The Revised Standard Certificate of Live Birth: Analysis of Medical Risk Factor Data from Birth Certificates in Alabama, 1988–92

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Synopsis

The latest revision of the birth certificate features a new checkbox format designed to collect more effectively information for public health research. One of the new checkbox items, medical risk factors for this pregnancy, is designed to collect information on risk factors which result in adverse pregnancy outcomes.

Data from 308,573 birth certificates filed in Alabama between 1988 and 1992 were analyzed. Although problems exist with the data collected for this item, useful information can be obtained to investigate important public health issues. First, the data can be used to determine the prevalence of medical risk factors in the population. Second, differences between subpopulations with these conditions can be examined. For example, some differences between racial groups in adverse pregnancy outcomes may be explained by the fact that black mothers are more likely to have a medical risk factor than whites. Third, some medical factors are associated with elevated risks for low birth weight, while others are associated with reduced probability of low birth weight.

Although useful data can be obtained from the medical risk factor item, it and other checkbox items would be more useful if efforts were made to improve reporting. Improvements in training persons who complete the birth certificate are especially needed. Reporting of checkbox items also needs to be validated by comparing results with other sources. In future revisions of the birth certificate, new items need to be examined carefully to determine if that instrument is the appropriate medium for collecting the information.

EACH DECADE staff of the National Center for Health Statistics (NCHS) and representatives from the State vital statistics offices form committees to revise the standard certificates for vital events. These committees are designed to have representatives from both users and providers of data.

The latest revised standard certificate of live birth, the 11th revision, contains a number of new items not previously collected on the birth certificate. In addition, some items were changed from an open-ended format to a checkbox format, which should make it easier to report conditions (*1,2*). Most States adopted the new standard certificate in 1989, and national data are available beginning in 1989 (*3*). Alabama, however, revised its certificate in 1988. Five years of data, 1988–92, are now available from Alabama for analyzing information from the new and revised items.

The 1989 revision resulted in doubling the size of the birth certificate. Furthermore, the reporting burden for physicians and medical records clerks was greatly increased. In Alabama, many hospitals had ceased filling out the open-ended questions on the old certificate. The checkboxes made it easier to report conditions, but the change in the size of the certificate was imposing. Some hospitals balked at having to provide so much new information and complained that this interfered with providing services and increased their costs.

Problems with Medical Risk Factors

The medical risk factors for this pregnancy are among the checkbox items on the birth certificate. These checkboxes include anemia, cardiac disease, acute or chronic lung disease, diabetes, genital herpes, hydramnios or oligohydramnios, hemoglobinopathy, chronic hypertension, pregnancy associ-

Table 1. Number of birth certificates with selected medical risk factor, by race of mother, Alabama, 1988–92

Medical risk factor	Total	White	Black
Pregnancy associated hypertension	9,287	6,167	3,120
Anemia	7,326	3,665	3,661
Diabetes	5,409	3,777	1,632
Chronic hypertension	2,544	1,237	1,307
Previous preterm or small for gestational age infant	2,252	1,274	978
Hydramnios or oligohydramnios	1,999	1,137	862
Previous infant 4,000 or more grams	1,931	1,549	382
Uterine bleeding	1,740	1,217	523
Genital herpes	1,349	988	361
Eclampsia	1,265	679	586
Rh sensitization	1,206	1,042	164
Incompetent cervix	442	251	191
Cardiac disease	389	280	109
Renal disease	270	181	89
Acute or chronic lung disease	235	159	76
Hemoglobiopathy	92	12	80

ated hypertension, eclampsia, incompetent cervix, previous infant 4,000 or more grams (g), previous preterm or small for gestational age infant, renal disease, Rh sensitization, uterine bleeding, and other.

This item is designed to collect information on the presence of diverse risk factors which may result in adverse birth outcomes. Some listed risk factors are themselves outcomes of pregnancy such as pregnancy induced hypertension, uterine bleeding, anemia (which can also be a preexisting condition), eclampsia, incompetent cervix, and hydramnios or oligohydramnios. Some are existing conditions which become worse or present special dangers to the mother or fetus, such as diabetes, chronic hypertension, or genital herpes. Others may have existed before the pregnancy or may appear during the pregnancy such as cardiac disease or acute or chronic lung disease.

