The Relationships of Maternal Health, Infant Health, and Sociodemographic Factors to Fertility

An analysis of data from the 1973 National Survey of Family Growth and the 1972 National Natality Survey

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EXAMINATION OF THE RELATIONSHIPS of maternal and infant health factors to fertility by means of cross-sectional data is complicated since some women have just begun their childbearing activity while others have just completed it. It is therefore important to analyze the two components of expected completed fertility—children ever born and additional births expected. Although the number of children ever born is an historical fact, the expectation of additional births is an attitude and may not precisely predict fertility in the future. The Princeton studies (1,2) showed that individual women's predictions for their future fertility were not highly accurate when compared with subsequent fertility, and Blake (3) has also questioned the credibility of expectations data. However, individual expectations data are the best available predictors of future fertility in the absence of longitudinal data.

Although social and demographic factors have been consistently shown to be related to fertility, it is not clear from the empirical or theoretical literature how maternal and infant health factors are related to fertility. Maternal health factors have been reported to be related to infant health factors as a result of both biological and sociodemographic factors (4-7). Higher birth order and infant mortality have been found to be positively related, which suggests some influence of fertility on health (8-10).

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However, little is known about the extent to which a woman's health and the health of her last child are related to her fertility, including her anticipated future fertility.

Numerous hypotheses relating health and fertility are possible. It could be hypothesized that good maternal and infant health should show a positive relationship to childbearing, because the healthy mother would have been better able to bear children in the past and would be more optimistic in anticipating additional births. Conversely, poor maternal or infant health may have interfered with past childbearing and may discourage a woman from expecting additional children. On the other hand, poor infant health or even infant mortality may increase some parents' birth expectations as a compensatory mechanism to insure that a minimum number of healthy children survive to adulthood (11,12). Some family planning proponents argue that there is an association between fewer births and good maternal and infant health. Their assumption is that good maternal and infant health will result from bearing fewer children and that excessive childbearing will result in poor infant and maternal health (13-14).

If fertility is related to a woman's health and the health of her last child, is this because of interrelationships between health and sociodemographic characteristics, or are health and fertility independently related? Some of the sociodemographic factors previously reported to be related to fertility are age, race, family income, education, age at first marriage, and age at first birth (15-18).

This analysis explores the relationships between maternal and infant health factors and fertility and controls for sociodemographic characteristics of the parents. Data are presented in a parallel analysis from two national fertility surveys—the 1973 National Survey of Family Growth and the 1972 National Natality Survey.

Data and Methods

The 1973 National Survey of Family Growth (NSFG) is the first cycle of a periodic series of surveys conducted to collect information on trends and differentials in fertility, family planning practices, and maternal and child health. The National Opinion Research Center, under a contract from the National Center for Health Statistics, collected data from 9,800 U.S. women under 45 years old and ever married or with their own children in their households, living within dwelling units of the coterminous United States. The data presented here are restricted to currently married women 15 to 44 years old who have given birth to at least one child. Data were collected between July 1973 and February 1974. All figures represent weighted national estimates of U.S. women as of September 1973.

The 1972 National Natality Survey (NNS) was designed by the National Center for Health Statistics to evaluate the accuracy and completeness of selected items on the live birth certificate and to extend the scope of the data that are available through the vital registration system. One out of 500 birth certificate records for 1972 was sampled from all 54 U.S. birth registration areas. Births reported or inferred to be illegitimate (816 out of 6,505 births originally sampled) were excluded from the survey, and then the mothers, physicians who attended the deliveries, and hospitals where the babies were delivered were mailed questionnaires to obtain additional social, demographic, and medical information. Nonhospital births are eliminated from this analysis because the hospital was the primary source of medical information. The remaining 5,647 certificates comprising the study sample are weighted to represent 2,818,000 legitimate live hospital births in 1972. NNS data on the age and race of the mother and the birth weight of the baby are obtained from the birth certificate. Data on medical conditions, prenatal visits, infant discharge status, and neonatal mortality come from questionnaires mailed to the physician who attended the delivery and the hospital where the birth occurred. The remaining data come from the questionnaire mailed to the mother.

Additional details of the sampling design and standard errors for the two surveys are available in other publications (19,20). Differences discussed in this paper are statistically significant at the 0.05 level with two-tailed normal deviate tests.

