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COMPARABILITY OF THE BIRTH CERTIFICATE AND
1988 MATERNAL AND INFANT HEALTH STUDY

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Table of Contents

	<u>Page</u>
Introduction	1
Data source and limitations	1
Demographic measures	1
Race and Hispanic origin of mother and father	1
Nativity of mother	2
Age of mother and father	2
Education of mother and father	3
Marital status	3
Pregnancy history measures	3
Live birth order	3
Prior fetal deaths	4
Pregnancy measures	4
Timing of prenatal care initiation	4
Number of prenatal care visits	5
Gestational age	5
Discussion	6
References	6

List of text tables

- A. Number and rate of respondents and nonrespondents for the maternal questionnaire, by category of respondent and race of mother: National Maternal and Infant Health Survey, 1988
- B. Percent of responses from the mother's questionnaire in agreement with the birth certificate for race of parents, by race: United States, 1988
- C. Percent of responses from the mother's questionnaire in agreement with the birth certificate for Hispanic origin of parents, by Hispanic origin: United States, 1988
- D. Percent of responses from the mother's questionnaire in agreement with the birth certificate for nativity of mother, by race and nativity: United States, 1988
- E. Percent of responses from the mother's questionnaire in agreement with the birth certificate for age of parents, by race and age: United States, 1988
- F. Percent of responses from the mother's questionnaire in agreement with the birth certificate for education of parents, by race and education: United States, 1988
- G. Percent of responses from the mother's questionnaire in agreement with the birth certificate for marital status of parents, by race and marital status: United States, 1988
- H. Percent of responses from the mother's questionnaire in agreement with the birth certificate for live birth order, by race and live birth order: United States, 1988
- J. Percent of responses from the mother's questionnaire in agreement with the birth certificate for prior fetal deaths, by race and number of fetal deaths: United States, 1988
- K. Percent of responses from the mother's questionnaire in agreement with the birth certificate for plurality, by race and plurality: United States, 1988
- L. Percent of responses from the mother's questionnaire in agreement with the birth certificate for trimester of first prenatal care, by race and trimester: United States, 1988
- M. Percent of responses from the mother's questionnaire in agreement with the birth certificate for number of prenatal care visits, by race and number of visits: United States, 1988
- N. Percent of responses from the mother's questionnaire in agreement with the birth certificate for length of pregnancy, by race and gestational age: United States, 1988

Symbols

- Data not available
- .. Category not applicable
- Quantity zero
- 0.0 Quantity more than zero but less than 0.5
- Z Quantity more than zero but less than 500 where numbers are rounded to thousands
- * Figure does not meet standard of reliability or precision (estimate is based on fewer than 20 births in numerator or denominator)

FOREWORD

Although improving the coverage of birth and death registration remains the most important problem in many countries, they must nevertheless pay attention to the quality of the information reported. In this way the civil registration and vital statistics systems will be able to provide data users with reliable information which can be effectively used in a variety of ways, even before complete coverage of vital events is attained.

This paper reports on a study aimed at assessing the quality of data reported on birth certificates in the United States. Information from birth certificates is widely utilized in the United States, both for producing statistical tabulations and for research in areas concerning maternal and child health. The method used in this study to assess the quality of birth certificate data was to compare the information reported for a sample of births in a national natality survey with the information from the corresponding birth certificates. As the authors of this paper state, "it is important to note that there is no systematic method for determining whether response on the birth certificate or the maternal survey is the most accurate, should they differ". However, significant differences between the two data sources can help identify those data items for which accuracy of reporting needs to be improved.

This paper is a somewhat abbreviated version of the following report:

Schoendorf KC, Parker JD, Batkhan LZ, Kiely JL. Comparability of the birth certificate and the 1988 Maternal and Infant Health Survey. National Center for Health Statistics. VITAL HEALTH STAT 2 (116) 1993.

