

# Montana Hospital Discharge Data System

Surveillance Report

September 2011



## Multiple Births in Montana, 2001-2010

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Multiple birth is a significant risk for a number of conditions, including, prematurity, low birth weight, and neonatal mortality, and negative maternal sequelae such as gestational diabetes.<sup>1</sup> Approximately 95% of multiple births are twins; higher order multiple births are less common. The nationwide rate for twin births rose 70% from 1980 to 2004; 2008 had the highest rate on record, 32.6 per 1,000 births.<sup>2</sup> Approximately a quarter of the increase in twin and triplet births has been attributed to increasing maternal age; the remainder of the increase, and especially high-order multiple births, is attributed to fertility treatments.<sup>3</sup>

We identified all live-born infants born to Montana-resident mothers from 2001 through 2010 from birth certificates. Montana implemented the 2003 US Standard Birth Certificate in 2008; this revision added information on a number of indicators, including fertility treatments for mothers (including both treatments such as fertility enhancing drugs and artificial insemination and also assisted reproductive technology (ART)), and newborn experiences such as assisted ventilation and admission to the neonatal intensive care unit (NICU) after birth. There were 116,738 live births registered in Montana during the interval; 97% occurred in hospitals. For birth certificate items that were unchanged with the implementation of the 2003 revision, we analyzed birth certificate data for the whole period; for items that were first implemented or substantially changed in 2008, we restricted analysis to 2008 through 2010.

We identified 104,191 live born infants from the Montana Hospital Discharge Data System (MHDDS)<sup>4</sup> by the primary ICD-9-CM diagnosis codes V30-V39.<sup>5</sup> Infants with code V30 are singletons, V31-V33 twins, and V34-V37 are higher order multiple births. The MHDDS contained no infants with unknown multiple status.

Birth certificates are fully identified, allowing mothers, infants, and multiple siblings to be linked. The MHDDS data are de-identified and siblings cannot be linked, nor can infants be linked to their mothers. Therefore the unit of analysis throughout this report is the individual infant; each infant is characterized as a singleton, twin, or higher order multiple. Higher order multiples were primarily triplets; there were fewer than five pregnancies of quadruplet or higher order identified in Montana in the interval 2001 to 2010.

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<sup>1</sup> [http://www.marchofdimes.com/Pregnancy/trying\\_multiples.html](http://www.marchofdimes.com/Pregnancy/trying_multiples.html)

<sup>2</sup> Martin JA, Hamilton BE, Sutton PD, et al. Births: Final data for 2008. National vital statistics reports; vol 59 no 1.: National Center for Health Statistics. 2010.

<sup>3</sup> Jewell SE, Yip R. 1995. *Obstet Gynecol* 85:229-232; Blondel B, Kaminski M. 2002. *Semin Perinatal* 26:239-249.

<sup>4</sup> The Montana Hospital Discharge Data system (MHDDS) receives annual de-identified hospital discharge data through a Memorandum of Agreement with the Montana Hospital Association. Most hospitals in Montana participate in voluntary reporting of discharge data from their Uniform Billing Forms, version 2004 (UB-04). The MHDDS receives information on more than 95% of the inpatient admissions in the state.

<sup>5</sup> <http://www.icd9data.com/>

Vital Statistics and MHDDS data sets are not directly comparable. Approximately 3% of infants are born outside of hospitals (0.7% in freestanding birthing centers, 2.2% at home, and a few at other locations). The MHDDS data set only contains data on infants born in the hospital or admitted very shortly after birth. In addition, coding conventions differ between birth certificates and the ICD-9-CM. The birth certificate records birth weight in grams and the obstetric estimate of gestational age in weeks, allowing us to compute the incidence of low birth weight (<2500 g) and preterm birth (<37 wk). Low birth weight and preterm birth can be recorded as secondary diagnosis codes on hospital discharge data but the MHDDS only receives eight secondary diagnosis codes. Low birth weight and preterm infants may receive many secondary diagnoses that may take precedence over birth weight and gestational age.

Based on birth certificates, 3% of Montana infants were twins. The proportion of infants born as parts of sets of twins and higher order multiples has been constant in Montana from 2001 to 2010, in contrast with the national trend of increasing incidence of multiple births. While the proportion of singletons who were premature or of low birth weight was low (8% and 6%, respectively), more than half of twins and nearly all (95% for both) higher order multiple births were premature, of low birth weight, or both.

