The Effects of Pregnancy Planning Status On Birth Outcomes and Infant Care

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Context: *The planning status of a pregnancy may affect a woman's prenatal behaviors and the health of her newborn. However, whether this effect is independent or is attributable to socioeconomic and demographic factors has not been explored using nationally representative data.*

Methods: *Data were obtained on 9,122 births reported in the 1988 National Maternal and Infant Health Survey and 2,548 births reported in the 1988 National Survey of Family Growth. Multiple logistic regression analyses were employed to examine the effects of planning status on the odds of a negative birth outcome (premature delivery, low-birth-weight infant or infant who is small for gestational age), early well-baby care and breastfeeding.*

Results: *The proportion of infants born with a health disadvantage is significantly lower if the pregnancy was intended than if it was mistimed or not wanted; the proportions who receive well-baby care by age three months and who are ever breastfed are highest if the pregnancy was intended. In analyses controlling for the mother's background characteristics, however, a mistimed pregnancy has no significant effect on any of these outcomes. An unwanted pregnancy increases the likelihood that the infant's health will be compromised (odds ratio, 1.3), but the association is no longer significant when the mother's prenatal behaviors are also taken into account. Unwanted pregnancy has no independent effect on the likelihood of well-baby care, but it reduces the odds of breastfeeding (0.6).*

Conclusions: *Knowing the planning status of a pregnancy can help identify women who may need support to engage in prenatal behaviors that are associated with healthy outcomes and appropriate infant care.*

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Babies born to women who had not intended to conceive when they did have an elevated risk of adverse health outcomes, such as premature birth, low birth weight and intrauterine growth retardation.[1] The planning status of a conception also affects maternal behaviors during pregnancy that may influence the infant's health at birth (for example, smoking and weight gain).[2] However, planning status varies quite widely according to such factors as women's age, marital status, parity, race or ethnicity, education and poverty status.[3] As a result, this question remains: Are women's pregnancy-related behaviors and the health of their newborns directly linked to the planning status of their pregnancy, or do the apparent effects of planning status actually reflect demographic and socioeconomic differences between women who had intended to conceive and those whose pregnancies were unplanned.

In previous analyses of the 1988 National Maternal and Infant Health Survey (NMIHS) and the 1988 National Survey of Family Growth (NSFG), we found that after differences in demographic and socioeconomic characteristics were taken into account, mothers who had intended to conceive were more likely than those who had not to recognize their pregnancy within the first six weeks and to initiate prenatal care within the first eight weeks. Contrary to expectations, however, once they had begun prenatal care, women whose pregnancies had been mistimed or unwanted and those whose pregnancies had been planned were similar with respect to most behaviors that could affect the newborn's health.[4]

In this article, we examine the effects of planning status on the health of the newborn and the mother's care of the infant, once again using the 1988 NMIHS and the 1988 NSFG.* Since these surveys provide us with nationally representative data, we are able to obtain a more complete picture of factors affecting newborns' health and mothers' infant care practices than was possible in previous analyses, which were based on narrow subgroups of the population (for example, married women)[5] or on samples that are not representative of all births (such as first births or births occurring in hospitals in a particular area).[6]

We expect that infants whose mothers did not intend to become pregnant are more likely than those whose mothers had planned to conceive to be premature, low-birth-weight or small for their gestational age (indicators of disadvantaged health status), but that this is at least partially attributable to differences between their mothers in how soon they recognized the pregnancy and initiated prenatal care, as well as their demographic and socioeconomic characteristics. We also anticipate that women who intended to conceive are more likely than those who had unplanned pregnancies to promote their babies' health and well-being by taking them for well-baby checkups and by breastfeeding.

Methodology

Data

Although both surveys contain relevant data for our analyses, they differ substantially in numerous ways, including the size and design of the samples, the design and administration of the questionnaires, and the definition and quality of specific data items.[7] The NMIHS questionnaire was mailed to a representative sample of women aged 15–49 living in 48 states, who were identified through vital records on live births, late fetal deaths and infant deaths in 1988; the final sample consisted of 18,594 women, 9,953 of whom had a live birth.[8]

The NSFG was conducted through personal interviews with a nationally representative sample of 8,450 women aged 15–44; respondents provided detailed reproductive histories, from which we extracted data about births occurring between January 1984 and the time of the survey. Data on a far larger number of births are

*We use data from the 1988 NSFG rather than the 1995 cycle of the survey for two reasons. The analyses presented here are part of a larger study, which began prior to the availability of the 1995 data. Also, the NMIHS has not been conducted again, and since our measures are sensitive to changing standards of care and medical advice for pregnant women, we wanted the data from the two surveys to be contemporaneous.

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available for analysis in the NMIHS than in the NSFG; because very few NSFG respondents reported fetal deaths or stillbirths, our analyses of both sets of data include only women who had live births.