The NSFG has a more complete set of questions on retrospective pregnancy history and a more detailed set of questions on future expectations than the NNS. However, the NSFG may not have as technically accurate reporting of medical information as the NNS because NSFG information is based on the mother's responses rather than on hospital or physician records. The time frames of the surveys differ slightly, but it is assumed that the relationships among the variables within each survey did not change significantly in the year between the midpoints of the two surveys, even though the surveys were conducted during a period of declining fertility (21,22). (The median month of interview for the NSFG was September 1973, the median month of birth for the NNS was July 1972, and the questionnaires were filled out several months after each birth).

There are several rationales for using both surveys in this analysis. First, the establishment of the same relationship in more than one sample lends greater credibility to the assertion that this relationship exists in the population as a whole (23). Second, if the same relationships are found in both surveys, it can be argued that there is some justification for using the strengths of the two surveys to complement each other. The details of one survey might be used to amplify something examined in less detail in the other survey. For example, medical information from NNS physician and hospital sources might be used indirectly to amplify respondent-reported information in the NSFG, or the detailed information elicited by a skilled interviewer might supplement more limited information obtained from a brief mailed questionnaire. Third, similarities or differences between the surveys will provide information about the validity of measures used and the effect of asking different questions of different populations. This information may suggest greater standardization of the data gathered on these two fertility surveys.

Since the surveys were not originally designed for a joint analysis, measurements of the analyzed variables differ. NNS expectations of additional births were obtained from responses to the following two questions on the mothers' questionnaire: "Do you expect to have more children?" (If definitely or probably yes. . .) "How many more children do you think you will probably have?" Mothers who received postpartum sterilization operations at the hospital were assigned an expected number of zero additional births. Respondents in the NSFG who were still able to bear children were first asked: "Do you and your husband intend to have another baby?" (If yes, then. . .) "How many more do you intend to have?" Women intending no more or who gave a number of intended future births were assigned zero or the given number as their expected number. A respond-

ent initially unsure of her intentions was asked her maximum and minimum expectations, and the average value was used for the expected number in this analysis. Women unable to bear additional children because of their or their husbands' sterility were assigned an expected number of zero additional births. Women currently pregnant at the time of the survey, by definition, had an expectation of at least one additional birth.

Findings

Table 1 shows that the 21,816,000 currently married mothers represented by the NSFG had borne an average of 2,662 children per 1,000 women by 1973. They expected 356 additional births per 1,000 and a total of 3,019 births per 1,000 women by the time they finished their childbearing.

There were 2,818,000 legitimate live hospital births in the United States in 1972 to mothers represented by the NNS. Including the 1972 births, 2,245 children were ever born per 1,000 NNS mothers. These mothers expected 788 additional births, and 3,033 total births were expected per 1,000 mothers by the time they finished childbearing. Although total births expected are shown in the tables, our subsequent analysis focuses only on children ever born and additional births expected.

In the NSFG, 47.2 percent of the mothers reported ever having had diabetes or pregnancy complications requiring hospitalization, or anemia or high blood pressure when not pregnant. Medical conditions—diabetes, varicosity, congenital heart disease, thyroid, obesity, anemia, cardiovascular renal disease, asthma or chronic pulmonary, or orthopedic problems—

Table 1. Number of children ever born, additional births expected, and total births expected per 1,000 mothers [1] of childbearing age, by maternal health characteristics, 1973 National Survey of Family Growth (NSFG) and 1972 National Natality Survey (NNS)

