as cerebral palsy, intra-ventricular hemorrhage, and visual disturbances [6, 7].

There is considerable variation across states in their levels of adverse outcomes, and Southern states have the worst rates. Southern states are also the epicenter of racial health disparities. Nearly one-third of these states' populations are comprised of African Americans and other minorities. Southern states consistently rank poorly in various health status indicators, and all of the states selected for this study rank in the bottom half of all states in infant mortality [8, 9]. According to the Centers for Medicare and Medicaid Services, Medicaid finances more than one-third of all births in the country [10], and these low-income women and children are at higher risk of pregnancy complications than women with commercial insurance. While adverse pregnancy outcomes have been studied among Medicaid enrollees [11–13], there are few studies regarding Medicaid costs generated by racial disparities in adverse outcomes of childbirth and pregnancy. Variations in outcomes are a significant public health concern, but also pose an economic burden [6, 7]. Approximately \$10.2 billion are spent on newborn care alone, with nearly 60 % spent for adverse pregnancy outcomes in infants birth [14]. A Thompson–Reuters study commissioned by the March of Dimes estimated that in 2007, one premature birth generated excess maternal and infant first-year costs of \$49,666 compared with full-term healthy births [15]. These costs do not include the indirect costs associated with adverse pregnancy outcomes, such as loss of productivity and wages, or family leave associated with mothers and infants. The cost of racial variation in outcomes [16] suggests a potential return on investment for interventions designed to eliminate these disparities.

Despite major advances in medical care and technology, racial disparities in pregnancy outcomes persist throughout the United States. While social determinants and stress of racism play a role, access to effective perinatal care is also important. African American mothers are less likely to receive adequate prenatal care [17] and experience higher rates of preterm birth, gestational diabetes, hypertension, fetal death, and still birth than White women [18–20].

The purpose of this study is to measure the rate of excess adverse pregnancy outcomes between racial/ethnic groups, and to estimate the corresponding potential Medicaid financial savings specifically tied to Medicaid paid claims for maternal healthcare costs of disparities in these adverse outcomes.

Methods

Data Source and Study Population

Medicaid Analytic eXtract (MAX) files capture Medicaid eligibility, service utilization, and payments in a common data format across all states. The MAX-file development process combines medicaid statistical information system (MSIS) data from each state on initial claims, interim claims, voids, and adjustments for a given service into final action events. Inpatient, outpatient (and other services), and prescription claims files were used, linked to the personal summary file for each enrollee by an MSIS ID number.

A cross-sectional study of pregnancy events was performed with the use of MAX inpatient hospital data from 2005 to 2007 among 14 southern states (Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Maryland, Missouri, Mississippi, North Carolina, South Carolina, Tennessee, Texas, and Virginia). The 3 year data set included 10,174,722 Medicaid inpatient hospital records. We selected the enrollees whose recipient delivery code was maternal delivery stay, which was assigned if any of the claims for this stay had a maternal delivery code. We selected 2,170,060 women. In order to avoid clustering of risk factors, women who had multiple gestations for a delivery during the data collection period were excluded from the analysis, which reduced the study population to 2,152,454. To capture the outpatient and prescription drug expenditures 9 months before the delivery date, we only included women whose delivery date occurred during 2006–2007, so that 2005 data were available for a look back at cost data for the 9 month pre-delivery period. This reduced our final sample size to 1,472,912.

The MAX file claims data provided information on inpatient hospital stays, outpatient services, and drug prescriptions, as well as Medicaid paid amounts for each claim. Diagnosis and procedure codes are captured on each outpatient or inpatient claim. The personal summary file provided demographic information on each enrollee. Due to the relatively small response rate of individuals who self-identified as American Indian, Asian, or Pacific Islander, these groups were excluded for statistical analyses. The data were exported to SAS for analyses.