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Comparability of the birth certificate and 1988 Maternal and Infant Health Survey

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Introduction

Information from birth certificates is widely utilized in the United States. Among the major uses of birth certificate data are annual statistical tabulations and research in areas concerning maternal and child health. Since birth certificate data are so commonly used, it is important to examine the validity of the birth certificate information. One method of assessing the quality of birth certificate data is to compare the information on the birth certificate with an independent source of information from the same birth. This was done in 1985, when survey data from the 1980 National Natality Survey (NNS) was compared with corresponding birth certificate data for a sample of births that occurred in the United States (1). Although that comparison provided much useful information, its generalizability may be limited because the maternal survey portion of the NNS included only married mothers.

The 1988 National Maternal and Infant Health Survey (NMIHS) allows for the assessment of birth certificate data for a broader cross-section of the population than the NNS allowed. The purpose of this report is to compare responses from the National Maternal and Infant Health Survey with birth certificate information for items common to both sources of data.

NOTE: We are grateful to Mary Glenn Fowler, M.D., M.P.H., and Robert L. Heuser for their reviews of this report.

Data source and limitations

The 1988 NMIHS was conducted by the National Center for Health Statistics to examine factors concerning maternal health, pregnancy outcome, and infant health. The NMIHS collected information on independent samples of live births, fetal deaths, and infant deaths that occurred in the United States in 1988 (2). The analyses in this report focus only on information from the live birth sample.

Data for each infant in the NMIHS live birth sample were derived from four different sources: A questionnaire completed by the mother anywhere from 6-30 months after the birth of the child; the mother's prenatal care provider(s); the hospital where the infant was born; and the infant's birth certificate. This report compares information from the maternal questionnaire only with information from the birth certificate. Future reports will include data from the prenatal care provider and hospital portions of the NMIHS.

The live birth sample contains an over-representation of low-birth-weight infants (with a birth weight of less than 2,500 grams) to allow for detailed analysis of factors associated with prematurity and growth retardation.

Additionally, because black women in the United States have a high risk of adverse pregnancy outcome, the live birth cohort contains an oversampling of black infants. The NMIHS was made nationally representative by the calculation of a sample weight for each record that accounts for the survey's sampling scheme and for survey nonresponse. In this report, the sample weights were not utilized in the calculation of comparability rates to permit the reporting of the actual numbers upon which the comparisons were based. No substantial differences were found when comparability rates with the sample weights were compared with comparability rates calculated without the sample weights.

Of the 13,417 mothers that were contacted for the survey, 9,953 responded, yielding an overall response rate of 74 percent. This report is limited to the 4,956 black mothers and 4,695 white mothers that responded to the survey, because there were too few mothers of other races to allow for meaningful comparisons among those groups. Table A shows the total number of sampled live births for white and black mothers, along with response rates and reasons for nonresponse. Because pregnancy characteristics and outcomes differ by race, all comparisons, with the exception of Hispanic origin, are reported separately for black and white persons. For those comparisons, maternal race on the birth survey respondents, information for individual survey questions for birth certificate are based only on records that contain valid responses for both items. The number of missing observations for each item is provided in the detailed tables. Additionally, in 1988, data concerning Hispanic origin and parental education were not reported on birth certificates in all States. Comparisons for those items are based only on the records of respondents residing in States which collected that information on the birth certificate (see the individual tables for lists of the States). Birth certificate data were used as the denominators for the comparison rates in this report. Although this facilitates the examination of potential misclassification of information on birth certificates, it is important to note that there is no systematic method for determining whether the response on the birth certificate or the maternal survey is the most accurate, should they differ.