Based on hospital discharge data, the most common principal procedure for all infants regardless of singleton, twin, or higher order multiple status was routine circumcision for males. Routine prophylactic vaccination was the second most common principal procedure for singletons and twins (20% and 13%, respectively); no triplets had it listed as a principal procedure. Venous catheterization (11%) and assisted ventilation (13%) were the most frequent principal diagnoses for higher order multiple infants; these procedures were rare for singletons (0.1% and 0.5%) and twins (1% and 3%).

Both birth certificates and hospital discharge records indicated that 3% of infants were parts of sets of twins; triplets and higher order multiples were rare (0.09% of all infants) (Figure 1). Prematurity and low birthweight were indicated on a higher proportion of birth certificates than hospital discharges (Figures 2 and 3).

Figure 1. Number Of Births By Multiple Order Status, Montana, 2001-2010

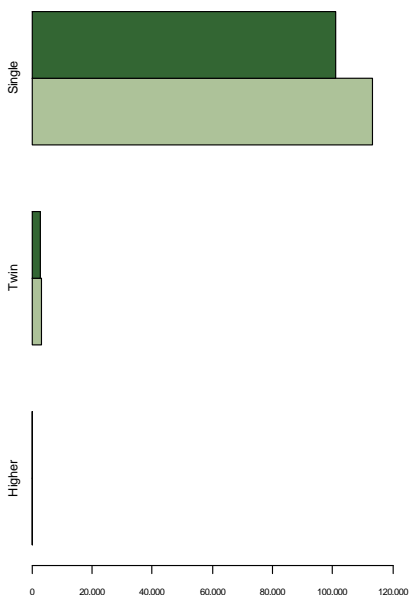


Figure 2. Percent Premature Births, Montana, 2001-2010

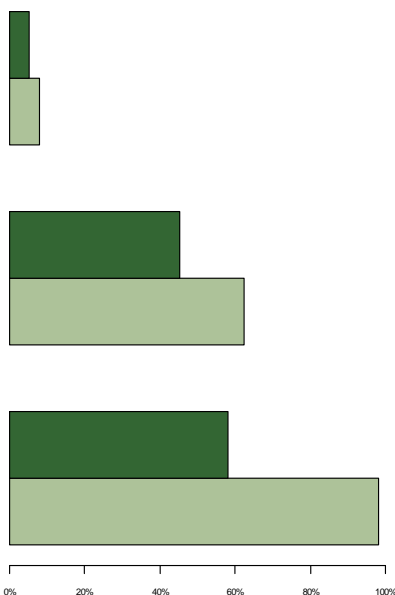
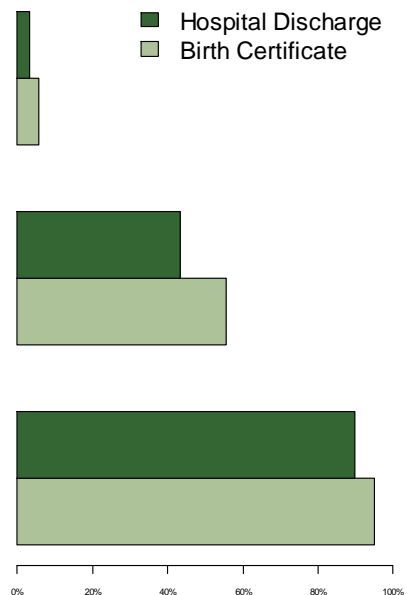