Definition of Adverse Pregnancy Outcomes

Women who had hospital admissions for adverse pregnancy outcomes were identified using the International Classification of Diseases, 9th revision (ICD-9). Maternal complications included in the study were preeclampsia (ICD-9 codes: 642.4–642.7), gestational diabetes mellitus (ICD-9 codes: 648.0 and 648.8); and placental abruption (ICD-9 code: 641.2); If women were found coded as preeclampsia, gestational diabetes mellitus and placental abruption one time in the inpatient files or at least two times in the outpatient files then she was categorized as having these complications. Other adverse outcomes included preterm birth (ICD-9 codes: 644.2, 765.0 and 765.1); small birth size for gestation (ICD-9 code: 656.5), fetal death/stillbirth (ICD-9 codes: 656.4, 768.0, 768.1, V27.1, V27.3, V27.4); and maternal death (ICD-9 codes: 674.9, 761.6).

Cost Assessment and Potential Savings

Total costs not only include inpatient hospital delivery expenditures, but also expenditures (Medicaid paid amounts) recorded in the outpatient services and prescription drug claims records for the mother during a 9 month window preceding the delivery date. Infant costs were not counted in this study, because of inconsistencies in linking mothers and infants in the MAX-file data.

The excess adverse event-1 variable was calculated by subtracting the highest race group rate of adverse pregnancy outcome, minus the rate of adverse pregnancy outcome across all racial group, multiplied by the number of Medicaid pregnant enrollees in the highest rate group. The excess adverse event-2 variable was calculated by the highest race group rate of adverse pregnancy outcomes, minus the lowest rate of adverse pregnancy outcome race group, multiplied by the number of Medicaid pregnant enrollees in the highest rate group. The corresponding potential savings were estimated as the excess adverse event admission count multiplied by the average hospitalization cost of that pregnancy outcome.

Statistical Analysis

The difference in mean maternal age at birth, mean length of hospital stays among Whites, African Americans, and Hispanics were tested initially with ANOVA. Due to the skewed distribution of Medicaid payment amounts per hospital admission and Medicaid payment amount per hospital stay, we used the Kruskal–Wallis test to compare variances in the highest rate of adverse pregnancy outcomes between racial/ethnic groups. Frequency variances among different racial/ethnic groups were estimated by using χ^2 test. The unadjusted odds ratio for adverse pregnancy outcomes was estimated through logistic regression using race/ethnicity as the principal independent variable. Logistic regression models were repeated with adjustment for multiple covariates, which included maternal age at birth, state, length of inpatient hospital stay, and Cesarean section status. Using Whites as the reference group, 95 % confidence intervals were estimated for African-Americans and Hispanics. The level of statistical significance was set at 0.05 and all tests were two tailed. Analyses were conducted using SAS 9.2 (SAS Institute, Cary, NC, USA).

Results

Table 1 shows the characteristics of 1,472,912 singleton deliveries by race/ethnicity. Whites represented 39.7 %, African-Americans represented 28.6 %, and Hispanics represented 26.6 % of all Medicaid-covered pregnancies. African-Americans tended to be much younger at delivery, stay longer in the hospital, and have higher Medicaid costs on average per hospital admission. Hispanic women on Medicaid had the oldest average maternal age at birth when compared to Whites and African-Americans, stayed in the hospital for 3.4 days when delivering, and Whites had the lowest costs per hospital admission for pregnancy compared with African American.

Table 2 shows the distribution of adverse pregnancy outcomes by racial/ethnic groups in 14 southern states from 2006 to 2007. At a rate of 25.6 %, African-Americans had the highest prevalence of overall adverse pregnancy outcomes. Whites had the lower prevalence of overall adverse pregnancy outcomes compared with African American. Hispanic women have the lowest prevalence of adverse pregnancy outcome. With the exception of gestational diabetes mellitus, African-Americans had the highest prevalence for all the adverse pregnancy outcomes. Whites had the highest prevalence of gestational diabetes mellitus (10.6 %). Due to the low rate of maternal death, mortality differences between racial/ethnic groups were not statistically-significant.

In Table 3 the crude ORs showed that African American women had a higher risk of fetal death/stillbirth (OR, 1.89; 95 % CI 1.81–1.99), preeclampsia (OR, 1.37; 95 % CI 1.34–1.39), preterm birth (OR, 1.44; 95 % CI 1.42–1.46), and placental abruption (OR, 1.22; 95 % CI 1.18–1.25). Hispanics had the lowest risk of adverse pregnancy outcomes compared to White and African American women within Medicaid.