Information is available in both surveys on women's age, parity and marital status at delivery; race and ethnicity; education; poverty status; and previous negative pregnancy experiences. In addition, the NMIHS contains information on employment and receipt of public assistance during pregnancy, and on what advice, if any, the woman had received from a prenatal care provider regarding smoking, alcohol use, vitamins and weight gain.*

With respect to behavior during pregnancy, the NSFG data include women's reports on the timing of prenatal care and the number of prenatal care visits for all births since January 1984. The NSFG provides information on smoking and alcohol use only for respondents' most recent pregnancy; because of the dramatic reduction in the sample size, we chose not to include these data. The NMIHS contains the same type of data on prenatal care, as well as information on smoking, alcohol and vitamin use, and weight gain during pregnancy. Although we relied primarily on self-reports from the mothers' questionnaires in the NMIHS, we also obtained some information from their infants' birth certificates.

Selection of Observations

The unit of analysis in our study is births. We excluded multiple births (e.g., twins and triplets) because these are associated with an elevated risk of low birth weight, and because the woman's prenatal behavior is likely to be affected by this knowledge. The sample from the NMIHS consists of 9,122 live births, which are roughly representative of all singleton live births that occurred in the United States in 1988.† For the analyses of infant care, we further restricted the sample to the 8,885 live-born infants who ever came home from the hospital and lived at least one month.

The NSFG data provide information on 2,548 births that are representative of singleton births occurring in the United States during the four-year period 1984–1988. Again, we limited the analyses of infant care to those who came home and lived at least a month, thereby reducing the sample to 2,528.

Both surveys oversampled specific groups of women—the NSFG, black women; the NMIHS, black women and women whose infants were low-birthweight—to increase the reliability of statistics for these groups. Both data sets contain appropriate population weights so statistical analyses can take the oversampling into account and estimates are applicable to the general population of U.S. births.

Measurement of Planning Status

Planning status is a measure of a woman's reproductive intention at the time she became pregnant. In both the NSFG and the NMIHS, three categories of births can be distinguished: intended (births occurring to women who wanted to become pregnant when they did), mistimed (births occurring to women who had not wanted to conceive at that time but had wanted to have a child in the future) and unwanted (births occurring to women who had not wanted to have any, or any more, children).

An unwanted conception does not necessarily imply an unwanted child, since planning status refers to the woman's intention before she conceived. Some couples may change their attitude toward the birth—and their memory of the original planning status—either during the pregnancy or after delivery. We expect that the original planning status of a birth will be incorrectly reported in a small number of instances; the error is most likely to be a misclassification of unintended births as intended.[9] If, as we hypothesize, unintended births are associated with more negative birth outcomes and prenatal behaviors than intended births, such misreporting will reduce the likelihood that we will find statistically significant differences by planning status.

Outcome Measures

We used information on the gestation and weight of the infant at birth to construct dummy variables indicating whether the birth was premature (occurring before 37 weeks' gestation) and whether the infant was low-birth-weight (less than 2,500 g).

We also constructed a third measure of the newborn's health, based on weight for gestational age. An infant is generally considered small for gestational age if his or her birth weight is below the 10th percentile for all babies born in the same week of gestation. To estimate this measure for white and black infants, we applied race-specific birth-weight standards for infants born at 25–42 weeks' gestation, by sex and birth order (first vs. higher order).[10] No national standard exists for Hispanics or other ethnic groups; however, since Hispanic infants' birth weights and rates of prematurity generally fall between those of whites and blacks,[11] we used the average of the white and black birth-weight cutoffs for Hispanics. Births to women of other ethnicities—who were mostly Asian, with some Native American and Eskimo—were assigned the standard used for whites.

A further complication in calculating this measure is that the NMIHS data report gestation according to two sources: the birth certificate and the mother's answer to the question "How many weeks did this pregnancy last?" We gave priority to the birth certificate information (which is calculated from the date of the woman's last menstrual period), although there is no consensus about which source is more accurate. We used the mother's survey response if the birth certificate is missing data on gestation or reports a gestation of less than 25 or more than 42 weeks; nevertheless, our data contain some reports of gestations below 25 or above 42 weeks.

We assumed that all infants born at gestations of greater than 42 weeks should have weighed at least 2,500 g at birth; we classified those who were below this cutoff as small for gestational age. For infants reportedly born before 25 weeks' gestation, we assumed that the birth was premature but that the gestation may have been misreported. We therefore omitted these births (253 in the NMIHS and 12 in the NSFG) from the analyses of the small for gestational age measure, but not from the other analyses.

Using information about all three infant health outcomes, we constructed a summary variable indicating any negative birth outcome. According to this measure, all premature and low-birth-weight babies are considered to have been born at a disadvantage, even if they were not small for gestational age. In addition, since the variable captures all three negative outcomes, the comparison group is infants born at 37 or more weeks of gestation weighing at least 2,500 g.

*In our analyses, the racial groups "white" and "black" include only non-Hispanic women; all women of Hispanic ethnicity, regardless of race, are categorized as Hispanic. Education and poverty status reflect the woman's situation at the time of the survey in the NSFG and in the 12 months preceding the infant's birth in the NMIHS. In both surveys, poverty status is the respondent's total household income as a percentage of the federally defined threshold of poverty, varying by the total number of related individuals in the household. In the NSFG analyses, previous negative pregnancy experiences were spontaneous abortion, stillbirth, low-birth-weight infant and infant death within two months of birth; in the NMIHS, previous negative pregnancy experiences were these plus induced abortion. Public assistance was defined as any income, in any form, from Aid to Families with Dependent Children, food stamps, housing assistance or public housing, social security or veteran's benefits. (For further detail, see reference 4.)

