

METHODOLOGY FOR THE "1980 NATIONAL NATALITY SURVEY/NATIONAL DEATH INDEX MATCH" PROJECT

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SUMMARY: The 1980 National Natality Survey (NNS) is based on a sample of 9,941 Certificates of Live Birth, and four types of respondents associated with the sampled deliveries were mailed questionnaires to expand information about live births on social, demographic, maternal health, infant health, and radiation characteristics. This project involves a search of the 1980 and 1981 National Death Index (NDI)--a computerized file of persons who have died--using names, birthdates, and other matching criteria from the 9,941 live born infants in the 1980 NNS. This will produce a numerically modest (perhaps 250-300 infant deaths) but extremely comprehensive infant mortality data set. The various types of statistical reports planned using the National Natality Survey/National Death Index (NNS/NDI) infant mortality data set are described.

BACKGROUND: The 1980 NNS is a nationally-representative survey conducted by the National Center for Health Statistics (NCHS) and is based on a sample of 9,941 Certificates of Live Birth supplied by all 52 State and independent registration areas of the United States. Four types of respondents associated with the sampled deliveries (mothers, hospitals, attendants at delivery, and other medical providers of ionizing radiation to the mother in the year preceding her delivery) were mailed eight-page questionnaires to greatly expand information about live births on social, demographic, maternal health, infant health, and radiation characteristics. Low birthweight infants (less than 2,500 grams, or 5 pounds 8 ounces) were oversampled in order to do special studies on high-risk infants; consequently, there are 2,214 low birthweight infants in the 1980 NNS instead of the 676 which would have occurred without oversampling. A 1980 National Fetal Mortality Survey (NFMS) was done at the same time, using the same kinds of questionnaires and respondents, based on 6,386 Reports of Fetal Death.

The 1980 NNS has some incomplete data on infant death, but the questionnaires were mailed 3 - 9 months after the birth, so they do not cover the standard one-year reference period for infant mortality. Also, unmarried mothers were not queried. Furthermore, not all married mothers and hospitals which were mailed questionnaires responded, hospitals were asked only whether the infant was discharged dead soon after delivery, not about the infant's subsequent hospitalizations which might be followed by death. Finally, a few birth certificates had notations in the margins that the infant died shortly after birth, but this is not a routine State practice. Death certificates were sought for these possibly deceased infants, even if they were not identified by the NDI.

There is a serious paucity of recent, comprehensive, nationally-representative data on infant mortality. The last time that NCHS produced infant mortality data from a followback survey was in 1964-66, when the 1964-66 NNS was done in conjunction with the 1964-66 National Infant Mortality Survey (NIMS). (The high-quality U.S. infant mortality statistics produced by the Mortality Statistics Branch are limited to less than a dozen characteristics, such as cause, age, race, sex, State, SMSA, etc.) Several hundred data characteristics in the 1980 NNS can be used to produce infant mortality rates in the NNS/NDI match study.

A project like the "National Natality Survey/National Death Index Match" became feasible only recently. It was not possible to conduct a match study of this type using the 1963, 1964-66, 1967-69, or 1972 NNS's because the NDI did not exist until 1979. Furthermore, NNS's before 1980 had much smaller sample sizes and had no oversampling of low birthweight infants. This research effort thus represents a unique opportunity.

Seven Public Health Service agencies participated in designing and funding the 1980 NNS/NFMS. Their data interests were "melded in" to survey content and design. The Health Resources and Services Administration (HRSA) contributed several hundred thousand dollars to NCHS through the NCHS Reimbursable Work Program specifically to fund the oversampling of low birthweight infants in the 1980 NNS. The NNS/NDI project builds further on that data interest, and HRSA's FY 1984 and FY 1985 financial support for NNS/NDI data collection and analysis is gratefully acknowledged.

SAMPLE SIZES: It is projected that we will ultimately confirm that nearly 300 infants in the 1980 NNS died in their first year of life by means of our search of the 1980 and 1981 National Death Index or by means of identifying deceased infants as reported by respondents on NNS questionnaires. Infant mortality rates by birthweight are not available for the United States in any recent year. Therefore, rough estimates of the expected number of infant deaths to be found were derived from infant weight-specific mortality rates for the United States in 1960 (1), and adjusted downward by 50% to estimate the 1980 U.S. infant weight-specific mortality rate to be applied to the birthweight distribution in the 1980 NNS (See Table 1). There is some evidence that a proportionately larger reduction in low birthweight infant mortality has occurred due to the saving of lives among the low and very low birth weight infants (2, 3, 4,). To the extent this occurred between 1960 and 1980, our numerical estimate of 271 projected infant deaths may be less accurate. However, using 1960 birthweight specific rates cut in half

seemed reasonable given our comparisons made with the various birthweight specific infant mortality rates available from various State infant mortality studies (5, 6, 7).

USING THE NATIONAL DEATH INDEX: The NDI is a national computerized index of death record information compiled from magnetic tapes submitted to the NCHS by all State vital statistics offices (8). These tapes (containing deaths from 1979 on) have a standard set of identifying information on each decedent for use in searches of the NDI file to identify and locate death records maintained in State vital statistics offices. There are seven optional matching criteria; the criterion used in this project required a match of the NNS birth record and NDI death record on month and year of birth and first and last name of decedent (either an "exact spelling" or "soundex" match). Other criteria used to assess the quality of the match are father's surname, sex, marital status, race, state of residence, and State of birth. An evaluation of the matching effectiveness of the NDI concluded that more true matches occur if Social Security# is a matching criterion (9), but infants do not usually have these numbers. Since the "1980 NNS/NDI MATCH" project is the first infant mortality study using the NDI, there is much to be learned.