After adjusting for covariates of maternal age at birth, state, length of hospital stay, and Caesarean section status, African-Americans still had the highest risks of all of the listed adverse pregnancy outcomes except for gestational diabetes mellitus.

Table 4 describes excess adverse pregnancy outcomes resulting in hospital admissions and the potential economic benefits for Medicaid (only counting maternal costs) that could be realized by eliminating the disparities in hospital admission rates related to adverse pregnancy outcomes among Whites, African-Americans, and Hispanics. Here, we estimate an excess of 21,782 preterm births as well as more than \$100 million in Medicaid paid amounts for care of the mother. Eliminating disparities would also eliminate 9,836 preeclampsia events, corresponding with \$50 million in maternal costs to the Medicaid program. Based on reducing the highest adverse event rate group to the benchmark lowest race/ethnicity group, which is biologically plausible, excess adverse event hospitalizations would be reduced by 44,821, with a corresponding Medicaid savings estimated at \$214 million in maternal costs.

Discussion

Racial/ethnic disparities in perinatal outcomes persist despite continued attention and considerable resources focused on eliminating health disparities [21–24]. Addressing these

health inequities is an important step to improving the health of the entire population. While some small progress is being made on a community level [25], we unfortunately have not made significant progress in closing the infant mortality gap between the African American population and non-Hispanic Whites [26]. Eliminating the black-white infant mortality gap could prevent roughly 100 infant deaths in the US every week [26].

Overall, African American women in our analysis experienced higher rates of adverse pregnancy outcomes when compared to non-Hispanic White females and Hispanic females, although disparities were not as extreme as those found in the general population. Even after adjusting for maternal age at birth, location, length of hospital stay, and Caesarean section, African American women still demonstrated the poorest outcomes on all adverse pregnancy outcomes except gestational diabetes. Previous observational and cohort studies have reported that African Americans have higher rates of preterm labor, fetal death, and stillbirth than non-Hispanic Whites [18].

The etiology of these disparities is multi-factorial, including complex interactions between healthcare, poverty, and racism [27, 28]. Epigenetic and biologic pathways have also been postulated [29]. Aside from limiting economic opportunity and access to social resources [30], experiences of racism can generate heightened and prolonged engagement of the body's "fight or flight" stress response, resulting in a chronic physiologic drag (allostatic load) [31, 32]. Experienced at both interpersonal and institutional levels, this has been associated with disparities of prevalence, incidence and mortality of specific diseases [33–36]. Pregnancy outcome disparities may be viewed as the result of complex interactions among biological, psychological, and environmental risks and protective factors that accumulate across a woman's life course [37–39].

While we found similar perinatal outcome disparities in this population of Southern Medicaid recipients, the disparities are actually less severe than in the general US population. For example, the risk of stillbirth in this Medicaid population was only 1.89 times greater for African Americans than for non-Hispanic Whites, compared with a black-white rate-ratio of 2.75 times among all US pregnancies across all insurance groups [40]. Rate-ratios for pre-term birth showed less difference, but were still lower in the Medicaid population (1.34) than in the general US population (1.59) [41]. In this Medicaid sample of 14 southern states, African American women actually had a lower overall risk (0.81) of gestational diabetes when compared to non-Hispanic Whites, while a previous study of women in New York City found a 1.29 times greater risk of gestational diabetes mellitus in African American women [42].

Comparisons in the fourteen southern states represented in our dataset suggest similar disparities—white LBW-rates ranging from 7.1 to 9.1 % across the fourteen states, compared with African American LBW-rates of 13.0–16.4 % [43]. The relatively better outcomes for the Medicaid population could be multi-factorial, but Medicaid insurance coverage itself may be an effective means for reducing racial/ethnic disparities in pregnancy outcomes. Women on Medicaid, for example, may be more likely to have continuity of care between outpatient prenatal care and delivery than might be expected among the uninsured. Medicaid eligibility also confers greater socioeconomic comparability, because women of

all racial-ethnic groups must meet the same low-income thresholds within a given state to qualify for Medicaid.