Demographic measures

Race and Hispanic origin of mother and father

Over 98 percent of mothers reported the same race on both the birth certificate and the mother's questionnaire (table B). The level of agreement was similar for black and for white mothers. For the father's race, the comparability between the birth certificate and the maternal questionnaire was also approximately 98 percent among both black and white fathers (table B). For the mother's race, the rate of item nonresponse was similar for black and white mothers. Approximately 2 percent of records were missing data on the mother's race from the birth certificate and/or the maternal survey. However,

Table A. Number and rate of respondents and nonrespondents for the maternal questionnaire, by category of respondent and race of mother: National Maternal and Infant Health Survey, 1988

Category of respondent	White		Black	
	Number	Rate ²	Number	Rate ²
Total number of births sampled	5,947		7,055	
Respondents	4,695	78.9	4,956	70.2
Nonrespondents:				
Unable to locate mother	544	9.1	1,119	15.9
Refused survey	250	4.2	254	3.6
Could not contact mother	124	2.1	320	4.5
Certificate excluded by State	200	3.4	195	2.8
Nonresident of the United States	43	0.7	31	0.4
Mother gave baby for adoption	22	0.4	32	0.5
Mother deceased	5	0.1	21	0.3
Mother claims no pregnancy	16	0.3	18	0.3
Other noninterview	48	0.8	109	1.5

¹As defined by the birth certificate.

²The number of records in each category divided by the total number of births samples multiple by 100.

approximately 43 percent of black mothers' records and 11 percent of white mothers' records were missing data on the father's race from at least one of the sources. Among the black mothers missing data on the father's race, 91 percent were missing data only from the birth certificate. Among these records, over 98 percent of the fathers were reported as black on the maternal questionnaire.

Data from the District of Columbia and the 30 States that collected parental Hispanic origin on the birth certificate in 1988 show that the agreement on Hispanic origin as reported on the birth certificate and on the maternal questionnaire was over 97 percent for both mothers and fathers (table C).

Nativity of mother

Overall agreement for maternal nativity was greater than 99 percent among both white and black women (table D). Nearly all of the mothers identified on their infant's birth certificate as being born in the United States also reported being native born on the maternal questionnaire. The rate of agreement was slightly lower among mothers identified as being foreign born, but the number of foreign born mothers was small.

Age of mother and father

While the mother's age at the birth of her infant is reported directly on the birth certificate, her age at delivery in the NMIHS was calculated using the mother's and the infant's date of birth. The overall agreement for mother's age, using grouped intervals, was approximately 97 percent among both black and white mothers (table E). When

considered by individual year, the agreement for mother's age dropped to 92.0 percent for black mothers and 93.2 percent for white mothers. Item nonresponse for mother's date of birth on the maternal questionnaire was low; 3.9 percent for black mothers and 2.5 percent for white mothers. There were no missing data for maternal age on the birth certificates because records with missing values for that variable are given an imputed age.

The NMIHS did not collect information regarding the father's age at the date of the birth of the infant. The NMIHS reports the father's age at the time the maternal survey was completed (6-30 months after delivery of the infant), while the birth certificate reports the father's age at the date of the birth of the infant. Consequently, the rate of agreement between the birth certificate and the maternal questionnaire by father's age group was relatively low, approximately 68 percent among black fathers and 72 percent among white fathers (table E). When considered by individual year, the agreement was lower; 8.1 percent and 6.0 percent for black fathers and white fathers, respectively. Subtracting one year from the father's age as reported on the NMIHS to estimate the effect of the reporting differences increased the rates of agreement between the two data sources. For the grouped ages, the agreement rate increased to 84.0 percent among black fathers and 89.4 percent among white fathers. Individual year comparability improved as well; 46.6 percent among black fathers and 54.3 percent

Table B Percent of responses from the mother's questionnaire in agreement with the birth certificate for race of parents, by race; United States, 1988

Race	Mother	Father
	Percent	
Total	98.4	98.2
White	98.3	98.4
Black	98.4	97.9

Table C Percent of responses from the mother's questionnaire in agreement with the birth certificate for Hispanic origin of parents, by Hispanic origin: United States, 1988

Hispanic origin	Mother	Father
	Percent	
Total	97.9	97.6
Hispanic	98.1	95.8
Non-Hispanic	97.9	97.9

NOTE: Hispanic origin was collected in the birth certificate in 1988 in the 30 following States and the District of Columbia: Alabama, Arizona, Arkansas, California, Colorado, Connecticut, Florida, Georgia, Hawaii, Illinois, Indiana, Kansas, Kentucky, Maine, Massachusetts, Mississippi, Montana, Nebraska, Nevada, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Tennessee, Texas, Utah, Washington, and Wyoming.