Maternal health characteristics	National Survey of Family Growth					National Natality Survey				
	Number of mothers (thousands)	Percent of mothers	Children ever born	Additional births expected	Total births expected	Number of mothers (thousands)	Percent of mothers	Children ever born	Additional births expected	Total births expected
All mothers	21,816	100.0	2,662	356	3,019	2,818	100.0	2,245	788	3,033
Medical conditions:										
1 or more	10,288	47.2	2,851	291	3,142	391	13.9	2,455	674	3,129
None	11,528	52.8	2,492	415	2,907	2,427	86.1	2,211	807	3,017
Number of fetal losses:										
None	16,024	74.3	2,551	377	2,927	2,434	86.3	2,132	826	2,957
1	3,911	17.9	2,837	306	3,143	266	9.4	2,806	596	3,402
2	1,054	4.8	3,297	327	3,623	88	3.1	3,149	385	3,534
3	647	3.0	3,334	[2] 203	3,537	31	1.1	3,737	633	4,370
Source of prenatal care:										
Private physician	18,052	82.7	2,639	327	2,966	. . . .	. . . .	. . . .	. . . .	. . . .
Hospital outpatient clinic	2,249	10.3	2,856	506	3,363	. . . .	. . . .	. . . .	. . . .	. . . .
Other	1,423	6.5	2,632	494	3,126	. . . .	. . . .	. . . .	. . . .	. . . .
None	93	0.4	2,849	[2] 391	3,240	. . . .	. . . .	. . . .	. . . .	. . . .
Prenatal visits:										
None	. . . .	. . . .	. . . .	. . . .	. . . .	195	6.9	2,213	772	2,986
1–4	. . . .	. . . .	. . . .	. . . .	. . . .	203	7.2	2,412	808	3,219
5–9	. . . .	. . . .	. . . .	. . . .	. . . .	809	28.7	2,343	785	3,128
10–14	. . . .	. . . .	. . . .	. . . .	. . . .	1,306	46.4	2,191	784	2,974
15–19	. . . .	. . . .	. . . .	. . . .	. . . .	285	10.1	2,112	818	2,930
20 or more	. . . .	. . . .	. . . .	. . . .	. . . .	18	0.7	2,286	754	3,040

[1] In the NSFG, mothers who were 15–44 years old and married at the time of the interview; in the NNS, mothers of legitimate infants born live in hospitals.

[2] Relative standard error greater than 25 percent; figure does not meet standards of reliability or precision.

NOTES: In the NSFG, medical conditions were diabetes, pregnancy complications requiring hospitalization or, when not pregnant, anemia or high blood pressure. In the NNS, medical conditions were diabetes, varicosity, congenital heart disease, thyroid, obesity, anemia, cardiovascular renal disease, asthma, other chronic pulmonary, orthopedic, and other medical conditions existing before pregnancy. The source of information for medical conditions and prenatal visits in the NNS was the hospital or physician, and the source of other information was the mother. Leaders (. . . .) indicate that the data were not available.

were reported by hospitals for 13.9 percent of the mothers in the NNS. Both surveys show that mothers with one or more conditions have had more children ever born and expect fewer additional births than mothers with no medical conditions.

The greater the number of fetal losses a mother has had, the greater the number of children she has ever borne. The NNS shows a curvilinear relationship between fetal losses and additional births expected; mothers having no losses or three or more losses expected more additional births than mothers with one or two losses. No relationship was seen between fetal loss and additional births expected among women in the NSFG.

Health care by private physicians is associated with fewer children ever born and with fewer additional births expected. NSFG mothers who went to a private physician for prenatal care before the last birth had 2,639 births per 1,000, or 217 fewer births per 1,000 than mothers who received care from hospital outpatient clinics. Mothers who went to a private physician expected to have 327 additional births per 1,000 and mothers attending hospital outpatient clinics

expected 506—a difference of 179 births expected. The number of prenatal visits in the NNS had no consistent relationship with fertility.

The health of the last child born was hypothesized to have a relationship to fertility, and birth weight of a child is an often-used indicator of infant health. Table 2 shows that having an infant of either low birth weight (2,500 grams or less) or high birth weight (4,001 grams or more) is associated with more children ever born in both surveys, and high birth weight is associated with fewer additional births expected in the NNS.

About 93 percent of the infants leave the hospital before or with the mother; only 7 percent of the infants are discharged after the mother or discharged dead. This indicator of child health is not related to either past or future fertility of the mother. However, the number of children ever born is significantly higher for NSFG mothers whose last birth did not occur in a hospital.