†Only 0.3% of all births in 1988 were to women outside the 15–49 age range. (Source: National Center for Health Statistics, Advance report of final natality statistics, 1988, *Monthly Vital Statistics Report*, 1990, Vol. 39, No. 4, Suppl.)

Finally, we examined two measures of the mother's behavior with regard to care of the infant. The first assesses whether the infant had at least one visit to a doctor for well-baby care in the first three and first six months of life. The second is whether the infant was ever breastfed. While both measures are intended to capture aspects of the mother's behavior, the first measure could be inaccurate, because someone other than the mother may have taken the infant for a well-baby visit.

Analyses

For all analyses, we used the statistical analysis program STATA, which allows for the inclusion of population weights, calculates the standard errors and can adjust for the six sampling strata in the NMIHS. In the tables, we present national estimates based on weighted data and report the unweighted sample size upon which the estimates are based. Only findings that are statistically significant at a p value less than .05 are discussed in the text unless otherwise noted.

We emphasize the findings from the NMIHS data simply because in many cases, we found statistically significant relationships in the NMIHS but not in the NSFG data. However, the direction and size of the estimated effects in the two data sources were often similar, and we therefore hypothesize that the larger sample of the NMIHS accounts for much of the discrepancy; the NSFG data may have yielded additional statistically significant results if the sample had been larger. (Nevertheless, because there are so many differences between the two surveys, the larger sample in the NMIHS does not necessarily make the findings from that survey more credible.) Obviously, we have the greatest confidence in findings in which the relationship operates in the same direction and is statistically significant in both data sets.

We look first at the prevalence of negative birth outcomes according to planning status. We then use multivariate logistic regression analysis to examine how the odds of a negative outcome are affected by four sets of variables—physical characteristics of the mother that are relatively fixed at the time of the birth, the mother's socioeconomic characteristics, the planning status of the pregnancy and the mother's prenatal behaviors. Specifically, we focus on whether a woman's behavior during pregnancy alters the effects of planning status. We then present findings from similar analyses of the effects of planning status on infant care.

Results

Birth Outcomes

Mistimed and unwanted births are more likely than intended ones to have a negative outcome (Table 1). For example, in the NMIHS, 16% of intended births had at least one negative outcome, compared with 20% of mistimed births and 26% of those that had been unwanted, and all of the differences are statistically significant; the pattern is similar for each individual outcome. The relationship between planning status and birth outcomes is not as uniform in the NSFG, although the proportion of infants who were low-birthweight or small for gestational age was lowest when the birth was intended.

In the first set of calculations in the logistic regression analysis, we examine only the effects of women's physical characteristics on the likelihood of a negative birth outcome (Table 2, page 226). The results show that prior negative outcomes, body mass index, age, and race or ethnicity affect the risk of a negative outcome. In the NMIHS, women who have had a negative outcome and those who are underweight for their height have significantly elevated odds of bearing an infant who is premature, low-birth-weight or small for gestational age (odds ratios, 1.4 and 1.5, respectively). Women aged 30–34 are significantly less likely than older mothers to have a negative outcome (0.7), and both Hispanic and white women are less likely to have a negative birth outcome than are black women (0.3 and 0.4, respectively). The NSFG data also indicate an increased risk for women who have experienced a previous negative outcome and a decreased risk for white women.*

When we add women's socioeconomic characteristics into the analysis, the physical factors that were initially significant in the NMIHS remain so; in addition, having had three or more children and being aged 20–24 are associated with reduced odds of a negative outcome (odds ratio, 0.7 for each). Furthermore, women with at least some college education are less likely to have a negative outcome than are women who did not graduate from high school (0.6–0.7). The lack of a relationship between high parity and better birth outcome in the first analysis may reflect the likelihood that women who have already had three births are among the least educated and thus most likely to have a poor outcome. In the second set of calculations, the effects of education and other socioeconomic characteristics are separated from the effects of parity.

In the NSFG, married mothers are significantly less likely to have a negative birth outcome than are never-married women. There is no obvious explanation for why this effect is evident in the NSFG and not in the NMIHS, but the discrepancy may be attributable to the differences in the composition of the sample.

The addition of planning status in the third set of analyses produces virtually no change in the estimated effects of the physical and socioeconomic factors in either the NMIHS or the NSFG. However, planning status has a significant independent effect on birth outcomes in the NMIHS: Women who had unwanted births are 1.3 times as likely to have a negative outcome as are those whose pregnancies were intended. In the NSFG, the odds ratio for unwanted births is positive, but it is not statistically significant.