Table D Percent of responses from the mother's questionnaire in agreement with the birth certificate for nativity of mother, by race and nativity: United States, 1988

Nativity of mother	Percent	
	White	Black
Total	99.6	99.8
Native born	99.8	99.8
Foreign born	95.8	*

among white fathers. As was the situation with race, more data were missing for father's age than for mother's age. For black mothers 45.6 percent and for white mothers 10.9 percent were missing data on father's age on either the birth certificate and/or the maternal questionnaire.

Education of mother and father

In 1988, parental education was reported on the birth certificates of all States except for California, New York State (exclusive of New York City), Texas, and Washington. The overall agreement for mother's education was approximately 80 percent among black mothers and 86 percent among white mothers (table F). For both races, the highest comparability rates were among those mothers reporting at least 16 years of education. Agreement for father's education was somewhat lower than that for mother's education for both black and white fathers (table F). As was true for the mothers, the highest levels of agreement were among those fathers reporting at least 16 years of education.

Several explanations may account for discrepancies in education level between the birth certificate and the maternal questionnaire. First, some parents may have completed more school in the period between the birth of the infant and the time the questionnaire was administered. Second, the questionnaire considers a high school graduate as having completed 12 years of education, regardless of how long it took to obtain a high school diploma. The birth certificate simply reports the number of years of schooling. Finally, the questionnaire but not the birth certificate, distinguishes academic from vocational training. For example, of those women reporting 12 years of education on the questionnaire, but more than 12 years on the birth certificate, approximately

75 percent of white mothers and 62 percent of black mothers reported additional vocational training on the questionnaire.

Overall, 3.1 percent of black mothers and 2.1 percent of white mothers were missing data on maternal education. Father's education was missing for approximately 50 percent of the black mothers and 13 percent of the white mothers. As was the case for father's race and age, the majority of the missing data on father's education was missing from the birth certificate only.

Marital status

The overall agreement for marital status at the time of birth of the infant was approximately 94 percent among black mothers and 96 percent among white mothers (table G). Comparability between the birth certificate and the questionnaire was the highest among unmarried black mothers and married white mothers. Approximately 5 percent of black and white mothers were missing information on marital status at the time of birth.

For the majority of the United States, marital status is reported directly on the birth certificate. However, for eight States (California, Connecticut, Maryland, Michigan, New Hampshire, North Carolina, Ohio, and Texas) parental marital status is inferred by comparing the surnames of the mother, father, and, if necessary, the child. This method of determining marital status on the birth certificate may explain some of the discrepancy between the birth certificate and the maternal questionnaire, particularly among populations of women most likely to retain their maiden name after marriage.

Pregnancy history measures

Live birth order

On the birth certificate, live birth order is determined directly from an item specifying the total number of live births the mother had, including the current birth. The NMIHS maternal questionnaire asked for detailed descriptions of factors associated with all previous pregnancies, including live birth, stillbirths, miscarriages,

Table E Percent of responses from the mother's questionnaire in agreement with the birth certificate for age of parents, by race and age: United States, 1988

Age	Mother		Father	
	White	Black	White	Black
All ages	97.6	96.9	71.6	68.2
Under 18 years	93.8	96.5	*	*
18-19 years	96.2	94.7	*	*
20-24 years	97.7	97.7	62.0	66.6
25-29 years	97.6	97.4	69.6	69.1
30-34 years	98.5	96.7	76.5	73.6
35-39 years	97.4	96.1	77.5	69.2
40 years and over	100.0	94.9	98.8	94.1

NOTES: Agreement is for grouped data. Father's age reported on the birth certificate is his age at the time of the infant's birth, while father's age reported on the questionnaire is the age at the time of completion of the questionnaire.

