Births to Mothers on Medicaid

Calendar Year 2005

Report to the Iowa Department of Human Services

From:

Iowa Department of Public Health

Bureau of Family Health

Bureau of Health Statistics

Chester Culver, Governor
Patty Judge, Lt. Governor
Thomas Newton, Director
Iowa Department of Public Health

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List of Abbreviations

BMI Body Mass Index

CPT Current Procedure Terminology

DRG Diagnostic Related Group

DHS Iowa Department of Human Services

IPI Inter-pregnancy interval

IDPH Iowa Department of Public Health

IOM Institute of Medicine

HTN Hypertension

LBW Low Birth Weight

PNC Prenatal Care

PTB Preterm Birth

Acknowledgments

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Report summary

Purposes: The purposes of this report were to: 1) describe the population of women whose 2005 births were paid for by Medicaid; 2) compare demographic characteristics, access to prenatal care, and birth outcomes of Medicaid mothers to non-Medicaid mothers; 3) to describe the Medicaid mothers who received dental care during their pregnancies; and 4) examine factors associated with infant low birth weight and premature birth for mothers on Medicaid at the time of their infants' births.

Methods: We used a matched data file created by linking Medicaid claims files and birth certificate data from calendar year 2005 for this report (n=39,275). We used a deterministic method to match claims data to birth certificates. Using SAS Version 9.1, we performed descriptive and chi-square analyses to compare Medicaid mothers to non-Medicaid mothers by maternal demographic characteristics (e.g., mother's age, race/ethnicity, immigrant status, and education level), pregnancy related health and behavior (e.g., smoking, alcohol use, and weight gain), health and obstetrical conditions, and birth outcomes (low birth weight and preterm birth).

Results: In calendar year 2005, approximately 33.5 percent of Iowa deliveries were paid by Medicaid. The proportion of mothers who smoked, gained an inadequate amount of weight during pregnancy, and who received inadequate prenatal care was greater among Medicaid mothers compared to non-Medicaid mothers. The proportion of Medicaid mothers who delivered a low birth weight infant was 8.7 percent compared to 6.3 percent for non-Medicaid mothers. The proportion of Medicaid mothers who delivered a premature infant was 13.7 percent compared to 11.1 percent for non-Medicaid mothers.

Conclusions: Medicaid mothers experienced adverse birth outcomes at a higher proportion than did non-Medicaid mothers. At the same time, Medicaid mothers smoked at a higher rate, gained less weight, and accessed prenatal care at a lower rate than non-Medicaid mothers.

Public Health Implications: Because maternal smoking, inadequate weight gain, and inadequate prenatal care were associated with adverse birth outcomes among Iowa Medicaid mothers for calendar year 2005, programs that address these issues may contribute to a reduction of adverse birth outcomes among future Medicaid recipients.

Report Highlights

Medicaid mothers compared to non-Medicaid mothers

Demographic Information

- In calendar year 2005, approximately 33.5 percent of Iowa deliveries were paid by Medicaid.
- Non-Hispanic black mothers accounted for 7.1 percent of Medicaid births, compared to 2.1 percent of non-Medicaid births to non-Hispanic black mothers.
- Non-Hispanic white mothers accounted for 76.4 percent of Medicaid births compared to 90.1 percent of births to non-Medicaid non-Hispanic white mothers.
- Approximately 18 percent of Medicaid births occurred among women less than or equal to 19 years of age. Non-Medicaid mothers, less than or equal to 19 years of age, accounted for 3.8 percent of births.
- Hispanic immigrants (mothers who reported that they were born in a Spanish-speaking country) represented 8.1 percent of Medicaid births, compared to 2.7 percent of non-Medicaid births to Hispanic immigrant mothers.

Health Behaviors

- Mothers on Medicaid were more likely to smoke during pregnancy than mothers not on Medicaid (30% vs. 9.3%).
- Mothers on Medicaid were less likely to have gained an adequate amount of weight during their pregnancy compared to non-Medicaid mothers (34.4% vs. 28.4%).

Maternal Health Status during Pregnancy

- The prevalence of diabetes and pregnancy-related hypertension during pregnancy were the same for Medicaid and non-Medicaid mothers.
- Medicaid mothers were more likely to have previously delivered a low birth weight infant or a preterm infant than non-Medicaid mothers (2.8% vs. 2.1%).

Interpregnancy intervals

- A greater proportion of Medicaid mothers (24.7%) than non-Medicaid mothers (17.9%) had short inter-pregnancy intervals (< 12 months between the mother's last menstrual period and a previous birth).
- A greater proportion of non-Medicaid mothers (48.6%) than Medicaid mothers (39.8%) had inter-pregnancy intervals of 12 to 35 months.

Access to Prenatal Care

- Medicaid mothers were less likely to have initiated prenatal care during the 1st trimester than were non-Medicaid mothers (79.6% vs. 91.6%).

- According the Kotelchuck Index of Prenatal Care Adequacy, a greater proportion of non-Medicaid mothers compared to Medicaid mothers received adequate or adequate plus prenatal care (85.9% vs. 76.7%).

- A greater proportion of Medicaid mothers received inadequate prenatal care when compared to non-Medicaid mothers (12.3% vs. 4.7%).

Access to dental care

- Seven percent (7.4%) of mothers received Medicaid reimbursable prophylactic dental care during their most recent pregnancies.

- Those who received dental care were more commonly non-Hispanic whites with at least a high school education. Receipt of dental care did not differ by age.

Birth Outcomes

- Medicaid mothers were more likely to have delivered a low birth weight infant than non-Medicaid mothers (8.7% vs. 6.3%).