In the final set of calculations, we include the mother's prenatal behaviors. Whereas the addition of these factors has no effect on the results for the previously entered variables in the NSFG, it produces some notable changes in the NMIHS. Women who have had two live births be-

Table 1. Percentage of infants who were premature, low-birth-weight or small for gestational age, by planning status at conception, 1988 National Maternal and Infant Health Survey (NMIHS) and 1988 National Survey of Family Growth (NSFG)

Outcome and planning status	NMIHS	NSFG
Any negative outcome	(N=9,122)	(N=2,463)
All pregnancies	18.0	16.5
Intended	15.6†,‡	15.5‡
Mistimed	20.4‡	16.9
Unwanted	25.5	20.7
Premature	(N=9,122)	(N=2,510)
All pregnancies	8.4	8.1
Intended	6.7†,‡	8.6
Mistimed	10.2‡	6.8
Unwanted	12.9	8.0
Low-birth-weight	(N=9,115)	(N=2,548)
All pregnancies	5.9	5.8
Intended	5.1†,‡	5.3‡
Mistimed	6.5‡	5.0‡
Unwanted	9.7	10.1
Small for gestational age	(N=8,852)	(N=2,442)
All pregnancies	10.4	8.4
Intended	9.5†,‡	6.7†,‡
Mistimed	11.3‡	10.3
Unwanted	13.7	12.9

†Significantly different from mistimed at p<.05. ‡Significantly different from unwanted at p<.05. *Notes:* NMIHS data reflect births in 1988; NSFG data reflect births in 1984–1988. Ns are unweighted.

*Our analyses also included a history of diabetes or hypertension, because in other multivariate analyses (not shown), each of these factors increased the odds of prematurity or low birth weight. As Table 2 shows, however, these variables are not significantly associated with the odds that an infant would be either premature, low-birth-weight or small for gestational age.

Table 2. Odds ratios from logistic regression showing the likelihood that an infant was premature, low-birth-weight or small for gestational age, by maternal characteristics, planning status of birth and maternal pregnancy behaviors, according to variables included in the regression, 1988 NMIHS (N=8,879) and 1988 NSFG (N=2,380)

Characteristics, planning status and behaviors	Physical		Plus socioeconomic		Plus planning status		Plus pregnancy behaviors	
	NMIHS	NSFG	NMIHS	NSFG	NMIHS	NSFG	NMIHS	NSFG
Physical								
Previous live births (ref=0)								
1	1.00	1.05	0.92	1.03	0.91	1.02	0.87	0.98
2	1.03	1.04	0.86	0.95	0.84	0.93	0.76*	0.89
≥3	0.96	1.07	0.71**	0.89	0.68**	0.85	0.63**	0.88
Ever had negative pregnancy experience† (ref=no)	1.37**	1.97**	1.42**	1.93**	1.43**	1.94**	1.34**	1.94**
Ever had diabetes (ref=no)	‡	1.28	‡	1.27	‡	1.25	‡	1.06
Ever had hypertension (ref=no)	‡	1.17	‡	1.17	‡	1.17	‡	1.01
Body mass index (ref=average)								
Underweight	1.50**	‡	1.48**	‡	1.48**	‡	1.57**	‡
Overweight	1.01	‡	0.99	‡	0.99	‡	0.89	‡
Obese	1.07	‡	1.02	‡	1.02	‡	0.76*	‡
Age at infant's birth (ref=≥35)								
<20	1.33	1.19	0.85	0.80	0.86	0.80	0.98	0.82
20–24	0.89	1.24	0.69*	1.01	0.70*	1.00	0.69*	1.08
25–29	0.84	1.03	0.76	0.91	0.78	0.92	0.82	0.98
30–34	0.70*	0.98	0.68**	0.94	0.69*	0.94	0.70*	1.00
Race/ethnicity (ref=non-Hispanic black)								
Hispanic	0.31**	0.69	0.30**	0.80	0.31**	0.81	0.32**	0.90
Non-Hispanic white/other	0.38**	0.66**	0.43**	0.91	0.43**	0.93	0.44**	0.96
Socioeconomic								
Marital status (ref=never-married)								
Married	na	na	1.00	0.54**	1.02	0.55**	1.06	0.53**
Formerly married	na	na	1.30	0.99	1.30	1.00	1.33	0.95
Education (ref=<H.S. graduate)								
H.S. graduate	na	na	0.86	0.94	0.86	0.95	0.96	0.93
Some college	na	na	0.70**	1.00	0.71**	1.00	0.85	0.96
≥college graduate	na	na	0.60**	0.84	0.61**	0.84	0.78	0.82
% of poverty level (ref=<100)								
100–199	na	na	1.00	0.86	1.00	0.86	1.03	0.88
≥200	na	na	0.89	0.86	0.90	0.87	0.96	0.92
Received public assistance during pregnancy (ref=no)	na	na	1.20	‡	1.19	‡	1.16	‡
Worked during pregnancy (ref=no)	na	na	0.88	‡	0.88	‡	0.93	‡
Planning status of birth (ref=intended)								
Mistimed	na	na	na	na	1.05	1.01	0.99	1.04
Unwanted	na	na	na	na	1.26*	1.15	1.22	1.16
Pregnancy behaviors								
First prenatal care visit in ≤8 wks. (ref=later)	na	na	na	na	na	na	1.06	1.15
% of recommended visits made (ref=90–120)								
<90	na	na	na	na	na	na	1.02	0.72
121–150	na	na	na	na	na	na	1.86**	1.54*
>150	na	na	na	na	na	na	3.44**	2.63**
Weight gain (ref=<16 lbs.)								
16–25 lbs.	na	na	na	na	na	na	0.62**	‡
26–35 lbs.	na	na	na	na	na	na	0.46**	‡
≥36 lbs.	na	na	na	na	na	na	0.27**	‡
Smoking (ref=nonsmoker)								
Smoked	na	na	na	na	na	na	1.89**	§
Quit	na	na	na	na	na	na	0.91	§
Drank during pregnancy (ref=never)								
≥2 drinks per month	na	na	na	na	na	na	0.99	§
≤1 drinks per month	na	na	na	na	na	na	0.95	§
Quit during pregnancy	na	na	na	na	na	na	0.94	‡
Took vitamins (ref=no)	na	na	na	na	na	na	0.88	‡