Table F. Percent of responses from the mother's questionnaire in agreement with the birth certificate for education of parents, by race and education: United States, 1988

Completed years of education	Mother		Father	
	White	Black	White	Black
	Percent			
Total	85.9	79.5	84.3	75.4
11 years or less	83.5	80.0	82.7	71.7
12 years	85.7	77.8	83.8	77.9
13-15 years	82.6	79.8	75.0	68.5
16 years or more	92.7	86.2	92.7	79.5

NOTES: Data for California, New York State (exclusive of New York City), Texas, and Washington are excluded because the information was not collected on the birth certificate in these States in 1988. Agreement is for grouped data.

and induced abortions. Live birth order from the maternal questionnaire was calculated as the sum of the prior live births plus the current birth.

The overall agreement rate for the live birth order was approximately 82 percent among black mothers and 89 percent among white mothers (table H). The agreement was slightly less when birth orders higher than four were examined individually, not combined as in table H. For black or white mothers, the comparability was the highest when the current birth was reported as the first birth. The agreement between the maternal questionnaire and the birth certificate was lower with each subsequent birth. Information necessary to compare live birth order was missing for 4.2 percent of black mothers and 3.0 percent of white mothers.

The birth certificate was more likely to report a high live birth order than was the maternal questionnaire. Among black mothers, 29.6 percent of records reporting a live birth order of four or higher on the birth certificate reported fewer than four live births on the questionnaire. Conversely, of records with a live birth order of four or higher on the maternal questionnaire, 9.8 percent reported fewer than four live births on the birth certificate. The situation was similar among white mothers, where the respective percents were 23.2 percent and 5.6 percent.

Prior fetal deaths

The number of prior fetal deaths from the birth certificate was defined as the sum of reported pregnancy terminations (spontaneous and induced) occurring before and after 20 weeks of gestation. The number of prior fetal deaths reported on the NMIHS maternal questionnaire was calculated as the sum of all reported stillbirths, miscarriages, and induced abortions.

Approximately 78 percent of black mothers and 81 percent of white mothers had the same number of prior

Table G. Percent of responses from the mother's questionnaire in agreement with the birth certificate for marital status of parents, by race and marital status: United States, 1988

Marital status	White	Black
	Percent	
Total	95.9	93.9
Married	97.4	91.6
Unmarried	88.6	95.1

fetal deaths recorded on the maternal questionnaire and the birth certificate (table J). The agreement was the highest for women with no fetal deaths reported on the birth certificate and decreased with each additional fetal death. Approximately 4 percent of black mothers and 3 percent of white mothers were missing information needed to calculate the number of prior fetal deaths.

The distribution of the number of prior fetal deaths was similar whether data from the birth certificate or the maternal questionnaire was examined. However, on an individual record level, the agreement between the two sources was not high. Unlike the situation for live birth order, there was no consistent trend for either the birth certificate or the maternal questionnaire to report a higher amount of prior fetal deaths.

Pregnancy measures

Plurality

The agreement for plurality of the delivery was over 99 percent among both black mothers and white mothers (table K). Singleton births were more likely to be identified on both the maternal questionnaire and the birth certificate than were multiple births. Data on plurality was missing from the questionnaires of 5.5 percent of the black mothers and 4.4 percent of the white mothers. The birth certificates had no missing values for plurality.

Timing of prenatal care initiation

The timing of the first prenatal care visit as reported on the birth certificate is derived from an item specifying the month of pregnancy prenatal care began (for example, first, second, etc.). The maternal questionnaire asked the mother, "How many weeks pregnant were you when you

Table H. Percent of responses from the mother's questionnaire in agreement with the birth certificate for live birth order, by race and live birth order: United States, 1988

Live birth order	White	Black
	Percent	
All live births	88.8	82.4
1st live birth	97.8	95.9
2nd live birth	84.0	77.0
3rd live birth	80.6	73.0
4th or higher live birth	76.7	70.4

Table J. Percent of responses from the mother's questionnaire in agreement with the birth certificate for prior fetal deaths, by race and number of fetal deaths: United States, 1988

Fetal deaths	White	Black
	Percent	
Total	81.0	77.7
None	86.0	88.7
1 prior fetal death	69.9	50.8
2 prior fetal deaths	57.7	35.2
3 or more prior deaths	51.8	35.1

went for your first prenatal visit?"