These conditions may present problems for analysis. Some conditions cause problems during pregnancy. In others, the pregnancy causes the medical condition. The causal sequence may be reversed so that one needs to be careful in collapsing categories. Factors vary in whether they are endogenous or exogenous to the pregnancy.

The birth certificate has some significant strengths and weaknesses as a source of data for research. First, a birth certificate is filed and available for research purposes for virtually every birth in the United States. It is the only source of data for every baby born in the United States. Data can be obtained easily and cheaply (*4*). In fact, the birth certificate is a legal document which is required for many legal and administrative purposes, such as obtaining a passport, driver's license, or social security card. Also, there should be little recall bias in the data because the certificate is completed soon after birth.

Birth certificates are frequently filled out, not by the physician attending the birth, the prenatal care provider, or the pediatrician who examines the baby, but by a medical records clerk who must try to locate the information on a medical record and transcribe it onto the birth certificate. Hospitals vary greatly in the care and attention given to completing birth certificates and the training of their medical records clerks. Sometimes it is difficult to obtain medical histories of mothers who have received no prenatal care or who have received prenatal care from a source other than the attending physician.

Physicians or others filling out the birth certificate may or may not be aware of the definition of the individual medical risk factors. When NCHS added the new items, no standard definitions were developed for the terms in the checkboxes nor are the definitions given on the birth certificate (*5*). The instruction manual merely says to check the appropriate box if there is one, "other" if there is one not listed, and "none" if there are none indicated on the medical record.

Subsequently, a committee from the Association for Vital Records and Health Statistics, with membership from NCHS, developed a set of "recommended standard medical definitions" for each of the items on the 1989 revision of the standard certificate (*6*). However, no physicians served on this committee. Also, in many States, no systematic effort has been made to distribute these definitions to physicians or medical records clerks; nor has training been provided in how to recognize and report these items. In Alabama, medical records clerks completing the birth certificates frequently have trouble trying to determine if a box should be checked since information on a mother's chart is not given in a way that makes it easy to determine whether it meets the "definition." In many cases, the clerk must use her judgement as to whether the condition is present.

A particular problem for the medical risk factor items has been the uncertainty about when a factor becomes a medical risk. For example, when does uterine bleeding become a medical risk? Many women have some spotting during pregnancy. Should this be counted as uterine bleeding or is it a risk factor only when there is sufficient bleeding to require medical attention? Some of these risk factors may not be known to the physician attending the birth. Will the physician know if the mother has had a preterm or small for gestational age baby or one that weighed more than 4,000 g?

Table 2. Rates per 1,000 live births and ratio of black to white for selected medical risk factors, by race of mother, Alabama, 1988–92

Medical risk factor	Total	White	Black	Ratio, black to white
Pregnancy associated hypertension	30.1	30.9	28.7	0.9
Anemia	23.7	18.3	33.7	1.8
Diabetes	17.5	18.9	15.0	0.8
Chronic hypertension	8.2	6.2	12.0	1.9
Previous preterm or small for gestational age infant	7.3	6.4	9.0	1.4
Hydramnios or oligohydramnios	6.5	5.7	7.9	1.4
Previous infant 4,000 or more grams	6.3	7.8	3.5	0.5
Uterine bleeding	5.6	6.1	4.8	0.8
Genital herpes	4.4	4.9	3.3	0.7
Eclampsia	4.1	3.4	5.4	1.6
Rh sensitization	3.9	5.2	1.5	0.3
Incompetent cervix	1.4	1.3	1.8	1.4
Cardiac disease	1.3	1.4	1.0	0.7
Renal disease	0.9	0.9	0.8	0.9
Acute or chronic lung disease	0.8	0.8	0.7	0.9
Hemoglobiopathy	0.3	[1]0.1	0.7	12.2

[1] Rate is based on a denominator with fewer than 20 cases.

The certificate makes the major assumption that the physician will use his or her best judgement, based on standard medical practice, as to what constitutes a medical risk. However, physicians received their training at different times and standard medical practices are subject to interpretation.

Presence of Medical Risk Factors

Despite the problems inherent in using birth certificate data, the item on medical risk factors provides useful information although there is evidence that there may be underreporting of certain checkboxes. This paper examines three uses of the new data. First, the presence of these medical risk factors in the population of women giving birth is examined. Second, racial differences in the prevalence of these risk factors are examined. Finally, the risks of bearing a low birth weight baby by women with and without these medical risk factors are compared.