Figure 3. Percent Low Birthweight, Montana, 2001-2010

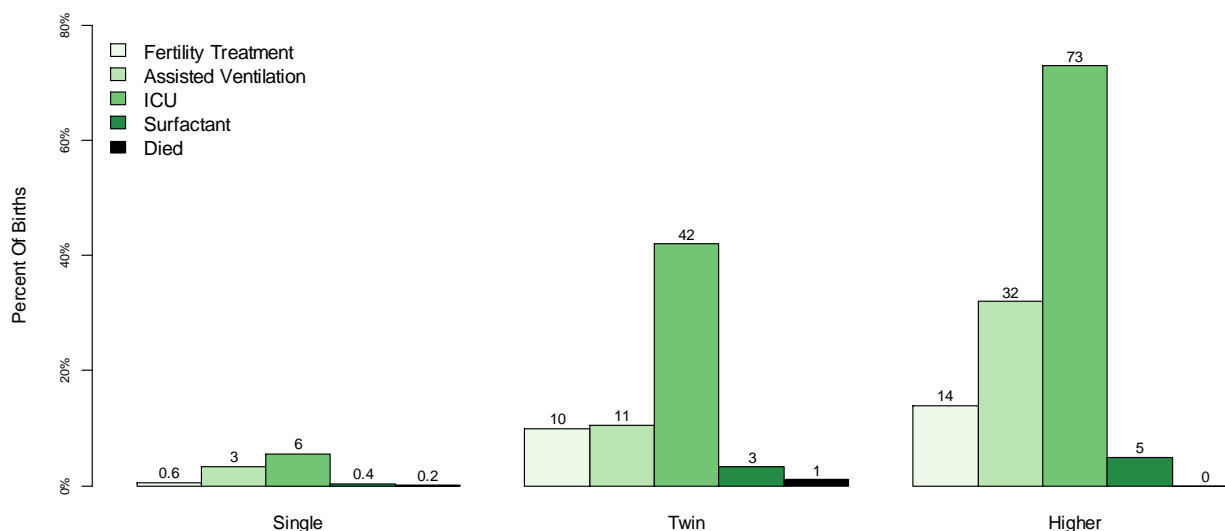


There were 106 higher order multiple infants indicated from birth certificates and 88 from hospital discharge records; bars do not show due to scale.

With the implementation of the 2003 revision, substantial detail was added to the Montana birth certificate. Fertility treatments of any type were rare (0.6%) for singletons, but 10% of twin births and 14% of higher order multiple births had a record of fertility treatments on their birth certificates (Figure 4). In this regard, Montana differs from the national trend: an estimated 5% of US births are associated with forms of fertility treatments such as fertility enhancing drugs and artificial insemination, and 1% of births nationwide are associated with ART.<sup>6</sup> This may change following the opening of the first fertility specialty clinic offering ART in Montana in 2011.<sup>7</sup>

The distribution of adverse neonatal outcomes (need for assisted ventilation, surfactant treatment, admission to the NICU, and perinatal mortality) was higher among twin and higher order multiple births (Figure 4). The proportion of newborns needing assisted ventilation or admission to the NICU substantially increased for both twins and infants of a higher multiple. Admission to the NICU was rare for singletons, but roughly half of twins and almost three quarters of infants of a higher order multiple birth were admitted to the NICU.

Figure 4. Selected Conditions By Multiple Order Status, Montana, 2008-2010



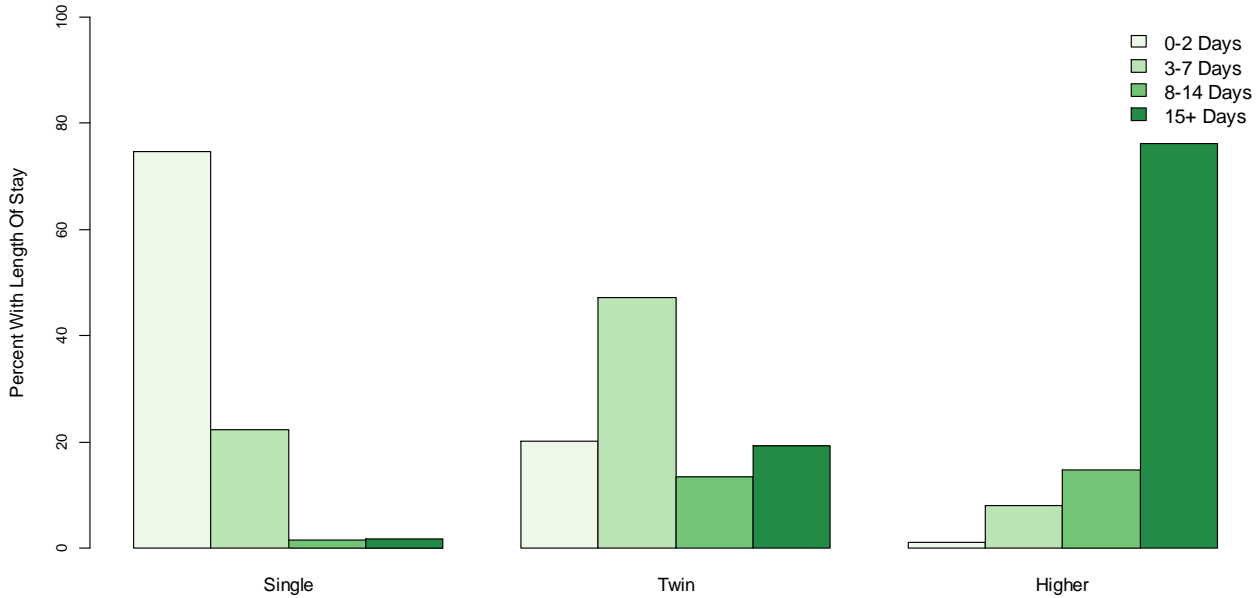
For singleton infants, 75% stayed in the hospital for one or two days; for twins, 20% stayed one or two days (Figure 5) while 47% stayed for three to seven days. For higher order multiples, the mean length of stay was 27 days, but only 3% stayed for 60 days or more and the longest stay was over 200 days. Total charges were highly positively correlated with length of stay for all infants.<sup>8</sup> Length of stay is one of many factors that affects charges for hospitalization, along with the specific procedures administered. Total charges were substantially higher for both twins and higher order multiples compared to singletons (mean=\$28,500, \$109,000, and \$4,500, respectively), likely due to the higher proportion of infants with low birth weight and prematurity and their attendant complications.