The overall agreement for timing of the first prenatal care visit varied by maternal race; 67 percent for black mothers and 85 percent for white mothers (table L). Among mothers who are reported as having received first trimester prenatal care on the birth certificate, over 87 percent of the black mothers and 95 percent of the white mothers also reported first trimester care on the NMIHS questionnaire. However, fewer than 40 percent of the women reported as having initiated prenatal care later than the first trimester on the birth certificate also reported delayed initiation of care on the maternal questionnaire.

Opportunities for errors in reporting the timing of prenatal care initiation exist for both the birth certificate and the maternal questionnaire. The method of collection of data for the birth certificate varies depending on the site of delivery. Some centers collect information directly from the mothers, while others abstract it from medical records. There are opportunities for error in both methods, particularly if the mother switched prenatal care providers during pregnancy (3). Information regarding the timing of prenatal care collected on the NMIHS questionnaire may be inaccurate because of the time lag between prenatal care and the completion of the maternal questionnaire. Up to 3 years can separate those events

Number of prenatal care visits

The overall agreement rate for the number of prenatal care visits the mother received was lower than 50 percent among both black and white mothers, even after grouping of data (table M). The relatively poor comparability between the birth certificate and the questionnaire for this item may be partially due to the same factors that influence the reporting the timing of the initial prenatal care visit. An additional factor that may affect the reporting of the number of prenatal care visits is the variation in determining exactly what constitutes a prenatal care visit. The reporting of appointments for pregnancy tests, sonograms, and other prenatal tests as a prenatal care visit

Table K. Percent of responses from the mother's questionnaire in agreement with the birth certificate for plurality, by race and plurality: United States, 1988

Plurality	White	Black
	Percent	
Total	99.7	99.1
Singleton	99.8	99.5
Twin or higher	96.4	89.0

Table L. Percent of responses from the mother's questionnaire in agreement with the birth certificate for trimester of first prenatal care, by race and trimester: United States, 1988

Trimester first prenatal care	White	Black
	Percent	
Total	84.9	66.9
First trimester	95.4	87.2
Second trimester	39.7	33.2
Third trimester or no care	32.6	36.2

may vary depending upon where the test occurred and whether the mother or the facility supplied the information for the birth certificate.

Gestational age

Gestational age from the birth certificate is measured by subtracting the date of the mother's last menstrual period (LMP) from the date of the infant's birth. The duration of the pregnancy as reported on the maternal questionnaire came from a question that asked, "How many weeks did this pregnancy last?"

Overall, the agreement between gestational age, as reported in 4- to 5-week intervals, between the questionnaire and the birth certificate was 66 percent among black mothers and 79 percent among white mothers (table N). The agreement was substantially higher among births of 38-42 weeks gestation than among births of less than 38 weeks gestation. This finding may support evidence showing that the LMP measure of gestational age is at its most accurate when assessing full-term births (4).

Among both the black and the white populations, the proportion of infants reported in each gestational age category below 33 weeks was slightly higher on the maternal questionnaire than on the birth certificate. However, 20.2 percent of black infants were reported as having a gestational age of 33-37 weeks on the birth certificate, compared with 11.1 percent on the maternal questionnaire. Fifty-three percent of black infants were given a gestational age of 38-42 weeks on the birth certificate, compared with 65 percent on the maternal questionnaire. Fifty-two percent of black infants reported as being 33-37 weeks gestation on the birth certificate were reported as having a gestational age of 38-42 weeks on the maternal questionnaire. The discrepancy among white infants was less, but still high. Among white infants