- Medicaid mothers were also more likely to have delivered a preterm infant compared to non-Medicaid mothers (13.7% vs. 11.1%).

A. Introduction and Background

The immediate and post-natal hospital costs of caring for low birth weight (LBW) and premature infants are staggering (1). In a study published in 2005, the mean hospital charges for normal weight infants (more than 5 pounds 8 ounces) were $5,816 compared to $205, 204 for infants weighing less than 1250 grams (2 pounds 12 ounces) at birth (2). Similarly, mean hospital charges for full-term infants (greater than 37 weeks gestation) were $4,788 and more than $200,000 for infants born between 26 and 28 weeks gestation. In other words, initial hospital charges are inversely related to both infant birth weight and gestational age. Likewise, low birth weight infants and premature infants are re-hospitalized at a greater rate than normal weight and full-term infants, leading to increased costs of care compared to normal weight and full-term infants.

Women who receive inadequate or late prenatal care (PNC) are at greater risk to give birth to LBW or preterm infants (3-6). The infants of women who receive inadequate prenatal care are more likely to be admitted to intensive care units. Conversely, women who receive adequate PNC are less likely to give birth to a LBW infant (5). Although causality cannot be assured, providing women at risk for adverse birth outcomes with PNC is viewed as an important strategy to reduce the number of infants who are born with LBW and/or born prematurely. Through PNC at risk women can receive services to ameliorate some of the factors that contribute to adverse birth outcomes.

To address financial barriers to PNC for low-income women, the health insurance program for low-income women (Medicaid) was expanded during the mid-1980s to make PNC available to a broad cross-section of low-income pregnant women. Medicaid expansion provisions included but were not limited to: an increase in eligibility to 185

percent of the federal poverty level (FPL) for pregnant women and infants (7), presumptive eligibility determinations for pregnant women, and enhanced services and case management for pregnant women (8) (See Appendix A). In Iowa, the household income limit for pregnant women to be eligible for Medicaid is 200 percent of the FPL. Once a woman is determined to be Medicaid eligible during her pregnancy, she retains continuous eligibility meaning that an increase in household income does not affect her Medicaid eligibility during her pregnancy, through 60 days postpartum. An underlying assumption of the Medicaid changes for low-income pregnant women was that more pregnant women would access Medicaid PNC. Increased access to PNC would lead to a reduction in postnatal costs by decreasing the number of infants born with LBW.

In the 1989 Iowa legislative session, Iowa legislators directed the Iowa Department of Human Services (DHS) to evaluate Medicaid program effectiveness for low-income pregnant women. To examine the pregnancy and birth outcomes of women receiving Medicaid benefits, two separate data sets were needed: Medicaid claims data and birth certificates. An inter-departmental agreement was executed between the DHS and the Iowa Department of Public Health (IDPH). Under the agreement, DHS provides Medicaid claims data to the IDPH on an annual basis. Iowa Department of Public Health staff link Medicaid claims data to birth certificate data and analyze the pregnancy and birth outcomes among women who received Medicaid benefits at the time of their infants' births.

B. Purposes

The purposes of this report were to: 1) describe the population of women whose 2005 births were paid for by Medicaid; 2) compare demographic characteristics, access to prenatal care, and birth outcomes of Medicaid mothers to non-Medicaid mothers; 3) to describe the Medicaid mothers who received dental care during their pregnancies; and 4) examine factors associated with infant low birth weight and premature birth for mothers on Medicaid at the time of their infants' births. Medicaid administrators and public health professionals can use this information to assess the success of the Medicaid programs in regards to pregnancy and infant outcomes, and to guide future Medicaid policy and public health program development.

C. Methods

1. Data

We used Medicaid claims files and birth certificate data from calendar year 2005 for this report. All hospital (UB92) and physician (HCFA1500) claims with pregnancy-related hospital diagnostic related group codes (DRGs) or physician current procedure terminology codes (CPTs) were selected to match with birth certificates. Relevant maternal and infant DRG codes and CPT codes are reported in Appendix B.

Bureau of Information Management staff edited and reordered claims files to create a file of unduplicated cases. The resulting file was then matched to the birth certificate file. We used a deterministic/direct process to match the claims data to birth certificate data. Variables used to conduct the match included the infant's name, the mother's married and maiden name, the infant's date of birth, the infant's sex, the birth hospital, the state of birth,

and the mother's county of residence. Eight computer passes were performed to match the infant's Medicaid claims data to a birth record; seven computer passes were performed to match the mother's Medicaid claims data to a birth record. The computer pass method and the variables used to conduct the match are presented in Appendix C. We obtained a 98.7 percent match rate for infants and a 95.4 percent match rate for mothers. We considered a match for Medicaid coverage if either the infants' births' or the mothers' deliveries contained a Medicaid claim. We limited our analysis to Iowa resident births (n=39,275).

2. Description of Variables

We obtained maternal demographic variables, pregnancy related health and behavior variables, access to PNC variables, and birth outcomes from birth certificate records. Maternal demographic variables were age, race/ethnicity (non-Hispanic black, non-Hispanic white, non-Hispanic other, and Hispanic) and marital status. We combined Hispanics of all races into a single group because the low proportions of Hispanic blacks and Hispanic other races (<0.1 % respectively). We examined maternal immigrant status based on the mothers' country of birth (born in a Spanish-speaking country or another country).