Table 2 does not show any statistically significant relationship between a child's surviving the neonatal period and the fertility of the mother, but this find-

Table 2. Number of children ever born, additional births expected, and total births expected per 1,000 mothers [1] of childbearing age, by health characteristics of last infant, 1973 National Survey of Family Growth (NSFG) and 1972 National Natality Survey (NNS)

Health characteristics of last infant	National Survey of Family Growth					National Natality Survey				
	Number of mothers (thousands)	Percent of mothers	Children ever born	Additional births expected	Total births expected	Number of mothers (thousands)	Percent of mothers	Children ever born	Additional births expected	Total births expected
All mothers	21,816	100.0	2,662	356	3,018	2,818	100.0	2,245	788	3,033
Birth weight (grams):										
2,500 or less	1,706	7.8	2,870	365	3,234	197	7.0	2,337	811	3,148
2,501–3,000	4,341	19.9	2,607	354	2,961	493	17.5	2,152	811	2,963
3,001–3,500	7,820	35.8	2,549	375	2,924	1,093	38.8	2,194	803	2,997
3,501–4,000	5,720	26.2	2,666	356	3,021	742	26.3	2,270	791	3,061
4,001 or more	2,230	10.2	2,997	290	3,287	294	10.4	2,464	672	3,136
Infant discharge status:										
Before or with mother ...	20,122	92.2	2,644	351	2,995	2,622	93.0	2,246	784	3,030
After mother, to another institution, or died	1,534	7.0	2,833	411	3,245	196	7.0	2,283	843	3,066
Not born in hospital	160	0.7	3,418	[2] 546	3,964	...	...	...	...	...
Neonatal mortality: [3]										
Survived	21,589	99.0	2,660	357	3,014	2,793	99.1	2,244	785	3,029
Died	227	1.0	2,946	624	3,570	25	0.9	2,312	1,173	3,485

[1] In the NSFG, mothers who were 15–44 years old and married at the time of the interview; in the NNS, mothers of legitimate infants born live in hospitals.
[2] Relative standard error greater than 25 percent; figure does not meet standards of reliability or precision.
[3] Infant death within same or following month as birth for NSFG

and within 28 days of birth for NNS.
NOTE: The source of information in the NNS for birth weight was the birth certificate; for discharge status and neonatal mortality, the hospital or physician; and for children born or expected, the mother. Leaders (....) indicate that the data were not available.

Table 3. Number of children ever born, additional births expected, and total births expected per 1,000 mothers [1] of childbearing age, by selected sociodemographic characteristics, 1973 National Survey of Family Growth (NSFG) and 1972 National Natality Survey (NNS)