During the period 1988–92, there were 311,707 births to Alabama residents. Of these, 3,134 (1 percent) had missing data for the question on medical risk factors for this pregnancy and were eliminated from the analysis. Thus, 308,573 records had a response to the question. The number of mothers who had the various medical risk factors varied greatly (table 1). Only 92 of the 308,573 certificates indicated hemoglobinopathy; 9,287 indicated pregnancy associated hypertension.

Many of the risk factors were relatively rare, so that there was some marked year-to-year fluctuation in the numbers. For research purposes, several years of data should be combined to yield reliable estimates for most States.

The most common medical risk factor was pregnancy associated hypertension, with 30.1 women per 1,000 live births experiencing this condition (table 2). Other common conditions were anemia, diabetes, chronic hypertension, previous preterm or small for gestational age infant, hydramnios or oligohydramnios, previous infant 4,000 or more g, and uterine bleeding. Relatively rare conditions were hemoglobinopathy, acute or chronic lung disease, and renal disease.

A study comparing data from the birth certificate to medical records in North Carolina, using a very small sample of records, found that anemia, diabetes, and hypertension were among the risk factors most frequently missed. These conditions are also the most commonly reported risk factors. Overall, the researchers found that birth certificate data were in exact agreement with medical records 58.5 percent of the time; as a result, they considered the reporting to be poor for medical risk factors for this pregnancy (*7*).

Racial differences in the presence of medical risk factors. Blacks and other races have significantly higher rates than whites for anemia, hemoglobinopathy, chronic hypertension, eclampsia, and previous preterm or small for gestational age infant (table 2). Whites have higher rates for diabetes, genital herpes, previous infant 4,000 or more g, and Rh sensitization. Black mothers are almost twice as likely to suffer from anemia during pregnancy as white mothers. White mothers are slightly more likely to have

Table 3. Percent of low birth weight infants associated with selected medical risk factors, by race of mother, Alabama, 1988–92

Medical risk factor	*Total*	*White*	*Black*
All births	8.4	6.2	12.3
Incompetent cervix	40.5	32.7	50.8
Previous preterm or small for gestational age infant	31.6	26.7	38.1
Eclampsia	29.4	24.4	35.2
Renal disease	24.7	21.7	29.8
Hydramnios or oligohydramnios	21.7	20.5	23.2
Uterine bleeding	19.3	16.7	25.3
Chronic hypertension	19.3	15.6	22.7
Pregnancy associated hypertension	18.5	15.3	24.8
Cardiac disease	11.9	9.3	18.5
Anemia	10.0	7.3	12.7
Acute or chronic lung disease	9.8	7.5	14.5
Hemoglobinopathy	8.7	[1]8.3	8.8
Rh sensitization	6.9	6.1	11.8
Diabetes	6.2	5.1	8.6
Genital herpes	5.3	4.3	8.0
Previous infant 4,000 or more grams	2.2	1.6	4.5

[1] Rate is based on a denominator with fewer than 20 cases.

Table 4. Ratio of low birth weight infants for selected medical risk factors to all births, by race of mother, Alabama, 1988–92

Medical risk factor	*Total*	*White*	*Black*
All births	1.0	1.0	1.0
Incompetent cervix	4.8	5.3	4.0
Previous preterm or small for gestational age infant	3.8	4.3	3.0
Eclampsia	3.5	3.9	2.8
Renal disease	3.0	3.5	2.3
Hydramnios or oligohydramnios	2.6	3.3	1.8
Uterine bleeding	2.3	2.7	2.0
Chronic hypertension	2.3	2.5	1.8
Pregnancy associated hypertension	2.2	2.5	1.9
Cardiac disease	1.4	1.5	1.4
Anemia	1.2	1.2	1.0
Acute or chronic lung disease	1.2	1.2	1.1
Hemoglobinopathy	1.0	[1]1.3	0.7
Rh sensitization	0.8	1.0	0.9
Diabetes	0.7	0.8	0.7
Genital herpes	0.6	0.7	0.6
Previous infant 4,000 or more grams	0.3	0.3	0.3

[1] Ratio is based on rates with fewer than 20 cases in the denominator.

pregnancy-related hypertension, but black mothers are almost twice as likely to experience chronic hypertension. Also, black mothers are 40 percent more likely to have had a previous preterm or small for gestational age infant. Black mothers are almost 60 percent more likely to have eclampsia and are more than 12 times more likely to have hemoglobinopathy, generally sickle cell disease, than white mothers.