In this report, we examined a number of maternal health related behaviors. These behaviors were maternal cigarette smoking during pregnancy (yes/no), alcohol use during pregnancy (yes/no), and weight gain ($\leq$ 24, 25-35, $\geq$ 36 pounds). The weight gain categories were based on the Institute of Medicine (IOM) recommendations for women at a normal Body Mass Index (BMI) (9). We reported maternal health and obstetrical history variables (parity and a history of delivery a LBW or preterm infant) and maternal health

conditions (any report of a medical condition, diabetes, pregnancy-related hypertension (HTN), chronic HTN, and eclampsia). We examined maternal parity (the number of offspring a female has borne, including stillbirths) in three categories (1st time mothers, 2-4 previous live births, 5 or more previous live births).

We examined PNC access by the trimester that women entered PNC (1st, 2nd, and 3rd) and by the Adequacy of Prenatal Care Utilization Index (Kotelchuck Index). The Kotelchuck Index categorizes PNC into four groups (adequate plus, adequate, intermediate, and inadequate) (10). Kotelchuck Index categories are based on three variables: month of PNC initiation, the number of PNC visits, and the infant's gestational age at birth (See Appendix D).

Using birth certificate information, we examined birth outcomes by creating categories for low (< 2500 grams) and very low birth weight (< 1500 grams). Also using the birth certificate, we created two categories for the infant's gestational age at birth, based on mothers last menstrual period (< 37 weeks & $\underline{\geq}$ 37 weeks).

We obtained the variables used to determine mothers' and infants' Medicaid status from Medicaid claims data. We used DRG or CPT codes to match infants' and mothers' birth record data to Medicaid claims data. In this year's report we also have included maternal receipt of preventive dental care, based on Medicaid claims files.

3. Data analyses

All data were examined, re-coded, and analyzed using SAS Version 9.1. We examined the data for missing and implausible values. Implausible values for birth weight and gestational age were excluded from the analyses. Unless explicitly stated, the terms indicating direction of change or differences in magnitude comparing Medicaid

mothers to non-Medicaid mothers are merely descriptive and do not imply statistically or practically significant differences.

4. Assumptions

We made a number of assumptions in writing this report and conducting the analyses. First, we assumed that birth certificate data were a reliable data source for birth weight and basic demographic data such as mother's race, her education level, county of residence, and marital status (11;12). Although less reliable for other factors, particularly medical history and alcohol use, the birth certificate is a reasonable data source for medical history and alcohol use. A second assumption was that Medicaid claims data are reflective of the true proportion of births paid for by Medicaid in the state of Iowa. In addition, we assumed that Medicaid payment at birth sufficiently measures exposure to Medicaid services. Finally, we assumed that these analyses have value to program and policy makers for improving birth outcomes of Medicaid recipients.

D. Results

1. Maternal Demographic Characteristics

The total number of births to Iowa resident mothers in calendar year 2005 was 39,275. Of these, 13,139 deliveries were paid for by Medicaid, representing 33.5 percent of births to Iowa resident mothers.

Table I presents maternal demographic characteristics by Medicaid status. Maternal age is an important factor to consider because women who are younger than age 17 and older than age 35 are at increased risk of experiencing an adverse birth outcomes such as LBW or PTB (1;13-15).

The age at which women give birth tends to be younger for women who receive Medicaid benefits compared to those who do not receive Medicaid. For example, slightly more than five percent (5.2%; n=682) of Medicaid mothers were less than or equal to 17 years old when they gave birth compared to 1.2 percent (n=313) of non-Medicaid mothers. Medicaid mothers (12.8%; n =1686) also comprised a greater proportion of mothers aged 18 to 19 compared to non-Medicaid mothers (2.6%; n=677).

Medicaid was an important source of support to young mothers in Iowa. Births to Medicaid mothers less than or equal to age 17 accounted for more than two-thirds (68.5%) of the births to women in this age group. Births to Medicaid mothers ages 18 to 19 accounted for more than seventy percent (71.3%) of the births to women in this age group.

In contrast non-Medicaid mothers comprised a greater proportion of births to women aged 30 to 39 (39.2%; n=10245 vs. 14.5%; n=1906) and equal to or older than age 40 (2.3%; n=602 vs. 0.9%; n=117) than Medicaid mothers. Births to Medicaid mothers ages 30 to 39 accounted for just fifteen percent (15.7%) of the births to women in this age group.

Like age, the mother's race has been associated with adverse birth outcomes (16). Specifically, non-Hispanic black women are at an increased risk for giving birth to a LBW infant (13) or a preterm infant (4). Non-Hispanic whites represent the largest group of Medicaid recipients (76.4%; n = 9960), followed by non-Hispanic blacks (7.1%; n=918) and those who reported other racial backgrounds (2.7%; n = 345), including, but not limited to, Indian, Chinese, Japanese, and Filipino (Table I). Although non-Hispanic blacks account for 3.8 percent of the population, they comprise 7.1 percent of those who received Medicaid. Hispanic (all races) women represented 13.9 percent (n=1807) of women

whose deliveries were paid for by Medicaid and, like non-Hispanic blacks, were over-represented among Medicaid recipients. Hispanics comprise 7.7 percent (n=3011) of the population, yet comprise 13.9 percent (n=1807) of those who received Medicaid.

According to the United States Census Bureau, Iowa's Hispanic population has increased by 25 percent from 2000 to 2005. In addition, Hispanics represent the largest ethnic minority in Iowa. Therefore, it is important to report the growth of this population, their access to Medicaid PNC, and their birth outcomes relative to other racial and ethnic groups. In addition to considering race and ethnicity, the country of the mother's birth is important to examine. For example, throughout the United States, Hispanic women who were born outside of the United States tend to deliver healthier infants compared to other racial and ethnic groups, even though Hispanic immigrants tend to have limited access to prenatal care (17).