*p<.05. **p<.01. †Spontaneous abortion, low-birth-weight or premature infant, stillbirth or infant death, and (in the NMIHS only) induced abortion. ‡Not measured in the survey. §Insufficient data for analysis. *Notes:* na=not applicable. NMIHS data reflect births in 1988; NSFG data reflect births in 1984–1988. Ns are unweighted.

come significantly less likely than women having their first live birth to experience a negative outcome (odds ratio, 0.8), and the odds associated with higher parity decline (0.6); in addition, obese women become significantly less likely than those of average weight to have a negative outcome (0.8). Moreover, the inclusion of prenatal behaviors eliminates the significance of planning status and education; thus, it appears that the effects of these factors are indirect, operating through their relationship to behaviors during pregnancy.

Because previous research showed an association between planning status and first prenatal visit,*[12] we had expected that planning status would have an indirect effect on birth outcomes by influencing women's use of prenatal care services. However, the timing of the first prenatal care visit has no effect on the odds of a negative pregnancy outcome (Table 2).

*Planning status is also significantly related to the odds of early pregnancy recognition (within the first six weeks), but we did not include this variable in the analysis because it is highly correlated with the timing of the first prenatal care visit.

On the other hand, our earlier analysis showed no significant relationship between planning status and whether a woman made at least 90% of the recommended number of prenatal visits, although investigation of NMIHS data suggested that higher education was strongly linked to making at least 90% of the recommended number of visits.* Our current logistic regressions show no significant difference between having made fewer than 90% and 90–120% of the recommended number of visits. However, making more than 120% of visits is strongly associated with a negative health outcome for the baby (odds ratios, 1.9–3.4).

A woman's weight gain during pregnancy is a key determinant of her newborn's health.[13] Our results confirm this, showing that the odds of a negative pregnancy outcome decline steadily as a woman's prenatal weight gain increases.

Women who had not intended to conceive when they did are more likely to smoke while pregnant than are those who planned their pregnancies (not shown). Confirming results of numerous other studies,[14] our analyses of the NMIHS data show that women who smoke during pregnancy are almost twice as likely as nonsmokers to have a negative birth outcome (odds ratio, 1.9). Interestingly, smokers who quit during pregnancy are no more likely to have a negative outcome than are nonsmokers.

In contrast to findings reported by other researchers,[15] our analyses showed no detrimental effect of drinking alcohol during pregnancy. Nor did we find a beneficial effect of vitamin use by pregnant women.

Infant Care Behaviors

Many infants are taken for a well-baby visit soon after birth and are examined again at two, four and six months of age, when they also receive immunizations. Data from both surveys indicate that more than 90% of infants have a well-baby visit in the first three months, but the proportion is significantly higher if the birth was intended than if it was unwanted (Table 3).† In the NMIHS, infants born after mistimed conceptions also are less likely than those whose conceptions were intended to have a well-baby visit. Furthermore, differences by planning status persist through the first six months: According to the NMIHS, the proportion of infants who have at least two visits by six months of age is significantly lower if the birth was unwanted (84%) than if it was mistimed (88%) or intended (92%).

Breastfeeding behavior also varies significantly by the planning status of the pregnancy. Only 36–40% of infants are ever breastfed if the pregnancy was unwanted, compared with 47–50% if it was mistimed and 60–61% if it was wanted.

Clearly, infant care practices vary by the planning status of the pregnancy. In the multivariate analyses, we explore whether this variation is attributable to the persistence of the mother's original attitude toward the pregnancy or to other factors.

• *Well-baby visits in the first three months.* In analyses controlling only for the mother's socioeconomic and physical characteristics,‡ education and poverty status have strong effects on the likelihood of an early well-baby visit (Table 4, page 228). In the NMIHS, the infants of high school graduates are nearly twice as likely as babies born to less-educated mothers to be taken for such a visit (odds ratio, 1.7), and the odds are still higher for those born to women with any postsecondary education (3.5–4.0). The odds also rise as income increases; infants whose mothers have an income at least twice the poverty level are 2.3 times as likely as those below the poverty line to have a well-baby visit. The effects of these variables are less marked in the NSFG. According to the NMIHS data, white women and mothers aged 25–29 also have elevated odds of taking their infant for a well-baby visit, and those who had previously borne three or more infants have a reduced likelihood of doing so.