With Medicaid already covering half of all births among African American women, and with the Affordable Care Act expansion of Medicaid coverage planned for the year 2014, Medicaid could be a powerful public health tool to reduce and eliminate racial/ethnic disparities in adverse pregnancy outcomes. Early initiation of prenatal care allows for assessment and earlier treatment of maternal disease, which positively affects pregnancy outcomes. For example, an earlier diagnosis of gestational diabetes through glucose tolerance testing allows earlier administration of glycemic control measures, which can decrease rates of cesarean delivery and shoulder dystocia related to high birthweight. Quality of care can also be monitored and influenced by Medicaid programs. Medicaid claims data could also potentially provide a surveillance mechanism for complications of pregnancy and adverse birth outcomes.

Medicaid programs also influence provider participation through reimbursement rates and processing efficiency. Low reimbursement rates and delays or “hassle-factor” in billing and payment process may lead to fewer physicians accepting Medicaid patients, who may be perceived as a high-risk population. In extreme cases, perinatal care for Medicaid enrollees becomes accessible only in the public sector by providers such as public health clinics, public hospitals, and federally-qualified health centers.

Medicaid policies also influence access to other forms of obstetrical care for high-risk patients by limiting the number of ultrasound procedures per pregnancy, or limiting payment rates for specialty care (perinatology or maternal-fetal medicine), or restricting access to progesterone injections to prevent preterm birth. Policies for covering enabling services such as transportation, social work, and behavioral health may also play a critical role in assuring positive birth outcomes.

Lack of dental coverage for adults in Medicaid is a specific concern. Two recent studies show an association between active periodontal disease at delivery and pre-eclampsia [44]. Three clinical trial studies suggest that oral prophylaxis and periodontal treatment can lead to a 57 % reduction in preterm low birthweight and a 50 % reduction in preterm births [45].

This study has several implications for the field of healthcare and insurance coverage for low income and underserved populations. First, racial/ethnic disparities continue to persist in adverse pregnancy outcomes. Second, these racial/ethnic disparities do not appear to be as extreme among our specific population of women with Medicaid coverage when compared to the general US population. And finally, the cost savings associated with eliminating racial/ethnic disparities in adverse pregnancy outcomes is significant, and may be an important area of focus for the health care system in which cost-effectiveness is essential.

Is the elimination of racial disparities in perinatal outcomes a realistic benchmark? The example of Madison Wisconsin (Dane County), suggests that this goal is at least potentially achievable. Disparities are not inevitable [46]. According to the Center for Disease Control and Prevention, the infant mortality rate “declined 67 %, from 19.4 per 1,000 live births for the period 1990–2001 to 6.4 for the period of 2002–2007” [47].

These results represent a reduction of only about three infant deaths per year, but the decrease in infant mortality is related to two highly-relevant trends affecting many more infants, e.g., a decrease in the occurrence of births of very low birthweight (VLBW) African American babies (< 1,500 g) from 391 per 1,000 live births to 154 per 1,000 (61 % decrease), and a decrease in the number of extremely preterm births (< 28 weeks estimated gestational age) among African American women from 2.8 to 1.1 %. Factors associated with this success story are not only access to prenatal care, but also services such as transportation, social work, behavioral support, and community linkages [46]. The role of Medicaid in paying for such enabling services may be key to the elimination of disparities in this population.

There are important limitations to this study. Because we are limited by the existing Medicaid claims data, we were unable to gather information on personal risk behaviors and fundamental determinants (such as experiences of racism) that may have contributed to these adverse pregnancy outcomes. Neither did we have access to clinical records, such as body-mass index, prenatal lab test results or ultrasound dating of pregnancy. We also did not have individual socioeconomic status information on these Medicaid patients, although within a given state women of all racial/ethnic groups had to meet similar low-income criteria to enroll in Medicaid. Finally, the Medicaid claims data that we use only encompassed 14 southern states in the United States, albeit the states with high disparities and large African American populations. As a result, important geographic and statewide differences may explain why our findings are generally more favorable than those of the entire US population, although it may also be true that Medicaid coverage truly matters. Another limitation of our study was the methodology used to estimate excess adverse outcomes and potential savings. Our findings are the most conservative estimate, in that we did not include indirect economic costs of adverse outcomes, nor were we able to link maternal outcomes to the associated costs of the infants born to these mothers. Clearly the cost of neonatal intensive care and other Medicaid expenses for low birthweight and premature births would add substantially to our estimates of the cost of perinatal outcome disparities.