Approximately 9.7 percent (n=3803) of mothers who gave birth in calendar year 2005 were born outside of the United States (Table I). Mothers born in Spanish-speaking countries accounted for about 4.5 percent (n=1765) of the 9.7 percent of immigrant mothers. When comparing Medicaid to non-Medicaid births, the proportion of Medicaid mothers born in Spanish speaking countries (8.1%; n=1064) was much greater than that of non-Medicaid mothers born in Spanish speaking countries (2.7%; n=701). The proportion of Medicaid and non-Medicaid mothers born in other countries was equal (5.1%; n=674 vs. 5.2%; n=1364).

Maternal education level has also been associated with adverse birth outcomes (15). Maternal education level was inversely associated with Medicaid receipt (Table I). Namely women who received Medicaid were more likely to have less than 12 years of

education (28.9%; n=3766 vs. 7.7%; n=1980) when compared to women who did not receive Medicaid. Women who received Medicaid were less likely to have more than 12 years of education (30.4%; n=3950 vs. 72.6%; n=18,777) than women who did not receive Medicaid.

According to the United States Census Bureau, births to unmarried women have increased dramatically over the past several years. Births to unmarried women in 2003 accounted for 32.5 percent of all births. Mother's marital status was inversely related to receipt of Medicaid (Table I). Medicaid mothers were less likely to report that they were married at the time that their infants were born than non-Medicaid mothers. The proportion of Iowa Medicaid mothers who were unmarried when their infant was born (35.8%; n=4708) was more than double that of Iowa non-Medicaid mothers (16.6%; n=4328).

2. Maternal health related behaviors

Maternal health behaviors such as low or excessive weight gain (9;18), cigarette smoking (19;20), and alcohol consumption (21;22) have been reported to be associated with delivering a LBW infant or a premature infant.

Table II reports maternal health behaviors by Medicaid status. The proportion of mothers who reported drinking alcohol during pregnancy was low and approximately the same for both Medicaid and non-Medicaid mothers. In contrast, Medicaid recipients reported a higher rate of cigarette smoking during pregnancy than did non-Medicaid recipients (30.0%; n=3939 vs. 9.3; n=2431).

We also examined maternal weight gain during pregnancy (Table II). Either excessive or less than the Institute of Medicine's recommended weight gain during pregnancy can contribute to adverse birth outcomes, including PTB and LBW (9;18).

However, weight gain needs to be considered in relationship to the woman's body mass index (BMI) and at this time our data were limited to weight gain only. Nonetheless, the proportion of Medicaid mothers who gained less than or equal to 24 pounds during their pregnancies was greater than that of non-Medicaid mothers (34.4%; n= 4484 vs. 28.4% n= 7373). The proportion of mothers who gained greater than or equal to 36 pounds during pregnancy was equal for Medicaid compared to non-Medicaid mothers.

3. Previous births/parity

Parity (the number of offspring a female has borne, including stillbirths) has also been linked to adverse birth outcomes. For example, women who have a higher parity are at an increased risk for having an infant with LBW (21). A greater proportion of Medicaid mothers were first time mothers compared to non-Medicaid mothers (40.1%; n=5270 vs. 36.9%; n=9651) (Table II). Medicaid mothers also were likely to be of high parity ($\geq$ 5 previous births) compared to non-Medicaid mothers (5.2%; n=688 vs. 3.7% n=962).

4. Maternal health and obstetrical conditions

We examined if mothers reported a history of or a current health or obstetrical condition that could have contributed to adverse birth outcomes. These health and obstetrical conditions were chronic hypertension (HTN), pregnancy-associated HTN, eclampsia, diabetes, and previous delivery of a LBW or premature infant (See Table II). Twenty-six percent (26.9%; n=3534) of Medicaid mothers compared to 25 percent (25.9%; n=6776) of non-Medicaid mothers reported any history or current health condition. The proportions of Medicaid mothers compared to non-Medicaid mothers were approximately equal for diabetes, pregnancy associated HTN, eclampsia, and a history of having had a

premature or a LBW infant. Non-Medicaid mothers were slightly more likely to have reported chronic HTN than Medicaid mothers.

In this year's report we measured inter-pregnancy intervals (See Table II). Both short inter-pregnancy intervals (< 12 months) and long inter-pregnancy intervals (≥ 36 months) can contribute to adverse birth outcomes (23;24). Medicaid mothers had a higher proportion of short IPI (24.7%; n=1657) than non-Medicaid mothers (17.9%; n=2581). Medicaid mothers also had a higher proportion of long IPI intervals (35.5%; n=2379) than non-Medicaid mothers (33.5%; n=2423). We also reported the proportions of Medicaid and non-Medicaid mothers who received primary and repeat c-sections (Table II). There were little differences when comparing Medicaid to non-Medicaid mothers. Fourteen percent (14.9%) of Medicaid mothers received primary c-sections; eleven percent (11.6%) received repeat c-sections. Fifteen percent (15.8%) of non-Medicaid mothers received primary c-sections; eleven percent (11.8%) received repeat c-sections.

