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# Twin Births in Medicaid: Prevalence, Outcomes, Utilization, and Cost in Four States, 2014–2015

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## Abstract

**Objectives** Twin births have increased in prevalence. Twin births are more likely to have poorer outcomes than singleton births and are more costly. However, although Medicaid paid for approximately half of U.S. births in 2016, little is known specifically about the incidence of twin births and related costs for Medicaid beneficiaries. This paper seeks to expand the knowledge of twin births covered by Medicaid.

**Methods** We obtained data for singleton (N = 115,568) and twin (N = 3775) Medicaid-covered births in selected geographic areas of four states in 2014 and 2015. States provided linked birth certificates to Medicaid claims data for mothers and infants. We compared health care utilization and Medicaid costs for twins to singletons in the same geographic areas.

**Results** The prevalence of Medicaid twins in the selected areas of these four states was 3.2% of births, identical to the rate of twins nationwide. Two thirds of Medicaid twins were born preterm, and average gestational age was 34.8 weeks. Mothers of twins had higher rates of C-Section (73.6% vs. 32.0% for singletons) and of neonatal intensive care use (45.2% vs. 11.1%). The average length of delivery stay for twins was 12.3 days, vs. 4.1, and the rate of hospital readmissions was almost twice as high. The total cost for mother and infant over the prenatal, delivery, and post-natal period for a pair of twins was \$48,479, over two and a half times as high as for singleton births (\$18,032). However, when considering the average cost of a single twin vs. a singleton birth, the cost differential is less (\$24,239 vs. \$18,032, or a ratio of 1.34).

**Conclusions** Medicaid twins are a fragile population with poorer outcomes and higher service use than singleton infants. Twins contribute substantially to the Medicaid cost of maternity and newborn care. A variety of strategies can be used to improve twin outcomes and reduce costs.

**Keywords** Twins · Medicaid · Costs · Birthweight · Prematurity · Assisted reproductive technology

## Introduction

Medicaid pays for almost half of the births in the U.S. (Medicaid.gov, n.d.), and as the dominant payer for high-cost infants, plays a critical role in ensuring life-saving care. Twins are a particularly fragile and high cost group (Chambers et al. 2014; Lemos et al. 2013; Ombelet et al. 2006), with high average rates of preterm birth and low birthweight. Both preterm birth and low birthweight are associated with short and long-term health consequences, including respiratory difficulties, infections, feeding difficulties, hearing and vision problems, and developmental disabilities (Centers for Disease Control and Prevention n.d.). The prevalence of twins has increased in the United States in part due to Assisted Reproductive Technology (ART) (Russell et al. 2003; Blondel et al. 2002; Kogan et al. 2000; Urquia et al. 2007).

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In spite of the growing interest in twin births, their increased prevalence, and the resulting potential costs, studies have not considered multi-state comparisons of twins under Medicaid. The purpose of this study is to investigate the prevalence of Medicaid-covered twins, birth outcomes and service use for twins enrolled in Medicaid, and their expenditures for care under the Medicaid program. We also compare twins to singleton births in order to determine the differences in outcomes and costs between these groups. We subsequently consider possible explanations for the rate of twinning among women enrolled in Medicaid and potential strategies to improve outcomes and reduce costs. This study provides new information that may help to target such Medicaid services for these fragile infants.

## Sample and Methods

The Strong Start for Mothers and Newborns Initiative Strategy Two: Enhanced Prenatal Care Models (Strong Start), was a Centers for Medicare & Medicaid Services (CMS) Center for Medicare and Medicaid Innovation (Innovation Center) initiative with the goal of reducing expenditures while preserving or enhancing quality of care by reducing the rates of preterm births among Medicaid and Children's Health Insurance Program beneficiaries (for simplicity, we hereafter only reference Medicaid) (Hill et al. 2018). Initiative evaluators merged birth certificates and Medicaid enrollment records and claims, linking women to their infants for Strong Start participants and a matched comparison group in nine states, accounting for approximately half of Medicaid births in each state. The comparison group members resided in the same counties as Strong Start participants, or in the case of small population sizes in geographic areas that were demographically similar. Women and infants are included only when the birth was covered by Medicaid.