Notwithstanding these limitations, this study demonstrates significant racial/ethnic disparities in adverse pregnancy outcomes in a large, multi-state Medicaid population, and the publicly-financed costs associated with these health disparities. It suggests the importance of the Medicaid program in eliminating birth outcome disparities. Future research is needed to define specific interventions targeting the elimination of racial/ethnic disparities in birth outcomes in the Medicaid population.

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Table 1

Characteristics of Medicaid recipients in 14 southern states who gave birth 2006–2007 (1,472,912 records)

	Overall % (<i>n</i>)	African American % (<i>n</i>)	White % (<i>n</i>)	Hispanic % (<i>n</i>)	<i>P</i> value
<i>N</i>	1,472,912	420,576	584,290	392,082	
Maternal age at birth (years)	24.3 ± 5.5	23.7 ± 5.3	23.9 ± 5.2	25.2 ± 5.9	<0.01 ^a
<17	7.1 (103,920)	8.1 (33,859)	8.1 (33,367)	6.6 (25,947)	<0.01 ^b
18–24	52.0 (766,158)	55.3 (232,665)	57.0 (333,113)	43.9 (172,065)	
25–34	35.1 (516,733)	31.9 (134,281)	32.4 (189,368)	41.5 (162,659)	
35+	5.9 (86,101)	4.7 (19,771)	4.9 (28,442)	8.0 (31,411)	
Mean length of hospital stay (days)	3.4 ± 2.1	3.6 ± 2.4	3.4 ± 2.0	3.4 ± 2.0	<0.01 ^a
3	62.8 (925,334)	56.6 (237,981)	64.5 (376,769)	67.0 (262,676)	<0.01 ^b
4–7	35.7 (525,692)	41.2 (173,386)	34.3 (200,459)	31.8 (124,676)	
8	1.5 (21,886)	2.2 (9,209)	1.2 (7,062)	1.2 (4,730)	
Caesarean section	25.9 (382,058)	26.3 (110,431)	24.5 (143,099)	28.1 (110,343)	<0.01 ^b
Medicaid costs (median and inter-quartile range)					
Inpatient payment ^d (median, Q1, Q3)	\$2,111 (1,350, 3,088)	\$2,224 (927, 3,488)	\$2,107 (1,261, 2,958)	\$1,998 (1,524, 2,994)	<0.01 ^c
Outpatient payment ^d (median, Q1, Q3)	\$1,471 (500, 2,708)	\$1,854 (557, 3,027)	\$1,937 (688, 2,986)	\$892 (240, 1,781)	<0.01 ^c
Prescription drug payment ^d (median, Q1, Q3)	\$34 (0, 148)	\$54 (0, 157)	\$63 (0, 196)	\$0 (0, 73)	<0.01 ^c
Total ^{d,e} (median, Q1, Q3)	\$4,151 (2,398, 5,706)	\$4,641 (2,430, 6,243)	\$4,463 (2,790, 5,921)	\$3,257 (2,130, 4,752)	<0.01 ^c

^a ANOVA test^b χ^2 test^c Kruskal–Wallis test^d Medicaid payment per person^e Inpatient + outpatient + prescription drug payment

Table 2

Distribution of adverse birth outcomes by race among Medicaid recipients in 14 southern states who gave birth in 2006–2007