5. Access to Prenatal care

Overall, Iowa women seek prenatal care (PNC) early in their pregnancies as noted in Table III. However, a lower proportion of Medicaid women compared to non-Medicaid women start PNC in their first trimester (79.6%; n=10422 vs. 91.6%; n=23839). Reflective of early entry into PNC, Medicaid mothers reported a lower proportion of having receiving adequate or adequate plus prenatal care, per the Kotelchuck Index (76.7%; n=10071 vs. 85.9%; n=22468). Kotelchuck Index categories are based on three variables: month of PNC initiation, the number of PNC visits, and the infant's gestational age at birth (See Appendix D). Women who received Medicaid were also more likely to report having

received inadequate prenatal care (12.3%; n=1613 vs. 4.7%; n=2836) than those who did not receive Medicaid.

6. Receipt of prophylactic dental care

We measured Medicaid mothers' receipt of prophylactic dental care based on Medicaid dental claim number D1110 (Using these data, we were not able to compare access to dental care by Medicaid status). Adverse birth outcomes have been reported to be associated with poor dental hygiene (25). Therefore, ideally most pregnant women would have received preventive dental care during pregnancy. In fact, just over seven percent (7.7%; n=1017) of Medicaid mothers received prophylactic dental care during their pregnancies (Table IV). Those who received dental care were more commonly non-Hispanic whites with at least a high school education. Receipt of dental care did not differ by age.

7. Birth outcomes

Low birth weight, very low birth weight, and preterm birth cannot be considered independent outcomes. In fact, the risk factors associated with LBW and VLBW are also commonly associated with PTB. To put it another way, it is difficult to tease out the factors that contribute to LBW and VLBW from those that contribute to PTB. In this report, we present these (Table V). The proportion of Medicaid mothers who delivered LBW infants (8.7%; n=1139 vs. 6.3%; n=1640) or VLBW infants (1.7%; n=226 vs. 1.0%; n=266) was greater than that of non-Medicaid mothers. The proportion of Medicaid mothers who delivered a preterm infant was also greater than that of a non-Medicaid mothers (13.7%; n=1590 vs. 11.1%; n=2779). Although Medicaid mothers were proportionately more likely to deliver a preterm infant, the actual number of preterm births

was greater among non-Medicaid mothers. Likewise, the proportion of Medicaid mothers who delivered a LBW infant was greater than that of a non-Medicaid mothers (8.7%; n=1139 vs. 6.3%; n=1640).

8. Factors associated with LBW and PTB among Medicaid mothers

The proportion of Medicaid mothers who delivered LBW infants or experienced a PTB was greater than that among non-Medicaid mothers. Medicaid mothers appear to be at greater risk for adverse birth outcomes because in many instances they were over-represented for having a number of the risk factors associated with LBW or PTB. In Tables VI through VIII we summarize the factors associated with LBW or PTB among Iowa Medicaid mothers. The factors that appear to contribute to adverse birth outcomes for Medicaid mothers were age, race, marital status, smoking, inadequate weight gain, parity, a number of health and obstetrical conditions, and prenatal care access. However these risk factors are not independent factors. A more in-depth analysis is needed to increase our understanding of how these factors independently contribute to adverse birth outcomes.

With few exceptions, the risk factors that other researchers found to be related with adverse outcomes hold true for Iowa mothers on Medicaid. Also consistent with other researchers, we found that Hispanic immigrants tend to have birth outcomes similar to non-Hispanic whites in a phenomenon called the “Hispanic paradox” or the “healthy immigrant effect.”

E. Limitations

There are several limitations to this report. The data sources we used were not created for program evaluation or for research; birth certificates are primarily a legal

documentation of birth, and Medicaid claims data are designed to secure reimbursement. On the other hand, birth certificates are accurate for birth weight and basic demographic data such as mother's race, her education level, county of residence, and marital status (11;12). Also, because birth certificates are based on a national standard, analyses based on Iowa's birth certificates can be compared to analyses of other states. Birth certificate data are less accurate for factors such as maternal tobacco use and weight gain during pregnancy (11;12). However a number of other Iowa Department of Public Health data sources report similar rates of maternal smoking during pregnancy. We therefore feel confident that the proportion of maternal smoking reported on the birth certificate represents the true proportion of maternal smoking during pregnancy. Birth certificate data are less reliable sources for maternal health and medical risk factors and maternal alcohol use.

The Medicaid claims files used for this report was limited to fee-for-service Medicaid recipients. Therefore this report excludes those births to mothers who received Medicaid through a managed care system and may underestimate the true proportion of Medicaid births. However, just two of ninety-nine Iowa counties provide Medicaid through a managed care system. Additionally, the length of recipient eligibility and any designation of Medicaid documented risk status were are not available through the claims data file. Therefore, it is not possible to determine whether a woman was enrolled continuously throughout her pregnancy, if she became eligible shortly before the birth of her child, or if the coverage was limited to coverage of the infant's birth. Finally, these data represent events and insurance coverage from nearly two years ago and may not be reflective of the current Medicaid coverage.

F. Conclusions and Recommendations

The purposes of this report were to: 1) describe the population of women whose 2005 births were paid for by Medicaid; 2) compare demographic characteristics, access to prenatal care, and birth outcomes of Medicaid mothers to non-Medicaid mothers; 3) to describe the Medicaid mothers who received dental care during their pregnancies; and 4) examine factors associated with infant low birth weight and premature birth for mothers on Medicaid at the time of their infants' births.

Medicaid mothers have a greater number of the risk factors associated with adverse birth outcomes than do non-Medicaid mothers. Perhaps, for this reason, Medicaid mothers fare worse with regard to birth outcomes. Therefore, Medicaid policy makers are challenged to develop effective programs for women at high risk for adverse birth outcomes. Two factors that contribute to adverse birth outcomes among Medicaid mothers are amenable to intervention. These factors are maternal cigarette smoking and maternal weight gain. Another area of intervention is to address short inter-pregnancy intervals among Medicaid mothers. Inadequate prenatal care among Medicaid mothers also appears to be associated with adverse birth outcomes. Medicaid administrators, public health professionals, and policy makers can develop and finance smoking cessation programs and support programs that promote for healthy prenatal weight gain. In addition, working to assure that Medicaid mothers receive adequate prenatal care may also contribute to better birth outcomes among Medicaid mothers.