Though the evaluation as a whole focused on singleton births, Louisiana, Missouri, New Jersey, and South Carolina provided full information for multiple births for all Medicaid beneficiaries in the designated areas. All four states provided 2014 data and all but New Jersey provided data for 2015 as well. Twins were identified by being so coded on the birth certificate. The study data were collected as part of the Strong Start Strategy Two final evaluation report but include all Medicaid women and their infants in these four states.

We extracted maternal age and birth outcomes from birth certificates and Medicaid expenditures from Medicaid claims files. Many states had a history of merging birth certificates to Medicaid data, including the four states in this analysis. We obtained the previously merged data from the four states. The methods for conducting the merge varied by state. Generally, birth certificates were matched to Medicaid eligibility records for women and their infants through a

combination of variables such as name, address, birthdate, and social security number. Once the files were matched, the eligibility file could be used to identify claims for the prenatal and postpartum periods for women and their infants. Detailed methods for merging Medicaid data to birth certificates are discussed in Appendix S in the Strong Start for Mothers and Newborns Evaluation: Year 5 Project Synthesis final report (Hill et al. 2018).

Assessing the quality of the linkage of birth certificates to Medicaid eligibility files at the state level presented challenges, as states only provided data on births that were previously matched to women with Medicaid coverage. There is no standardized tabulation of Medicaid births to which we could compare the number of births matched, especially since we focused on sub-areas of each state, not the total state. Because we did not perform the linkage directly, we do not have statistics on the number of Medicaid-covered births not linked to a birth certificate. Many factors could contribute to a match rate below 100%; likely the sample analyzed in this study includes most, but not all, Medicaid births. In addition, it is possible that the match rate for twins was lower than for singletons, leading to some twins being coded as singleton births or being excluded altogether. Either of these circumstances would lead to a lower proportion of twin births than is presented in this paper.

Evaluators excluded Medicaid births under 20 weeks gestation, births with no hospital or birth center claim, and triplets or other higher order births. The final study sample included 3775 twin and 115,568 singleton births.

Evaluators extracted Medicaid claims for women and their infants for 8 months prior to birth, the birth episode, and the 11 months following the month of birth. The birth episode was coded as beginning at the woman's hospital or birth center admission and ending when both the woman and her infant(s) were discharged. Claims for the birth month and any maternal or infant stays beyond that period were grouped to create a delivery episode for the woman and her infant(s), as these costs are often mixed in Medicaid claims data.

Utilization and costs were excluded when a woman or infant left Medicaid, for example because she moved out of state or lost Medicaid coverage. Such circumstances could lead to underreporting total Medicaid expenditures in the postpartum period. Though such potential for underreporting is important for most studies of Medicaid utilization and expenditures, it has little influence on this study. The average length of enrollment for women prior to birth was 6 or 7 months (depending on the state), and average length of infant enrollment was 10 to 11 months post-birth month. The effect of turnover on total expenditures thus is only for mothers who lose their Medicaid eligibility after 60 days post-partum. This could apply in the two states that had not expanded Medicaid coverage for post-partum women by

2015 (LA and MO). Given that the average monthly postnatal cost for mothers was under \$300 in both states, turnover does not create a large downward bias in overall cost of care for mothers and infants across all four states.

This study has limitations to consider in interpreting the data. We only had data on women and their infants when the woman was covered by Medicaid at the time of delivery. Infants who were enrolled in Medicaid after birth but were not born to enrolled mothers are not included in this analysis. Our data set for both singletons and twins enrolled in Medicaid included selected areas in four states. While the states represent a wide range of Medicaid program policies and geography, they cannot be assumed to represent the Medicaid population nationally. We had access only to the data that had been previously matched by states for the evaluation of the Strong Start Strategy Two Initiative. State matching algorithms varied, and it was not possible to fully ascertain the accuracy of the matching process. It is possible that infants not included because of faulty matching had different outcomes or expenses than the infants analyzed in our sample. Finally, the cost of care provided in this paper is limited to Medicaid costs. Other costs are not included, in particular out-of-pocket costs, the cost of ART (if used), costs covered by co-enrollment in private insurance, or other services not covered by Medicaid. Finally, there was no adjustment for length of enrollment during the prenatal and post-partum periods, although as discussed in the methods section we do not believe this was a large source of bias for these estimates.