In general, black mothers are slightly more likely to have a medical risk factor for this pregnancy and the more serious medical risk factors, such as anemia, chronic hypertension, eclampsia, incompetent cervix, and hemoglobinopathy, are more common among black mothers. This fact indicates that early and adequate prenatal care is especially important for black mothers.

Medical risk factors may be differentially reported by race. In Alabama, black and other race mothers are more likely to receive their care in health department clinics, while white mothers are more likely to see a private physician. Black mothers are more likely to have an attending physician who did not deliver all (or any) of the prenatal care. Black mothers are also more likely to receive no prenatal care or to receive prenatal care late.

Medical risk factors and low birth weight. An important adverse pregnancy outcome is the birth of a low birth weight infant (one that weighs less than 2,500 g). These infants are at greater risk of dying and experiencing poor health and developmental problems. The risk of low birth weight is greatest for infants of women who have an incompetent cervix or who have had a previous infant that was low birth weight or was small for its gestational age (table 3).

Other high rates of low birth weight are found for babies of women with eclampsia, hydramnios or oligohydramnios, renal disease, or uterine bleeding. These conditions may hinder the mother from carrying the baby to full term and be more likely to result in a premature birth.

Certain other medical risk factors, on the other hand, are associated with lower percentages of small babies, compared with all births. For mothers who have had a previous infant weighing 4,000 g or more, only 2.2 percent had a low birth weight baby during this pregnancy. Mothers with genital herpes, diabetes, and Rh sensitization also were less likely to bear a low birth weight baby than mothers without the specified risk factor. Although these may be related to adverse pregnancy outcomes such as prematurity or macrosomic births, they do not lead to higher proportions of low birth weight babies.

Between the races, black babies were almost twice as likely to be of low birth weight as white ones. However, white mothers with medical risk factors have a higher risk ratio compared with white mothers without the risk factor than is true for black mothers. For example, among white mothers, those with an incompetent cervix were 5.3 times as likely to have a low birth weight baby as those without the risk factor; for blacks, the ratio was 4.0 (table 4).

Nevertheless, black mothers with each risk factor had a higher percentage of low birth weight infants than white mothers with the risk factor.

There may be some reverse causation with regard to the presence of low birth weight and medical risk factors. If the baby is born preterm or of low birth weight, the physician may intensively scrutinize the case to find a bad condition to explain the poor birth outcome.

Conclusions

In conclusion, the information obtained from the item on medical risk factors for this pregnancy does provide useable data, if it is used cautiously. This paper has indicated three possible uses of the data: to determine the prevalence of these risk factors in the population of women giving birth, to examine differences among subpopulations of new mothers, and to investigate the association of these factors with the likelihood of a low birth weight baby. The fact that black mothers are at greater risk of many of the more serious risk factors can help explain why these mothers are at greater danger of experiencing an adverse pregnancy outcome such as bearing a low birth weight baby.

Much needs to be done to improve the reporting of these conditions. For example, physicians need to be convinced that the accurate indication of these conditions on the birth certificate is important in providing data for public health researchers and in improving the health of mothers and babies. In addition, medical records clerks need better training in identifying and transcribing data from medical records to birth certificates. The medical portion of the certificate needs to be filled out from data provided by both the attending physician and the pediatrician who examines the baby.

More studies are needed that compare data obtained from the birth certificate with alternative data sources such as medical records to determine the validity and reliability of the data. Also, further research needs to be done relating these items to other variables on the birth certificate. While the North Carolina study showed many individual cases of inconsistency between the birth certificate and medical risk factors, this study of 5 years of data has shown that the birth certificate data can be used to predict low birth weight in the aggregate.

Committees will soon be formed for the next revision of the U.S. standard certificates. The committees are directed to consider many things and should pay particular attention to several points. New items need to be examined carefully to determine if the birth certificate is the appropriate instrument for collecting the information. Any suggested item needs to be rigorously pretested before being adopted. The committee members also should consider the response burden on hospitals and the medical care community. Physicians and medical records clerks need to be trained in the definition of any item added to the birth certificate. Finally, existing items need to be reviewed to see whether they are yielding reliable information and whether the birth certificate is the appropriate medium to collect the data.

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