<sup>6</sup> Schieve, L et al. 2009 *Am. J. Epidemiol.* 170 (11): 1396-1407.

<sup>7</sup> <http://www.billingsclinic.com/body.cfm?id=982>

<sup>8</sup>  $r=+0.93$

Figure 5. Length Of Stay By Multiple Order Status, Montana, 2001-2010



Only 1.5% of births to teenage mothers were multiple births, whereas over 5% of births to mothers aged more than 40 years were multiple births (Figure 6). Increasing maternal age is a documented correlate of multiple birth. In addition, older women are more likely to use fertility treatments; maternal age and fertility treatments may have confounded effects.<sup>9</sup>

Figure 6. Multiple Births As A Percentage Of All Births By Maternal Age, Montana, 2001-2010



To explore the independent effects of age and fertility treatments on multiple births, we fit a logistic model based on birth certificate data from 2008 (when the more comprehensive birth certificate was implemented in Montana) through 2010, incorporating maternal age as a continuous variable and fertility

<sup>9</sup> Luke B, Martin J, 2004 *Clinical Obstetrics And Gynecology* 47 1:118-133

treatments as predictors of multiple birth (Table 1). Infants with missing data for maternal age, multiple status, or fertility treatment were excluded from analysis (N=6). Maternal age was associated with a 4% increase in the risk of multiple birth per year of age (Odds Ratio 1.04, 95% Confidence Interval 1.03, 1.05). The impact of fertility treatments swamped the small effect of maternal age: Women who had had fertility treatments were approximately 15 times more likely to have multiple births than were women who had not had such treatments (OR 15.6, 95% CI 12.2, 21.1). Thus, fertility treatments are a major risk factor for multiple birth and maternal age is a small independent contributing factor.

Table 1. Factors Affecting Multiple Birth in Montana, 2008-2010			
Outcome: Single Birth†		N=35,285	
Outcome: Multiple Birth		N = 1,094	
Effect		Odds Ratio	95% CI
No Fertility Treatment†		1.00	
Fertility Treatment		<b>15.6</b>	<b>12.2, 21.1</b>
Maternal Age		<b>1.04</b>	<b>1.03, 1.05</b>
† Reference category			
Odds Ratios in <b>bold</b> are statistically significantly different from reference category.			

In Montana, maternal age has held steady and women have had less access to fertility treatments than women in other states, so the nationwide trend of increasing multiple order births has yet to occur in Montana. Multiple order births are a major risk factor for low birthweight, preterm gestation, admission to the NICU, and longer length of stay. If Montana experiences the national trend of increasing maternal age and fertility treatments, policy planners should develop the resources to handle the corresponding potential increases in low birthweight, preterm gestation, admission to the NICU, and longer length of stay.

Please visit our website at <http://dphhs.mt.gov/PHSD/MTHDDS/>  
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