G. Future reports

The data set created by linking Medicaid claims data to the birth certificate file provides a rich data source from which many other important maternal and infant health

issues can be examined. One important future analysis is to conduct a more in-depth statistical analysis, such as logistic regression, to explore the independent relationships of demographic and other maternal variables to birth outcomes. Like this report, future reports will include summary data for Medicaid compared to non-Medicaid recipients.

Researchers have identified a relationship between periodontal disease and adverse birth outcomes (25). In Iowa, we need to conduct an in-depth examination of dental care access by Medicaid mothers. For example, in what part of the state did these mothers reside? How many dentists are available to serve women on Medicaid? Another area of further investigation is the relationship between inter-pregnancy intervals, and birth outcomes.

We have expanded our request for Medicaid claims data to include care coordination by nurses and social workers and the women who received Medicaid coverage through 3-day emergency coverage. Therefore, in future reports we will include information about the Medicaid mothers who received care coordination by nurses and social workers and the women who received coverage through 3-day emergency coverage.

Other areas for future analysis are related to maternal marital status. Marriage maybe a measure of social support; maternal social support as been reported to improve birth outcomes(26-28). Among Medicaid mothers it may be worthwhile to explore social support other than marriage. For example, one group of researchers noted that infant mortality rates were lower among unmarried women who named the infant's father on the birth certificate (29).

In 2007, the Iowa Department of Public Health introduced the 2003 revised birth certificate. Using the revised birth certificate, we will be able to explore the relationship of body mass index (BMI) and birth outcomes because women will report their height and weight, as well as pre-pregnancy weight. BMI and pregnancy weight gain relative to pre-pregnancy weight are much more informative in understanding adverse birth outcomes and possible weight related interventions (9). The revised birth certificate will also collect data about whether or not women quit smoking once they became pregnant and if so in which trimester they quit smoking.

Appendixes

Appendix A

Summary of Medicaid expansion legislation for pregnant women

Name of Bill	Bill provision(s)
Deficit Reduction Act of 1984	● Allowed pregnant women who would be Medicaid eligible if her infant was born and living with her in the month that AFDC would be paid, to receive Medicaid (30)
Consolidated Omnibus Budget Reconciliation Act of 1985	● Allowed states to provide enhanced prenatal care and prenatal case management (8;31) ● Required states to drop family structure requirements (8)
Omnibus Budget Reconciliation Act of 1986	● Increased Medicaid coverage for pregnant women to 100 percent FPL ● Increased reimbursement to prenatal care providers ● Simplified application process ● Instituted presumptive eligibility ● Provided outreach to inform potential recipients of Medicaid availability (8)
Omnibus Budget Reconciliation Act of 1987	● Allowed states to increase Medicaid eligibility from 100 percent FPL up to 185 percent FPL (7)
Medicare Catastrophic Coverage Act 1988	● Mandated that states provide Medicaid coverage to all pregnant women below the FPL (7)
Omnibus Budget Reconciliation Act of 1989	● Mandated that states provide Medicaid coverage to all pregnant women below 133 percent FPL (7)

Appendix B

Codes for Medicaid-Diagnostic Related Groups (DRGs)

Mother
370..... Cesarean section with complications
371..... Cesarean section without complications
372..... Vaginal delivery with complicating diagnoses
373..... Vaginal delivery without complicating diagnoses
374..... Vaginal delivery with sterilization or D&C
375..... Vaginal delivery with surgical procedure except sterilization or D&C.

Infant
385..... Neonates, died or transferred to another acute care facility
386..... Extreme immaturity or respiratory distress syndrome, neonate
387..... Prematurity with major problems
388..... Prematurity without major problems
389..... Full term neonate with major problems
390..... Neonate with other significant problems
391..... Normal newborn

Appendix C

Matching the **Mother's** Medicaid records to a birth record

Pass	Items used to match the records
1	• Provider number • Occurrence state • Occurrence county • Mother's date of birth (year, month, day) • Last name (6 characters) • First name (6 characters)
2	• Provider number • Occurrence state • Occurrence county • Mother's date of birth (year, month, day) • Last name (6 characters) • First name (first character)
3	• Provider number • Occurrence state • Occurrence county • Mother's date of birth (year, month, day) • Last name (4 characters) • First name (2 characters)
4	• Provider number • Occurrence state • Occurrence county • Mother's date of birth (year, month) • Last name (4 characters) • First name (2 characters)
5	• Provider number • Occurrence state • Occurrence county • Mother's date of birth (year, month, day) • Last name (6 characters) • First name (6 characters) **Note:** For the birth file, the mother's maiden name is used
6	• Provider number • Occurrence state • Occurrence county • Mother's date of birth (year, month) • Last name (4 characters) • First name (2 characters) • **Note:** For the birth file, the mother's maiden name is used
7	• Provider number • Occurrence state • Occurrence county • Mother's date of birth (year, month, day) • First name (6 characters)

Appendix C (continued)