In the second set of calculations, we control for whether the birth had a negative outcome; the addition of this variable produces little change in the effects of the socioeconomic and physical characteristics. In the NSFG data, a negative pregnancy outcome significantly reduces the likelihood that an infant is taken for well-baby care by three months of age (odds ratio, 0.4); this could reflect that infants who were premature, low-birth-weight or small for gestational age are taken to the doctor to address particular health problems rather than for well-baby care.

Similarly, planning status has no independent effect on well-baby care. When this variable is taken into account, the results remain unchanged.

In the final set of calculations, controlling for pregnancy behaviors, early prenatal care is associated with an increase in the odds of early well-baby care in the NMIHS (odds ratio, 1.4), but education and poverty status still have the strongest effects. Additionally, when prenatal behaviors are taken into account, teenagers are twice as likely as mothers aged 35 and older to take their infant for a well-baby visit (2.2). (In our earlier study, we found that teenage mothers are less likely than older women to make early prenatal care visits.[16]) As in the other analyses, white mothers are more likely than blacks to take their infant for well-baby care (1.4). The racial difference may reflect variations in access to services or in views about the importance of such visits.

The association between high parity and reduced odds of an early well-baby visit is consistent across analyses for the NMIHS data, but it becomes significant in the NSFG only when prenatal care behaviors are included. While this effect may indicate that women with more children have greater confidence and place less importance on a well-baby visit, it also may suggest that these women have a harder time taking a new baby for a medical visit. Furthermore, while the NSFG data consistently show that infants who were small for gestational age, premature or low-birth-weight are less likely than infants without such disadvantages to have a well-baby visit in the first three months,

Table 3. Percentage of mothers who took their baby for at least one well-baby visit in the first three months, who took their baby for at least two visits in the first six months and who ever breastfed, by planning status at conception, 1988 NMIHS and 1988 NSFG

Infant care and planning status	NMIHS	NSFG
≥1 visit by age 3 mos.	(N=7,802)	(N=2,373)
All pregnancies	94.3	96.0
Intended	95.6†,‡	96.8‡
Mistimed	93.2‡	96.0‡
Unwanted	89.5	91.7
≥2 visits by age 6 mos.	(N=8,006)	
All pregnancies	89.8	u
Intended	91.9†,‡	u
Mistimed	87.5‡	u
Unwanted	83.9	u
Ever breastfed	(N=8,444)	(N=2,512)
All pregnancies	53.4	55.2
Intended	59.9†,‡	60.6†,‡
Mistimed	46.6‡	50.1‡
Unwanted	36.1	40.1

†Significantly different from mistimed at p<.05. ‡Significantly different from unwanted at p<.05. *Notes:* NMIHS data reflect births in 1988; NSFG data reflect births in 1984–1988. Ns are unweighted. u=unavailable.

*For each woman, the recommended total number of visits depends upon the duration of the pregnancy and the timing of the initiation of prenatal care. (For further detail about this variable, see reference 4.)

†In the NSFG, mothers were asked only for the timing of the first well-baby visit. In the NMIHS, they were asked to report the total number of well-baby visits in each of the first six months of life.

‡Since physical characteristics are not biologically related to infant care behaviors, as they may be to birth outcomes, we grouped them with socioeconomic characteristics in the analyses of well-baby visits and breastfeeding.

Table 4. Odds ratios from logistic regression showing the likelihood that an infant was taken for well-baby care by age three months, by maternal characteristics, birth outcome, planning status of birth and maternal pregnancy behaviors, according to variables included in the regression, 1988 NMIHS (N=7,729) and 1988 NSFG (N=2,280)

Characteristics, birth outcomes, planning status and behaviors	Physical and socioeconomic		Plus outcome		Plus planning status		Plus pregnancy behaviors	
	NMIHS	NSFG	NMIHS	NSFG	NMIHS	NSFG	NMIHS	NSFG
Physical and socioeconomic								
Age at infant's birth (ref=>35)								
<20	1.67	0.26	1.67	0.23	1.66	0.20	2.17*	0.23
20–24	1.14	0.49	1.14	0.46	1.11	0.44	1.22	0.46
25–29	1.85*	0.55	1.85*	0.50	1.80*	0.49	1.85*	0.48
30–34	1.52	2.47	1.51	2.25	1.48	2.20	1.49	2.08
Race/ethnicity (ref=non-Hispanic black)								
Hispanic	1.04	0.95	1.00	0.87	0.98	0.85	1.03	0.88
Non-Hispanic white/other	1.46*	1.25	1.42*	1.18	1.39*	1.12	1.44*	1.11
Marital status (ref=never-married)								
Married	1.16	0.62	1.16	0.58	1.15	0.58	1.05	0.58
Formerly married	1.25	0.43	1.26	0.42	1.26	0.41	1.38	0.42
Education (ref=<H.S. graduate)								
H.S. graduate	1.73**	2.41*	1.72**	2.46*	1.72**	2.41*	1.68**	2.42*
Some college	3.50**	3.14*	3.46**	3.33*	3.46**	3.20*	3.43**	3.10*
≥college graduate	4.00**	2.32	3.96**	2.28	3.92**	2.23	3.98**	2.33
% of poverty level (ref=<100)								
100–199	1.49*	2.32*	1.49*	2.20*	1.49*	2.14	1.65**	2.08
≥200	2.34**	1.38	2.33**	1.31	2.30**	1.31	2.30**	1.23
Received public assistance during pregnancy (ref=no)	1.41	†	1.42	†	1.43*	†	1.35	†
Worked during pregnancy (ref=no)	1.06	†	1.06	†	1.06	†	1.03	†
Previous live births (ref=0)								
1	0.90	1.24	0.90	1.25	0.91	1.28	0.93	1.28
2	0.67	0.65	0.66	0.64	0.68	0.65	0.73	0.66
≥3	0.50**	0.31	0.49**	0.29	0.51**	0.33	0.58*	0.34*
Ever had negative pregnancy experience‡ (ref=no)	1.22	1.42	1.24	1.54	1.23	1.52	1.16	1.57
Outcome								
Premature, low-birth-weight or small for gestational age (ref=none of these)	na	na	0.84	0.38**	0.85	0.38**	0.85	0.41**
Planning status of birth (ref=intended)								
Mistimed	na	na	na	na	0.92	1.38	0.91	1.42
Unwanted	na	na	na	na	0.80	0.85	0.84	0.90
Pregnancy behaviors								
First prenatal care visit in ≤8 wks. (ref=later)	na	na	na	na	na	na	1.42*	1.52
% of recommended visits made (ref=90–120)								
<90	na	na	na	na	na	na	0.89	0.77
121–150	na	na	na	na	na	na	1.00	0.97
>150	na	na	na	na	na	na	1.32	0.59