Sociodemographic characteristics	National Survey of Family Growth					National Natality Survey				
	Number of mothers (thousands)	Percent of mothers	Children ever born	Additional births expected	Total births expected	Number of mothers (thousands)	Percent of mothers	Children ever born	Additional births expected	Total births expected
All mothers	21,816	100.0	2,662	356	3,019	2,818	100.0	2,245	788	3,033
Number of children ever born:										
1	5,086	23.3	—	918	1,918	1,030	36.5	—	1,342	2,342
2	7,107	32.6	—	304	2,304	944	33.5	—	640	2,640
3	4,740	21.7	—	121	3,121	431	15.3	—	309	3,309
4	2,352	10.8	—	85	4,085	200	7.1	—	304	4,304
5 or more	2,531	11.6	—	69	6,056	212	7.5	—	193	6,367
Age groups (years): [2]										
Under 20	429	2.0	1,149	1228	2,377	415	14.7	1,656	1,120	2,776
20–24	2,949	13.5	1,546	930	2,476	1,031	36.6	1,854	965	2,818
25–29	4,808	22.0	2,082	575	2,656	850	30.2	2,309	672	2,980
30–34	4,834	22.2	2,796	243	3,038	356	12.6	3,012	427	3,439
35–39	4,380	20.1	3,229	99	3,328	129	4.6	4,021	274	4,295
40–44	4,417	20.2	3,479	31	3,509	37	1.3	4,691	*90	4,781
Race:										
Black	1,822	8.4	3,098	477	3,575	278	9.9	2,557	799	3,356
White	19,764	90.6	2,623	343	2,967	2,490	88.4	2,206	784	2,991
Other	231	1.1	2,517	548	3,065	50	1.8	2,414	920	3,334
Number of times married:										
Once	18,796	86.2	2,604	368	2,972	2,583	91.7	2,166	819	2,985
More than once	3,021	13.8	3,029	285	3,314	235	8.3	3,109	447	3,556
Age at first marriage:										
Under 18	4,887	22.4	3,056	311	3,366	280	9.9	2,474	788	3,252
18–19	7,098	32.5	2,683	348	3,032	772	27.4	2,277	771	3,048
20–21	5,026	23.0	2,527	364	2,890	800	28.4	2,252	797	3,048
22–24	3,369	15.4	2,428	399	2,827	676	24.0	2,096	867	2,962
25–29	1,225	5.6	2,228	427	2,655	240	8.5	2,159	663	2,821
30 or more	211	1.0	2,326	422	2,748	51	1.8	2,767	516	3,283
Age at first birth:										
Under 18	2,642	12.1	3,423	332	3,755	293	10.4	2,633	760	3,393
18–19	5,134	23.5	2,890	345	3,235	542	19.2	2,346	780	3,126
20–21	5,261	24.1	2,699	345	3,044	600	21.3	2,284	822	3,106
22–24	5,179	23.7	2,442	351	2,792	721	25.6	2,026	878	2,904
25–29	3,026	13.9	2,110	417	2,527	522	18.5	2,112	742	2,854
30 or more	574	2.6	1,685	411	2,096	139	4.9	2,498	439	2,937
Family income:										
Less than $4,000	976	4.5	2,802	577	3,379	296	10.5	2,129	969	3,098
$ 4,000–$6,999	2,271	10.4	2,832	526	3,358	537	19.1	2,069	965	3,033
$ 7,000–$9,999	3,697	16.9	2,602	457	3,059	681	24.2	2,310	806	3,115
$10,000–$14,999	6,855	31.4	2,557	353	2,911	818	29.0	2,319	681	3,000
$15,000 or more	8,018	36.8	2,714	238	2,951	487	17.3	2,293	640	2,933
Mother's education (years):										
0–8	1,948	8.9	3,536	384	3,920	121	4.3	3,056	738	3,794
9–11	4,482	20.5	2,993	304	3,298	475	16.9	2,584	708	3,292
12	10,646	48.8	2,510	348	2,858	1,348	47.8	2,119	841	2,961
13–15	2,816	12.9	2,414	377	2,791	541	19.2	2,313	716	3,029
16 or more	1,924	8.8	2,206	465	2,671	334	11.8	1,863	824	2,686
Father's education (years):										
0–8	2,704	12.4	3,481	305	3,786	179	6.4	3,466	661	4,127
9–11	3,929	18.0	2,819	336	3,155	400	14.2	2,548	691	3,239
12	7,996	36.7	2,530	355	2,885	1,180	41.9	2,163	778	2,941
13–15	3,366	15.4	2,453	373	2,826	467	16.6	1,885	920	2,805
16 or more	3,820	17.5	2,381	401	2,783	592	21.0	2,117	809	2,925

[1] In the NSFG, mothers who were 15–44 years old and married at the time of the interview; in the NNS, mothers of legitimate infants born live in hospitals. [2] Age at survey for NSFG, age at 1972 birth for NNS.

NOTES: The source of information in the NNS on age and race was the birth certificate, and the source of other information was the questionnaire returned by the mother. A dash indicates the category is not applicable.

ing may be due to the small number of mothers in both surveys whose last baby died within the first month after birth. The direction of the relationship, however, is such that mothers with a neonatal death have had more children ever born and expect more additional births than mothers whose last child survived the neonatal period.

The preceding findings suggest that some maternal and infant health characteristics are related to fertility, but these relationships may be spurious to the extent that health factors are also related to social and demographic characteristics. Table 3 shows the relationship of sociodemographic characteristics of mothers to their past, additional expected, and total expected births. The table also presents the distribution of characteristics of the two populations surveyed in order to clarify some of the differences in the findings between the two surveys.

Age is highly related to fertility; both the NSFG and the NNS show that older women have more children ever born and fewer additional births expected than younger women. The recent mothers in the NNS were much younger than the mothers in the NSFG. In the NNS, 51 percent of the mothers were under 25 years old, whereas only 15 percent of the NSFG mothers were in this age group. Recent mothers in the NNS expected more total births than NSFG women because their recent birth was the factor that made them eligible for the sample.

Children ever born and additional births expected are negatively related; mothers with one child expect two to three times more additional births than mothers with two children. NSFG mothers were more likely to have three or more children than NNS mothers, and this factor alone accounts for much of the difference in the number of additional births expected by mothers in the two surveys.

Both surveys indicate that black women have more children ever born than white women, and the NSFG indicates that black women expect more additional births than white women.

Mothers who have been married more than once have had more children ever born and expect fewer additional births than mothers married once. This may be attributed partly to their being older and representing the higher fertility cohorts.