Matching the **Child's** Medicaid records to a birth record

Pass	Items used to match the records
1	• Provider number • Occurrence state and county • Infant's date of birth (year, month, day) • Infant's gender • Last name (6 characters) • First name (6 characters)
2	• Provider number • Occurrence state and county • Infant's date of birth (year, month, day) • Infant's gender • Last name (6 characters) • First name (first character)
3	• Provider number • Occurrence state and county • Infant's date of birth (year, month, day) • Infant's gender • Last name (6 characters) • First name (6 characters) Note: For the birth file, the mother's last name is used
4	• Provider number • Occurrence state and county • Infant's date of birth (year, month, day) • Infant's gender • Last name (4 characters) • First name (2 characters)
5	• Provider number • Occurrence state and county • Infant's date of birth (year, month) • Last name (4 characters) • First name (2 characters)
6	• Provider number • Occurrence state • Occurrence county • Infant's date of birth (year, month, day) • Infant's gender • Last name (6 characters)
7	• Occurrence state • Occurrence county • Infant's date of birth (year, month, day) • Infant's gender • Last name (6 characters) • First name (6 characters)
8	• Provider number • Occurrence state • Occurrence county • Infant's date of birth (year, month, day) • Infant's gender • First name (6 characters)

Appendix D

OUTLINE OF THE KOTELCHUCK ADEQUACY OF PRENATAL CARE UTILIZATION INDEX (10)

I. Month prenatal care began (Adequacy of Initiation of Prenatal Care)

Adequate Plus: 1st through 4th month

Adequate: 1st through 4th month

Intermediate: 1st through 4th month

Inadequate: 5th month or later or no prenatal care

II. Proportion of the number of visits recommended by the American College of Obstetricians and Gynecologists received from the time prenatal care began until the time of delivery (Adequacy of Received Services)

Adequate Plus: 110% or more

Adequate: 80-109%

Intermediate: 50-79%

Inadequate: less than 50%

III. Summary of Adequacy of Prenatal Care Utilization Index

Adequate Plus: prenatal care began by the end of the 4th month and 110% or more recommended visits received

Adequate: prenatal care began by the end of the 4th month and 80-109% or more recommended visits received

Intermediate: prenatal care began by the end of the 4th month and 50-79% or more recommended visits received

Inadequate: prenatal care began after the 4th month or less than 50% recommended visits received

Appendix E

Table I. Maternal demographic characteristics by Medicaid status

Characteristics	Medicaid (n=13,139)		Non-Medicaid (n=26,136)		All mothers (n=39,275)	
Age (years of age)	**Number**	**%**	**Number**	**%**	**Number**	**%**
Youngest through 17	682	5.2	313	1.2	995	2.5
18-19	1686	12.8	677	2.6	2363	6.0
20-29	8748	66.6	14,296	54.7	23,044	58.7
30-39	1906	14.5	10,245	39.2	12,151	30.9
40 through oldest	117	0.9	602	2.3	719	1.8
Race/ethnicity						
Non-Hispanic Black	918	7.1	555	2.13	1473	3.8
Non-Hispanic White	9960	76.4	23,427	90.1	33,387	85.5
Non-Hispanic Other	345	2.7	828	3.2	1173	3.0
Hispanic (all races)	1807	13.9	1204	4.6	3011	7.7
Immigrant status						
Born in the US	11401	86.8	24071	92.1	35472	90.3
Born in a Spanish-speaking country	1064	8.1	701	2.7	1765	4.5
Born in another country	674	5.1	1364	5.2	2038	5.2
Mothers education level						
Less than 12 years	3766	28.9	1980	7.7	5746	14.8
12 years	5281	40.6	5118	19.8	10,399	26.8
Greater than 12 years	3950	30.4	18777	72.6	22727	58.5
Marital status						
Married	4708	35.8	21,807	83.4	26,515	67.5
Not married	8428	64.2	4328	16.6	12,756	32.5

Appendix E (continued)

Table II. Maternal health behaviors and health and obstetrical history by Medicaid status

Variables	Medicaid (n=13,139)		Non-Medicaid (n=26,136)		All mothers (n=39,275)	
	Number	**%**	**Number**	**%**	**Number**	**%**
Maternal behaviors						
Smoking	3939	30.0	2431	9.3	6370	16.2
Alcohol use	145	1.1	128	0.5	273	0.7
Weight gain (pounds)						
Lowest through 24	4484	34.4	7373	28.4	11,857	30.4
25-35	4365	33.5	10,234	39.4	14,599	37.4
36 through highest	4201	32.2	8345	32.2	12,546	32.2
Health and obstetrical history						
Parity						
First-time mothers	5270	40.1	9651	36.9	14921	38.0
2-4 previous births	7179	54.7	15,509	59.4	22,688	57.8
> 5 previous births	688	5.2	962	3.7	1650	4.2
Any medical history	3534	26.9	6776	25.9	10310	26.3
Diabetes	566	4.3	1180	4.5	1746	4.5
Chronic HTN	97	0.7	286	1.1	383	0.9
Pregnancy associated HTN	692	5.3	1352	5.2	2044	5.2
Eclampsia	50	0.4	82	0.3	132	0.3
Previous PTB or LBW	370	2.8	535	2.1	905	2.3
Interpregnancy intervals						
< 12 months	1657	24.7	2581	17.9	4238	20.1
12 to 35 months	2664	39.8	6988	48.6	9652	45.8
≥ 36 months	2379	35.5	4823	33.5	7202	34.2
Obstetrical procedures						
Primary c-section	1946	14.9	4083	15.8	6029	15.5
Repeat c-section	1504	11.6	3070	11.9	4574	11.8
Vaginal birth	9573	73.5	18,685	72.3	28,258	72.7

Appendix E (continued)