Table M. Percent of responses from the mother's questionnaire in agreement with the birth certificate for number of prenatal care visits, by race and number of visits: United States, 1988

Number of prenatal care visits	White	Black
	Percent	
Total	46.5	39.6
No visits	51.7	50.4
1-6 visits	35.7	36.3
7-10 visits	32.9	34.6
11-16 visits	57.3	45.2
17 or more visits	44.0	34.2

NOTE: Agreement is for grouped data.

with a gestational age of 33-37 weeks on the birth certificate. 27.6 percent had a gestational age of 38-42 weeks on the maternal questionnaire. These variations in the reporting of gestational age may be important when examining prematurity as a pregnancy outcome. Unfortunately, deciding whether the birth certificate or the maternal questionnaire provides the most accurate estimate of gestational age is not possible from this information.

Discussion

The degree of comparability between data collected on the birth certificate and information reported on the 1988 National Maternal and Infant Health Survey maternal questionnaire was dependent on the item examined. In general, agreement rates were slightly higher among white mothers than among black mothers. Parental race and Hispanic origin, maternal nativity, maternal age, and plurality all had agreement rates of over 95 percent for both black and white mothers.

Responses to other items common to the birth certificate and the maternal questionnaire, such as number of fetal deaths, gestational age, and measures of prenatal care, were not highly comparable between the two data sources. While the overall distribution of most of the variables was similar for the birth certificate and the maternal questionnaire, the lack of comparability for those items may limit the utility of individual-level analyses using that information. Particularly, indices of prenatal care adequacy that are based on gestational age and number of prenatal care visits as reported on birth certificates may be of questionable validity, since the agreement in the reporting of either of those factors was relatively low.

Although the sampling and weighting scheme of the NMIHS was designed to produce a nationally representative sample of U.S. live births in 1988, these comparability results may not completely represent the population as a whole. Since the NMIHS included an oversampling of low-birth-weight births, the findings of this report may be different than if a random sample of births was chosen. Overall survey nonresponse and individual item nonresponse were not considered in this analysis and may also limit the generalizability of each comparison. However, as mentioned earlier in this report,

utilizing the weights that account for the survey sampling scheme and survey nonresponse did not affect the comparability rates. There is also potential for bias among the respondents of the maternal questionnaire. Mothers who received the questionnaire late or who delayed completing and returning the questionnaire may have had more difficulty recalling details of the index pregnancy, particularly time-dependent items such as timing of prenatal care, than did mothers who completed the questionnaire promptly. Additionally, the time lag could have made it possible for responses to the maternal questionnaire to be confused with a more recent pregnancy than the one referred to on the birth certificate.

The comparability rates between the birth certificate and the 1988 NMIHS maternal questionnaire are generally somewhat lower than those between the birth certificate and the 1980 National Natality Survey (1). The exception was the agreement for parental race, which was higher in this report. The comparability of other variables reported here, such as parental Hispanic origin, marital status, and number of prenatal care visits, was not measured in the NNS report. A possible explanation of the apparent decline in comparability is that the NMIHS was composed of a higher risk population than was the NNS. The information on either the birth certificate or the maternal questionnaire may be less likely to be accurately reported for the NMIHS population.

From those analyses, one cannot conclude whether the birth certificate information is accurate for any given item. However, a high rate of agreement between the birth certificate and the maternal questionnaire may support the validity of a particular data item, while a low rate of agreement may highlight a source for potential problems. This report should be helpful in determining which variables commonly used in the reporting of national natality data are likely to be accurately reported on the birth certificate.

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Table N Percent of responses from the mother's questionnaire in agreement with the birth certificate for length of pregnancy, by race and gestational age: United States, 1988

Gestational age	Percent	
	White	Black
Total	78.7	66.0
Less than 24 weeks	*	41.9
24-28 weeks	73.7	64.8
29-32 weeks	61.6	44.4
33-37 weeks	57.9	29.1
38-42 weeks	91.5	89.7
Greater than 42 weeks	*	*

NOTE: Agreement is for grouped data.