The study was reviewed and approved by the Urban Institute Institutional Review Board.

## Results

Table 1 shows the prevalence of twin births in the combined four-state study population, 3.2%. This percentage had minor variation from state to state, with a range of 2.8 to 3.3% (data not shown). Prevalence of twins in the study sample is just under the prevalence for all births in the U.S. population at large, which was 3.4% in 2015 (Martin et al. 2017).

The average maternal age in the sample among mothers of twins is 27.5, as compared to 26.7 for mothers of singletons (see Table 1). The age difference, almost a full year, is consistent with national data that show mothers giving birth to twins to be older than mothers of singletons. (Martin et al. 2017).

Birth outcomes for twins were substantially worse than for singletons (see Table 2). The average gestational age for twins (34.8 weeks) was almost 4 weeks less than for singletons (38.4 weeks), with 66.8% of twins born preterm (before 37 completed weeks' gestation) compared to 10.6% of singletons. The rate of late preterm birth (34–36 weeks) was

**Table 1** Prevalence of twin births under medicaid and average maternal age, selected areas of four states, 2014–2015

	Four state study group
Total number of births	119,817
Number of singleton births	115,568
Number of twin births	3775
Number of other multiple births	474
Percent singleton births	96.5%
Percent twin births	3.2%
Percent other multiple births	0.3%
Average maternal age for singleton births	26.7
Average maternal age for twin births	27.5

Data only provided for 2014 for N.J

**Table 2** Birth outcomes for twin and singleton births medicaid births in selected areas of four states, 2014–2015

Birth outcome	Twins	Singletons
Average gestational age (weeks)	34.8	38.4
Percent preterm (< 37 weeks)	66.8%	10.6%
Percent late preterm (34–36 weeks)	43.2%	7.5%
Percent moderate/very preterm (< 34 weeks)	23.6%	3.1%
Average birthweight (g)	2242	3189
Percent low birthweight (< 2500 g)	65.0%	9.7%
Percent very low birthweight (< 1500 g)	11.0%	1.7%

Data for twins only provided for 2014 for N.J

over five times as high for twins (43.2% vs. 7.5%), while the rate for other preterm birth (before 34 weeks) was almost 8 times as high: 23.6% vs. 3.1%.

The average Medicaid twin was low birthweight (under 2500 g at birth) at only 2242 g, versus 3189 g for singletons. Disparities in the rates of low birthweight paralleled rates of prematurity, with 65.0% of twins vs. 9.7% of singletons born at low birthweight and 11.0% vs. 1.7% at very low birthweight (under 1500 g). These patterns, with stark differences in birth outcomes between twin and singleton births, are similar to those observed nationally and internationally (Blondel et al. 2002; Martin et al. 2017).

Medicaid-covered health service utilization also differed substantially between twins and singletons (see Table 3). Mothers of twins were twice as likely to have a C-Section as mothers of singletons (73.6% versus 32.0%). Consistent with their high rates of prematurity and low birthweight, study group twins also had higher rates of health service use after birth. They stayed three times as long in the hospital (12.3 days vs. 4.0 days), and were four times as likely to use the Neonatal Intensive Care Unit (NICU), with 45.2% of twins admitted to the NICU

**Table 3** Use of health services for twin and singleton births medicaid births in selected areas of four states, 2014–2015

Service use	Twins	Singletons
Percent C-section	73.6%	32.0%
Average length of delivery stay (days)	12.3	4.1
% Using NICU	45.2%	11.1%
Average number of emergency department visits in 11 months following delivery (infant)	1.0	1.1
Average number of hospital stays in 11 months following delivery (infant)	0.15	0.09

Data for twins only provided for 2014 for N.J. Average length of delivery stay not available for S.C  
 NICU means neonatal intensive care unit

as compared to 11.1% of singletons. Though the average number of emergency department visits in the 11 months after delivery was nearly the same for twins and singletons (1.0 vs. 1.1), twins had substantially more post-birth discharge hospitalizations in that same period, averaging 0.15 vs. 0.09 per infant.