*p<.05. **p<.01. †Not measured in the survey. ‡Spontaneous abortion, low-birth-weight or premature infant, stillbirth or infant death, and (in the NMIHS only) induced abortion. *Notes:* na=not applicable. NMIHS data reflect births in 1988; NSFG data reflect births in 1984–1988. Ns are unweighted.

it is not known whether they instead make visits because of medical problems.

The NMIHS offers some evidence that the mother's behavior with regard to medical visits during pregnancy is predictive of similar behavior after pregnancy. Mothers who made an early prenatal care visit are more likely to take their infant for a well-baby visit than are mothers who did not obtain early prenatal care (odds ratio, 1.4). In the NSFG, the odds ratio is also positive, but it is not statistically significant.

•*Breastfeeding*. Whether a mother breastfeeds her baby is significantly related to a number of her socioeconomic and physical characteristics and to her baby's health at birth. Both surveys show that young mothers—particularly teenagers—are less likely than those aged 35 or older to breastfeed (Table 5). White and Hispanic mothers are 3–4 times as likely to breastfeed as are black mothers. Increased education and higher income, as well as having had a previous negative birth outcome, are associated with greater odds of breastfeeding.

In the NMIHS analyses, married women are more likely than their never-married counterparts to breastfeed (odds ratio, 1.3), while women who worked during the pregnancy and those with one prior birth are less likely to breastfeed than are mothers who did not work and those who had never had children (0.8–0.9). In both surveys, infants who were small for gestational age, premature or low-birth-weight are significantly less likely than babies with none of these conditions to be breastfed (0.6–0.7).

When all maternal characteristics, pregnancy outcome, planning status and prenatal behaviors are taken into account, the NMIHS data show that infants whose conception had been unwanted are significantly less likely to be breastfed than are those whose birth had been intended (odds ratio, 0.6); the result from the NSFG is in the same direction but is not statistically significant. The odds of breastfeeding are no different if the birth was mistimed than if it was intended.

Discussion

Our bivariate findings suggest that asking a woman whether she had planned her pregnancy can help identify those who are likely to need added support during pregnancy to promote healthy outcomes and take good care of their babies. For example, in the NMIHS, the proportion of infants who are premature, low-birth-weight or small for gestational age is substantially higher if the birth was unwanted (26%) or mistimed (20%) than if it was intended (16%). Differences by planning status in the proportion

Table 5. Odds ratios from logistic regression showing the likelihood that an infant was ever breastfed, by maternal characteristics, birth outcome, planning status of birth and maternal pregnancy behaviors, according to variables included in the regression, 1988 NMIHS (N=8,357) and 1988 NSFG (N=2,406)