Both surveys indicate that age at first marriage and age at first birth are related negatively to past fertility and positively to future fertility. Minor exceptions to this pattern are NSFG mothers whose first marriage or first birth occurred at 30 years or older and NNS mothers who married or had their first birth at 25 years or older.

Higher family income is associated with fewer additional births expected by the mother. This observation may be due to the greater liklihood that older mothers, who expect fewer additional births, are in the higher family income brackets.

Both surveys show that the more education the mother has had, the fewer children she has borne (NNS mothers with 1 to 3 years of college are an exception to this pattern). However, no consistent relationship is seen between mother's education and additional births expected. The education of the husband has much the same relationship with fertility as does the mother's education.

The multiple regression coefficients shown in table 4 indicate the extent to which maternal health, infant health, and sociodemographic characteristics are related independently to fertility. The independent variables of age, education, and number of fetal losses are entered into the regression in their interval unit form. Noninterval variables, and variables which might have a nonlinear relationship with fertility, are entered into the regression as dummy variables. For dummy variables, the size and significance of the coefficients are compared to the omitted category, shown as a dash (–) in the table.

The multiple regression equations show that age is significantly related to all three measures of fertility in both surveys. Each increase of 1 year in the age of the mother indicates 125 more children ever born, 49 fewer additional births expected, and 76 more total births expected per 1,000 NSFG mothers.

In both surveys, black mothers had more children than white mothers. In the NSFG, black mothers expected to have more additional births than white mothers, but in the NNS there was no statistically significant difference by race.

Age at first birth has a negative relationship with past fertility. Each year older at first birth indicates 188 fewer children in the NSFG and 42 fewer children in the NNS ever born per 1,000 mothers. The NSFG indicates that age at the birth of the first child is positively related to additional births expected, but the NNS shows no relationship.

The relationship between the age at first marriage and past fertility is different in the two surveys; however, both surveys indicate that mothers who were older at marriage expected more additional births than mothers who were younger at marriage. The two surveys show opposite results for mothers married more than once, both for children ever born and for additional births expected.

The two surveys also show opposite results for the relationship between family income and past fertil-

ity, but they agree that lower family income is associated with more expected births in the future.

The NSFG and NNS both indicate that educational attainment of the mother is inversely associated with the number of children ever born, but education is not related to additional births expected after other characteristics entered into the regression are controlled. For recent mothers (NNS), but not for all mothers (NSFG), the father's education was independently related to fertility in the same direction as mother's education.

Mother's experience of medical conditions and more fetal losses is associated with greater numbers of children the mother has ever borne. (This relationship should not be interpreted as medical problems causing the woman to desire more children. A NSFG analysis, not shown here, indicates stronger support for the causal hypothesis that a mother who has a large number of children increases her probability of having medical conditions or fetal losses.) The presence of a medical condition reduced the number of additional births expected by 49 births per 1,000 women in the NSFG and by 63 in the NNS. In the NNS, the number of fetal losses is negatively associated with the number of additional births expected; in the NSFG, there is no statistically significant relationship. It thus appears that higher past fertility may contribute to the presence of health problems for mothers, and that they may consider these health problems in their expectations of additional births. However, the overall magnitude of these effects appears to be small.

NSFG mothers who received prenatal care for their last birth in a hospital clinic expected 72 more additional births per 1,000 than mothers who visited a private physician, but there is no relationship between source of prenatal care and past fertility. The NNS shows that fewer (1–9) prenatal visits of a mother for her 1972 birth were associated with higher past fertility, but they were not associated with future fertility. To the extent that prenatal care by private physicians and more prenatal visits are indicators of better health care, these results are not consistent with other data presented here that poor health is associated with higher past and lower future fertility. One interpretation is that there is no direct relationship between prenatal care and maternal health. Mothers who receive less prenatal care and care from hospital outpatient clinics may be less successful family planners or may desire more children than mothers who receive more prenatal care and care from private physicians.

NSFG mothers (but not NNS mothers) whose last child weighed 3,501 or more grams had more children ever born than mothers whose last child weighed 3,500 grams or less. However, the lowest birth weight infants have the greatest health problems, and neither survey shows low birth weight related to past births or to additional births expected after other characteristics are controlled.