High utilization rates among twins were associated with in higher expenditures for the Medicaid program than costs for singletons (Table 4). The sources of cost for a Medicaid birth, whether for singleton or twin births, come from three components (see Table 4). The first is for the mother's care, both prenatal and post-natal. As shown, maternity care for the Medicaid mothers of twins was more than for mothers of singletons (\$5762 vs. \$4954). However, averaged across the two twins (i.e., maternity care per infant), it was substantially less (\$2881 vs. \$4954). As noted previously, delivery hospitalization costs cannot be computed separately for women and their infants. The total average Medicaid expenditures for the birth hospitalization was three times as high for twins (\$32,641 vs. \$10,562); however, when that birth expenditure is averaged across the two twins, the difference is much smaller (\$16,320 vs. \$10,562). The single twin infants' postnatal cost for the 11 months following the birth month was twice as high as a singleton (\$5038 vs. \$2516). However, considering the full prenatal, delivery, and postnatal periods, while both twins cost \$48,479, when averaged across twins (\$24,239) this compares to \$18,032 for singleton infants, a ratio of 1.34 for the total cost of an individual twin to a singleton infant.

**Table 4** Medicaid expenditures for twin and singleton births medicaid births in selected areas of four states, 2014–2015

Expenditure	Both twins	Single twin (Average)	Singletons	Ratio of single twin \$ to singleton \$
Maternal (prenatal and postnatal \$)	5762	2881	4954	0.58
Delivery (total \$, mother and infants)	32,641	16,320	10,562	1.55
Post-natal year, infant (\$)	10,076	5038	2516	2.00
Total, mother and infant, prenatal, delivery and 1st postnatal year (\$)	48,479	24,239	18,032	1.34

Data for twins only provided for 2014 for N.J

## Discussion and Conclusions

Though Medicaid covers about half of births nationally, and twins are known to have high rates of poor birth outcomes and associated high costs (Chambers et al. 2014; Lemos et al. 2013; Ombelet et al. 2006), prevalence and cost of twins covered by Medicaid have not been well-documented prior to this study. In four states that each cover about half of births through Medicaid, we find that in the sub-state areas evaluated, twins are almost as prevalent among births covered by Medicaid as among all births in the U.S. population as a whole and that costs for twin births and care during infancy are substantially higher than those for singleton infants.

Twins births have increased in the U.S. population from less than 2% in 1980 to 3.4% in 2015 (Martin et al. 2017), primarily as a result of increased use of Assisted Reproductive Technology (ART), which results in multiple births in more than half of pregnancies (American College of Obstetricians and Gynecologists n.d.). Unfortunately, though the 2003 birth certificate form does have a field for documenting whether a woman conceived through ART, the field is often not completed. Only about half of ART conceived births are recorded as such (Moaddab et al. 2016), making it impossible to use our data to determine reliably how many infants born in our study sample may have been conceived through ART.

Fertility treatment has not been a part of comprehensive health care in the United States, and coverage for treatment



often has high out-of-pocket costs, even for the privately insured (Adashi and Dean 2016). Although most states cover fertility testing under Medicaid for enrolled adults, no state covered ART under Medicaid in 2016 (Walls et al. 2016), meaning women who were uninsured prior to pregnancy or who relied on Medicaid for insurance likely did not have access to such services. As such, the similar proportion of twin births to women who are and are not enrolled in Medicaid is unexpected.