INFANT DEATHS: Based on information from NNS/NDI possible and probable matches, from notations on NNS birth certificates, from responses of married mothers on the pregnancy outcome section of their questionnaire, and from hospital questionnaire information regarding the discharge status of the infant, it was decided to procure copies of 645 death certificates from the appropriate States to further assess the quality of each match and confirm infant death. This assessment involves physical inspection and comparison of the 645 infant death certificates with NNS birth certificates. Preliminary investigation suggests that 295 confirmed matches will ultimately be made. Most of the 295 probable deaths came from the 1980 and 1981 NDI searches, but some were located only from certificate and questionnaire information. Part of the false negatives problem (NNS information indicated deceased infant, but NDI records were not found) may have been due to unnamed infants. Of 9,941 NNS infants, 133 had no first names shown on their birth certificates. As per NDI instructions, NNS names were submitted as "Baby Boy" (with last name) or "Baby Girl" (with last name). Unfortunately, some States did not follow that convention, but instead submitted NDI records with first names such as "Male Infant", "Twin Girl", "Boy Baby", and "Unknown", etc.--which therefore produced no exact or soundex match on the first name, even though last name and date of birth matched. This finding was revealed in our inspection of those death certificates which were obtained because the mother, hospital, or birth certificate gave us reason to believe the infant may have

died. This problem is being resolved by NCHS so that the "Baby Boy"/"Baby Girl" names in the NDI central file will match with "Baby Boy"/"Baby Girl" names submitted by users in the future. Physical inspection of birth and death certificates is still being done and statistical information such as cause of death for the 295 probable matches is being coded. After the 295 deaths are appropriately weighted up by means of the NNS post-stratified ratio estimation procedure, the NNS/NDI estimate of infant deaths should approximate the following counts of infant deaths in the U.S. in 1980: total, 45,526; white male, 18,290; white female, 13,590; all other male, 7,514; and all other female, 6,132. Exact numerical correspondence is not likely since the count of infant deaths in 1980 is based on infants born alive in 1979 or 1980, whereas NNS/NDI infant deaths occurred in 1980 or 1981 based on infants born alive in 1980. Still, the robustness of various NNS/NDI infant mortality estimates can be evaluated by comparing them with the extent to which NNS/NDI estimates deviate from final infant mortality counts.

REPORTS: Six types of statistical reports are planned, given the limited number of infant deaths from 9,941 live births:

- 1) Univariate infant mortality rates according to numerous data items in the 1980 National Natality Survey, including birthweight, length of infant at delivery, Apgar score, respiratory distress syndrome, infant jaundice, malformations and congenital anomalies, maternal smoking and drinking behavior, parental socioeconomic status, maternal complications of pregnancy and labor, maternal and fetal exposure to ionizing radiation during pregnancy, etc. These rates will be presented at the November 11-15, 1984 American Public Health Association Meetings (10). Over two dozen NNS/NFMS detailed reports on the above topics have been published and are now readily available (11).
- 2) Matched-sample epidemiologic studies using deceased infants and the surviving infants from the 1980 NNS.
- 3) Sophisticated multivariate analyses.
- 4) Perinatal mortality studies, since the deceased infants can be combined with the 6,386 NFMS infants in various kinds of studies.
- 5) Evaluation studies on the NDI, similar to those reported on elsewhere (9). This is possible because hospitals and mothers were mailed questionnaires in the 1980 NNS which asked whether the infant was discharged dead from the hospital or still alive. Thus, we can compare whether these infants reported as dead on NNS questionnaires are dead according to the National Death Index.
- 6) Trend studies comparing 1980 NNS/NDI infant mortality rates with 1964-66 NNS/NIMS infant mortality rates. Rates by numerous characteristics were produced because a 1964-66 National Infant Mortality Survey (NIMS) was done in conjunction with a 1964-

66 National Natality Survey (NNS)(12, 13, 14).

CONCLUDING REMARKS: The utility of this match study to researchers and data consumers may yield valuable information about the general feasibility of planning a future infant mortality survey, perhaps in conjunction with the 1988 National Natality Followback Survey.

The rates produced can be compared with data which may be produced by the Division of Vital Statistics if a National birth-infant death linked record system is developed. These rates can also be compared with special studies of infant mortality done by States (15,16,17).

The infant mortality rates produced may be suggestive more than conclusive due to the limited sample size and limitations of the study design. Yet, given that recent infant mortality rates by more than a few characteristics are not available for the United States, the estimates produced should stimulate scientific discussion and generate more robust research.

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Table 1. Infant Weight Specific Mortality Rates^a: United States
1960, Estimated United States 1980, and Estimated 1980 National
Nativity Survey Infant Deaths

	Linked record study, U.S., 1960	Rough estimate for U.S., 1980	1980 NNS Sample N's	Projected 1980 NNS/NDI MATCH Infant Deaths
1,500 grams or less (3.29 lbs. or less)	734.0 ^b	367.0	383	140
1,501-2,000 grams (3.30-4.39 lbs)	206.6	103.3	460	48
2,001-2,500 grams (4.40-5.50 lbs.)	58.4	29.2	1,371	40
2,500 grams or more (5.50 lbs or more)	11.2	5.6	7,727	43
Total	25.1	12.5	9,941	271

^aInfant deaths per 1,000 live births

^bAverage of 919.3 for 1,000 grams and 548.5 for 1,001-1,500 grams.

^cSee Reference (1) for source of data.