Characteristics, birth outcomes, planning status and behaviors	Physical and socioeconomic		Plus outcome		Plus planning status		Plus pregnancy behaviors	
	NMIHS	NSFG	NMIHS	NSFG	NMIHS	NSFG	NMIHS	NSFG
Physical and socioeconomic								
Age at infant's birth (ref=≥35)								
<20	0.69*	0.14**	0.69*	0.13**	0.66*	0.13**	0.69*	0.13**
20–24	0.77	0.55*	0.76	0.54*	0.72*	0.53*	0.75	0.53*
25–29	0.84	0.59*	0.83	0.58*	0.78	0.57*	0.82	0.57*
30–34	0.99	0.57*	0.97	0.56*	0.94	0.55*	0.99	0.56*
Race/ethnicity (ref=non-Hispanic black)								
Hispanic	3.45**	4.36**	3.22**	4.36**	3.12**	4.31**	3.08**	4.32**
Non-Hispanic white/other	2.99**	3.72**	2.86**	3.75**	2.77**	3.68**	2.75**	3.67**
Marital status (ref=never-married)								
Married	1.28*	1.14	1.28*	1.10	1.25*	1.09	1.27*	1.09
Formerly married	1.23	1.11	1.25	1.11	1.24	1.10	1.17	1.10
Education (ref=<H.S. graduate)								
H.S. graduate	1.34**	1.34	1.33**	1.34	1.32**	1.33	1.35**	1.32
Some college	2.62**	3.00**	2.58**	3.02**	2.56**	2.97**	2.61**	2.94**
≥college graduate	5.08**	3.81**	4.98**	3.80**	4.88**	3.75**	5.11**	3.71**
% of poverty level (ref=<100)								
100–199	1.33**	1.76**	1.33**	1.74**	1.34**	1.72**	1.33**	1.72**
≥200	1.50**	2.09**	1.50**	2.07**	1.49**	2.07**	1.50**	2.06**
Received public assistance during pregnancy (ref=no)	0.83	†	0.84	†	0.85	†	0.88	†
Worked during pregnancy (ref=no)	0.87*	†	0.86*	†	0.86*	†	0.85*	†
Previous live births (ref=0)								
1	0.81*	0.80	0.81*	0.80	0.81*	0.81	0.81*	0.81
2	1.01	0.95	1.00	0.95	1.05	0.97	1.04	0.97
≥3	1.16	0.86	1.14	0.86	1.23	0.91	1.23	0.91
Ever had negative pregnancy experience‡ (ref=no)	1.20*	1.24	1.22**	1.29*	1.20*	1.29*	1.20*	1.29*
Outcome								
Premature, low-birth-weight or small for gestational age (ref=none of these)	na	na	0.68**	0.62**	0.69**	0.62**	0.70**	0.62**
Planning status of birth (ref=intended)								
Mistimed	na	na	na	na	0.94	1.10	0.96	1.10
Unwanted	na	na	na	na	0.57**	0.85	0.57**	0.86
Pregnancy behaviors								
First prenatal visit in ≤8 wks. (ref=later)	na	na	na	na	na	na	0.96	1.11
% of recommended visits made (ref=90–120)								
<90	na	na	na	na	na	na	0.99	1.01
121–150	na	na	na	na	na	na	1.07	1.02
>150	na	na	na	na	na	na	0.99	1.04

*p<.05. **p<.01. †Not measured in the survey. ‡Spontaneous abortion, low-birth-weight or premature infant, stillbirth or infant death, and (in the NMIHS only) induced abortion. *Notes:* na=not applicable. NMIHS data reflect births in 1988; NSFG data reflect births in 1984–1988. Ns are unweighted.

taken for an early well-baby visit are much smaller, but statistically significant and in similar directions. And babies whose mothers reported that their pregnancy was mistimed or unwanted are less likely to be breastfed (47% and 36%, respectively) than are those born to women who had intended to conceive when they did (60%).

Not surprisingly, multivariate analysis shows a much more complicated picture. The mother's physical and socioeconomic characteristics, as well as the infant's health status at birth, have strong and significant effects on the newborn's health and the mother's care for her infant. When these factors are taken into account, the effects of a mistimed pregnancy are no longer statistically significant.

Results for unwanted births are not as consistent. Unwanted births are significantly more likely than intended ones to be associated with negative health outcomes, when women's prior pregnancy experiences, physical characteristics and socioeconomic factors are considered. The effect becomes nonsignificant, however, when prenatal behaviors are included, possibly because of the link between intention status and smoking during pregnancy.

Planning status of the pregnancy does not affect the likelihood that a woman will take her infant for at least one well-baby visit by the age of three months. Rather, the odds of such a visit are determined by socioeconomic variables that reflect access to care and, possibly, differences in perceived value of that care. In addition, women who made their first prenatal visit early in pregnancy (a behavior that is associated with intended pregnancies) are more likely than those who delayed care to take their baby for early well-baby visits, suggesting a behavioral marker for identifying women who might be more or less likely to adhere to recommended visit schedules for their baby.

Finally, women whose pregnancy was unwanted are less likely to breastfeed their babies than are those who intended to conceive. Planning status could be a crude proxy for social or financial constraints on breastfeeding. But since the relationship between an unwanted pregnancy and breastfeeding remains statistically significant even with a variety of controls, we conclude that a woman's attitude toward her baby has a direct effect on her decision to breastfeed.

The measure of intention status available from these data sets is very limited, since

it is retrospective and assesses only women's attitudes at one point in time, rather than being multifaceted and including women's feelings about their pregnancy as it progressed and even after their infant's birth. Consequently, our finding that planning status has few independent effects on the outcomes examined should not be interpreted as indicating that a woman's attitudes about her pregnancy and toward the baby once it is born are unimportant. Other methodological approaches and refined measures may be better suited to investigate the relationships between intention status and outcomes.

It is useful and important for providers to know that the effects of socioeconomic characteristics, especially poverty and behavior during pregnancy, are so strong that they can be used as indicators of which groups of women are likely to have difficulty bearing a healthy baby and taking good care of the infant. As a gross indicator, intention status at conception discriminates quite well between different outcomes and can be used to identify women needing more services and support.

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