In the NSFG, mothers whose last child was discharged after them, discharged to another institution, or discharged dead had more children ever born than mothers whose last child was discharged from the hospital with or before them. However, this indicator of poor infant health is not related in either survey to expected future fertility.

Neonatal deaths to NSFG and NNS mothers are significantly associated with additional births expected, but not with past fertility. Mothers in the NSFG whose last child died in the neonatal period expected 251 more and those in the NNS expected 304 more additional births per 1,000 than mothers whose last child survived this period.

Table 5 presents the coefficients of determination (R^2) for the number of children ever born, the number of additional births expected, and the total number of births expected according to various combinations of sociodemographic and health characteristics. The top row indicates that the proportion of the variance explained by sociodemographic variables in the number of children ever born was 0.367 in the NSFG and 0.263 in the NNS. Adding the maternal and infant health characteristics to the model increases the explained variance in children ever born by 1 percentage point in each survey. A similar pattern is observed for additional births expected; a small additional amount of variance is explained with the inclusion of maternal and infant health factors. (An analysis not shown indicates that including children ever born as a predictor in the additional births expected regression adds little to the explained variance and changes none of the relationships.)

Summary and Conclusion

Data from two national surveys, the National Survey of Family Growth (NSFG) and the National Natality Survey (NNS), were used to assess the relationships of maternal and infant health characteristics to past and expected future fertility. Although the two surveys were designed for different purposes and sampled different populations, confidence can be

Table 4. Multiple regression coefficients for the number of children ever born, additional births expected, and total births expected per 1,000 mothers [1] of childbearing age regressed on sociodemographic, maternal health, and infant health characteristics, 1973 National Survey of Family Growth (NSFG) and 1972 National Natality Survey (NNS)

Sociodemographic and maternal and Infant health characteristics	National Survey of Family Growth			National Natality Survey		
	Children ever born	Additional births expected	Total births expected	Children ever born	Additional births expected	Total births expected
Age	125†	−49†	76†	123†	−48†	75†
Race:						
White	—	—	—	—	—	—
Black	176†	85†	261†	362†	−31	330†
Other	184	74	258†	124	148	271
Age at first birth	−188†	25†	−163†	−42†	−6	−48†
Age at first marriage	46†	16†	61†	−19†	26†	7
Number of times married:						
Once	—	—	—	—	—	—
More than once	−138†	79†	−59	541†	−208†	333†
Family income:						
Under $4,000	232†	125†	357†	−340†	247†	−93
$4,000–$6,999	272†	56	328†	−307†	248†	−59
$7,000–$9,999	100	22	122	−59	108	50
$10,000–$14,999	—	—	—	—	—	—
$15,000 or more	−91	15	−76	45	−36	9
Mother's education	−32†	−5	−37†	−48†	4	−45†
Father's education	−7	−0	−7	−73†	25†	−49†
Medical conditions:						
None	—	—	—	—	—	—
One or more	90†	−49†	41	40†	−63†	−22
Number of fetal losses	112†	8	120†	188†	−29†	159†
Source of prenatal care (NSFG):						
Private physician	—	—	—	...	...	...
Hospital outpatient clinic	83	72†	155†	...	...	...
Other care	4	48	52	...	...	...
No care	35	−27	8	...	...	...
Prenatal visits (NNS):						
None	...	...	...	124	−58	66
1–4	...	...	...	243†	−39	203†
5–9	...	...	...	162†	−33	129†
10–14	...	...	...	—	—	—
15–19	...	...	...	−65	28	−36†
20 or more	...	...	...	115	−18	96
Birth weight (grams):						
2,500 or less	−12	−9	−21	34	−15	19
2,501–3,000	14	−16	−2	7	−34	−27
3,001–3,500	—	—	—	—	—	—
3,501–4,000	107†	−4	103†	73	−10	63
4,001 or more	270†	−26	243†	157	−94	64
Infant discharge status:						
Before or with mother	—	—	—	—	—	—
After mother, to another institution, or died	212†	−18	194†	27	3	30

Table 4. Multiple regression coefficients for the number of children ever born, additional births expected, and total births expected per 1,000 mothers [1] of childbearing age regressed on sociodemographic, maternal health, and infant health characteristics, 1973 National Survey of Family Growth (NSFG) and 1972 National Natality Survey (NNS)—Continued

Sociodemographic and maternal and infant health characteristics	National Survey of Family Growth			National Natality Survey		
	Children ever born	Additional births expected	Total births expected	Children ever born	Additional births expected	Total births expected
Neonatal mortality:						
Survived	—	—	—	—	—	—
Died	58	251†	309	166	304†	471
Constant	1,973	1,152	3,124	1,884	1,191	3,075

[1] In the NSFG, mothers who were 15–44 years old and married at the time of the interview; in the NNS, mothers of legitimate infants born live in hospitals.