Although African-American women are disproportionately represented in Medicaid and are known to have a higher rate of twins than other racial-ethnic groups (Martin et al. 2017), higher rates of enrollment of African American women are not sufficient to explain a higher rate of twins with no use of ART. In 1980, before ART was generally available, the twin birth rate for African American women was 2.4%, far below the observed rate of 3.2% twin births for Medicaid covered women of all races in this study. Twins are also common among older women, but although the average age of women in our study who gave birth to twins (27.5) was higher than the average age for women who had singletons (26.7), it is still lower than the average age of women for all births in the U.S., which is 28 (Mathews and Hamilton 2016). As women in our study were younger at their births than is average for the population as a whole, age does not explain the relatively high rate of twin births.

## Implications for Practice

With Medicaid covering almost half of births in the U.S., and the prevalence of twins in this Medicaid sample being close to the overall U.S. population rate, it is important to know about twin births specifically in Medicaid. Such an understanding can help providers, birth facilities, and public health programs to consider how evidence-based, optimal care for twins and their mothers could be provided to promote improved outcomes and cost-effectiveness and how such practices might be implemented.

Our data show that birth outcomes for twins enrolled in Medicaid are substantially worse than for singletons and their associated utilization and costs are higher, consistent with other studies (Chambers et al. 2014; Lemos et al. 2013; Luke et al. 1996). Common poor outcomes for twins, such as low birthweight, preterm birth, high cesarean birth, extended hospital stays, NICU use, and hospitalization during infancy are all costly.

Our analysis shows that the cost per Medicaid twin, when tabulated across the entire birth episode and averaged for individual twins, is about 35% higher than for singleton births. It is possible that effective strategies, such as appropriate preventive care in pregnancy, evidence-based delivery practices, and high-touch newborn care, could lessen cost gaps between

twins and singletons, while improving outcomes for twins and their mothers.

Researchers and policy analysts have pointed to factors that may lead to unnecessary utilization and costs for twins, such as high rates of induced late preterm and early term birth (Kogan et al. 2002; Dodd et al. 2014) and high rates of cesarean section. For instance, our data show that 73.6% of twin births were by cesarean section vs. 32.0% for singletons. Though twin births often include complications (e.g. breech presentation) that make cesarean the safest option, research indicates that vaginal birth is a safe option for many twins. A randomized trial of cesarean section for twins found that infant outcomes did not differ significantly between planned cesarean section and planned vaginal delivery when the first twin was in cephalic presentation (head down) (Barrett et al. 2013). Thus, it may be possible to reduce Medicaid costs through reductions in cesarean births for twins without adverse effects on infant outcomes.

Some improved outcomes and reduced costs for twins could potentially be achieved through non-medical, evidence-based newborn care. Future research should consider the impact of care avenues such as midwifery care, vaginal birth support, non-medical neonatal interventions, and non-clinical parental support on twin outcomes and costs among Medicaid beneficiaries. Practices such as skin-to-skin kangaroo care (Conde-Agüido et al. 2018), breastfeeding (Whitford et al. 2018), and rooming in (Kuhnly 2015) may be particularly beneficial for twins and could potentially shorten NICU stays or prevent further hospitalizations. These practices may be particularly challenging, however, especially if the family has other children at home or if the mother is recovering from a cesarean section or other birth complications. Medicaid waivers could provide cost-efficient coverage to support these practices through payment to postpartum doulas or other non-licensed maternity care staff.

Preventive care in pregnancy also offers opportunities for improving twin outcomes and reducing costs. Low-dose aspirin use is recommended for all women with twin pregnancies in order to prevent pregnancy hypertension and pre-eclampsia (American College of Obstetricians and Gynecologists 2018), but research indicates that aspirin therapy is underused in eligible women enrolled in Medicaid (Cross-Barnet et al. 2018). Prenatal care co-management between a birth center or other midwifery practice and high-risk specialists could may show some of the positive effects that have been observed in midwifery care for lower risk Medicaid women (Hill et al. 2018).

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