Adverse outcomes	African-American % (n)	White % (n)	Hispanic % (n)	P value
Overall	25.6 (107,838)	23.3 (136,079)	19.9 (78,188)	<0.01
Preeclampsia	7.0 (29,517)	5.2 (30,630)	4.7 (18,348)	<0.01
Placental abruption	1.8 (7,669)	1.5 (8,789)	0.97 (3,802)	<0.01
Gestational diabetes mellitus	9.0 (37,697)	10.6 (61,816)	9.4 (36,856)	<0.01
Preterm birth	10.0 (41,998)	7.2 (41,776)	6.6 (25,695)	<0.01
Small for gestation age	2.3 (9,845)	2.3 (13,257)	1.1 (4,456)	<0.01
Fetal death/stillbirth	1.1 (4,774)	0.6 (3,524)	0.6 (2,173)	<0.01
Maternal death	0.0 (<11 ^a)	0.0 (<11 ^a)	0.0 (<11 ^a)	0.28 ^b

^aCell size 11 persons are masked for confidentiality reasons under CMS data use agreement

^bFisher's exact test

Table 3

Logistic regression analysis for adverse birth outcome by race among Medicaid recipients in 14 southern states, who gave birth, 2006–2007

Adverse outcomes	African American		Hispanic	
	OR (95 % CI)	Adjusted OR (95 % CI) ^a	OR (95 % CI)	Adjusted OR (95 % CI) ^a
Preeclampsia	1.37 (1.34, 1.39) *	1.30 (1.28, 1.33) *	0.89 (0.87, 0.94) *	0.85 (0.83, 0.87) *
Placental abruption	1.22 (1.18, 1.25) *	1.23 (1.19, 1.27) *	0.64 (0.62, 0.67) *	0.63 (0.61, 0.66) *
Gestational diabetes mellitus	0.83 (0.82, 0.84) *	0.81 (0.80, 0.82) *	0.88 (0.87, 0.89) *	0.79 (0.78, 0.81) *
Preterm birth	1.44 (1.42, 1.46) *	1.34 (1.32, 1.36) *	0.91 (0.90, 0.93) *	0.94 (0.92, 0.96) *
Small for gestation age	1.03 (1.01, 1.06) *	1.03 (1.01, 1.06) [‡]	0.50 (0.48, 0.51) *	0.55 (0.53, 0.57) *
Fetal death/stillbirth	1.89 (1.81, 1.99) *	1.89 (1.81, 1.98) *	0.92 (0.87, 0.97) *	0.86 (0.81, 0.92) *
Maternal death	1.39 (0.55, 3.50)	1.64 (0.63, 4.26)	0.50 (0.14, 1.84)	0.64 (0.14, 2.97)

* $p < 0.01$

[‡] $p < 0.05$

^a Adjusted maternal age at birth, state, year of delivery, length of inpatient hospital stay, Caesarean section status

Table 4

Economic impact of eliminating adverse pregnancy outcomes among races who gave birth and received Medicaid in 14 southern states 2006–2007

Adverse outcomes	Excess adverse events-1 ^a	Potential savings 1 ^b	Excess adverse events-2 ^c	Potential savings 2 ^d
Preeclampsia	6,115	\$30,966,152	9,836	\$49,807,404
Placental abruption	1,635	\$8,224,040	3,591	\$18,064,787
Gestational diabetes mellitus	3,639	\$17,681,793	9,445	\$45,893,319
Preterm birth	9,297	\$42,620,284	21,782	\$99,849,143
Small for gestation age	1,619	\$8,139,282	5,065	\$25,457,527
Fetal death/stillbirth	1,659	\$6,067,105	3,069	\$11,222,217
Maternal death		\$1,469		\$3,817
Sum	23,968	\$113,706,658	44,821	\$214,345,816

: Cell size 11 persons are masked for confidentiality reasons under CMS data use agreement

^a Highest adverse pregnancy outcomes rate- adverse pregnancy outcome rate for whole population) × number highest racial group for Medicaid pregnancy women = excess adverse events-1

^b Excess adverse events-1 × average cost per event = potential savings from equalizing excess adverse events-1

^c Highest adverse pregnancy outcomes rate- adverse pregnancy outcome rate for lowest racial group) × number of highest racial group for pregnancy women on Medicaid = excess adverse events-2

^d Excess adverse events-2 × average cost per event = potential savings from equalizing excess adverse events-2