NOTES: A dash indicates that the category was omitted for the dummy variable analysis (coefficient is zero). A dagger † indicates coefficient is 2.0 times or more its standard error, and is therefore significantly different from zero at the 0.05 or greater level of confidence.

Fertility per 1,000 mothers with certain characteristics may be calculated from the coefficients. The number of children ever born would be estimated as follows:

	NSFG				NNS			
Age 30	125	×	30	=	3,750	123	× 30 =	3,690
White	—			=	0	—	=	0
Age 22 at first birth	−188	×	22	=	−4,136	−42	× 22 =	−924
Age 20 at marriage	46	×	20	=	920	−19	× 20 =	−380
Married once	—			=	0	—	=	0
Income $10,000 to $14,999	—			=	0	—	=	0
Mother 12 years of education	−32	×	12	=	−384	−48	× 12 =	−576
Father 16 years of education	−7	×	16	=	−112	−73	× 16 =	−1,168
No medical conditions	—			=	0	—	=	0
One fetal loss	112	×	1	=	112	188	× 1 =	188
Private physician prenatal care	—			=	0	...		
10 to 14 prenatal visits	...					—	=	0
3,501 to 4,000 grams birthweight	—			=	107		=	73
Infant discharged before or with mother ..				=	212		=	27
Infant survived neonatal period	—			=	0	—	=	0
Constant term				=	1,973		=	1,884
Total children ever born					2,442			2,814

Table 5. Coefficients of determination (R^2) of number of children ever born, additional births expected, and total births expected for mothers [1] of childbearing age regressed cumulatively on sets of sociodemographic, maternal health, and infant health characteristics: 1973 National Survey of Family Growth (NSFG) and 1972 National Natality Survey (NNS)

Sets of characteristics [2]	National Survey of Family Growth			National Natality Survey		
	Children ever born	Additional births expected	Total births expected	Children ever born	Additional births expected	Total births expected
Sociodemographic characteristics	0.367	0.261	0.216	0.263	0.093	0.119
Sociodemographic and maternal health characteristics	0.373	0.264	0.223	0.274	0.094	0.126
Sociodemographic and maternal and infant health characteristics	0.377	0.265	0.227	0.275	0.095	0.128

[1] Mothers 15–44 years old married at time of interview (NSFG) or mothers of legitimate infants born live in hospitals (NNS).
[2] Characteristics as defined in table 4.

placed in the relationships found to the extent that both surveys show statistical significance in the same direction.

A relationship was seen between more children ever born and poorer maternal health or health care. Both surveys show that mothers with a medical condition, a history of fetal loss, and fewer prenatal visits have had more children ever born than other mothers. These relationships persist after sociodemographic characteristics have been controlled in a regression analysis. However, mothers with a health condition or a history of fetal loss expect fewer births than other mothers, but prenatal care from a hospital outpatient clinic is related to more additional births expected.

Some relationship exists between poor infant health characteristics and higher past and expected fertility. High birth weight and the infant not being discharged at the same time as the mother are related to more children ever borne by the mother, according to the NSFG. Both surveys support the hypothesis that women attempt to replace deceased children; mothers whose last child died shortly after birth expected more additional births than mothers who had not lost a child.

Both surveys show that sociodemographic characteristics of mothers explain more variation in their actual and expected fertility than do maternal and infant health factors. Mothers who are older, black, younger at the birth of their first child, and have completed less education have had more children ever born than other mothers. Fewer additional births are expected by older women; and, independent of other characteristics in the regression equation, fewer additional births are expected by women who were younger at first marriage.

Much has yet to be learned about the causes of fertility patterns, and better measurements of health, including perceptions of health, could be of some utility. Although maternal and infant health factors are less strongly related to fertility than are sociodemographic characteristics, they are still important in understanding variations in fertility.

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