Table III. Prenatal care access by Medicaid status

Variable	Medicaid (n=13,139)		Non-Medicaid (n=26,136)		All mothers (n=39,275)	
	Number	**%**	**Number**	**%**	**Number**	**%**
Prenatal care access						
PNC initiation						
1st trimester	10422	79.6	23839	91.6	34261	87.6
No prenatal care	84	0.6	89	0.3	173	0.4
PNC adequacy						
Adequate plus	4995	38.0	10,125	38.7	15,120	38.5
Adequate	5076	38.6	12,343	47.2	17,419	44.4
Intermediate	1367	10.4	2275	8.7	3642	9.3
Inadequate	1613	12.3	1223	4.7	2836	7.2

Appendix E (continued)

Table IV. Characteristics of women who received Medicaid reimbursable dental care prophylaxis during pregnancy

Characteristics	Received dental care (n=1017; 7.7%)		Did NOT receive dental care (n=12,122; 92.3%)	
Age (years of age)	**Number**	**%**	**Number**	**%**
Youngest through 17	54	5.3	628	5.2
18-19	121	11.9	1565	12.9
20-29	695	68.3	8053	66.4
30-39	138	13.6	1768	14.6
40 through oldest	9	0.9	108	0.9
Race/ethnicity				
Non-Hispanic Black	47	4.7	871	7.3
Non-Hispanic White	890	88.0	9070	75.5
Non-Hispanic Other	18	1.8	327	2.7
Hispanic (all races)	56	5.5	1751	14.6
Immigrant status				
Born in the US	975	95.9	10426	86.0
Born in a Spanish-speaking country	14	1.3	1050	8.7
Born in another country	28	2.8	646	5.3
Mothers education level				
Less than 12 years	180	17.8	3586	29.9
12 years	430	42.5	4851	40.5
Greater than 12 years	403	39.8	3547	29.6
Marital status				
Married	325	31.9	4383	36.2
Not married	692	68.0	7736	63.8

Appendix E (continued)

Table V. Birth outcomes by Medicaid status

Variable	Medicaid (n=13,139)		Non-Medicaid (n=26,136)		All mothers (n=39,275)	
	Number	**%**	**Number**	**%**	**Number**	**%**
Birth Weight						
Low birth weight	1139	8.7	1640	6.3	2779	7.1
Very low birth weight	226	1.7	266	1.0	492	1.3
Gestational age at birth						
Less than 37 weeks	1590	13.7	2614	11.1	4204	11.9

Appendix E (continued)

Table VI. Prevalence of low birth weight and preterm birth among Iowa Medicaid mothers by demographic characteristics

Variables	Low Birth weight (8.7%; n=1139)		Preterm Birth (13.7%; n=1590)	
	Number	%	Number	%
Maternal age				
Youngest through 17	80	11.6	90	15.4
18-19	168	9.9	210	14.3
20-29	701	8.0	1009	13.0
30-39	173	9.1	263	15.7
40 through oldest	17	14.5	18	19.2
Race/ethnicity				
Non-Hispanic black	868	8.7	137	17.4
Non-Hispanic white	111	12.1	1182	13.5
Non-Hispanic other	36	10.5	56	18.3
Hispanic (all races)	112	6.3	203	12.2
Immigrant status				
Born in the US	1026	7.8	1397	14.0
Born in a Spanish-speaking country	57	5.4	111	11.1
Born in another country	56	8.3	82	13.5
Maternal education level				
Less than 12 years	325	8.7	421	12.9
12 years	476	9.0	685	14.8
Greater than 12 years	305	7.7	441	12.5
Marital status				
Unmarried	776	9.2	1031	14.1
Married	363	7.3	559	13.4

Appendix E (continued)

Table VII. Prevalence of low birth weight and preterm birth among Iowa Medicaid mothers by health behaviors/health and obstetrical conditions

	Low Birth weight (8.7%; n=1139)		**Preterm Birth (13.7%; n=1590)**	
	Number	**%**	**Number**	**%**
Maternal behaviors				
Smoking	439	11.2	462	13.7
Alcohol use	21	14.5	21	17.1
Weight gain (pounds)				
Less than or equal to 24	575	12.9	692	17.6
25-35	316	7.3	476	12.2
Greater than/equal to 35	230	5.5	399	10.9
Health and obstetrical history				
Parity				
First-time mothers	511	9.7	637	13.6
2-4 previous births	555	7.6	845	13.4
> 5 previous births	73	10.7	108	18.6
Any medical history	189	13.9	590	19.1
Diabetes	47	8.3	86	17.6
Chronic HTN	25	25.8	25	28.7
Pregnancy associated HTN	150	21.8	161	26.1
Eclampsia	19	38.0	16	38.1
Previous PTB or LBW	117	31.8	114	36.1
Interpregnancy intervals				
< 12 months	183	11.1	297	18.0
12 to 35 months	179	6.7	321	12.1
$\geq$ 36 months	162	6.8	295	12.5

Table VIII. Prevalence of low birth weight and preterm birth among Iowa Medicaid mothers by prenatal care access

	Low Birth weight (8.7%; n=1139)		**Preterm Birth (13.7%; n=1590)**	
	Number	**%**	**Number**	**%**
Prenatal care access				
PNC initiation				
1st trimester	902	8.7	1253	13.5
No prenatal care	17	20.2	18	38.3
PNC adequacy				
Adequate plus	667	13.4	1074	28.7
Adequate	232	5.7	230	4.5
Intermediate	78	5.7	66	4.8
Inadequate	149	9.3	210	15.7

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