Evidence from the National Survey of Family Growth

Work During Pregnancy and Subsequent Hospitalization of Mothers and Infants

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HOSPITALIZATION OF MOTHERS for complications of pregnancy or hospitalization of their infants during the first year of life is more likely among women who work during the last few months of their first pregnancy than among women who stop working earlier. Moreover, this association is greater among black than white women: for black women who work in the last 3 months of their first pregnancy, the rates of hospitalization of the mother or infant are more than twice as high as for white women who do not work that late. However, among women who are provided prenatal care by a private physician and among women who have insurance that pays for all or part of the hospital bill, working in the last trimester is not associated with higher rates of hospitalization. These are some of the major results of my analysis of interview data that were collected in the 1973 National Survey of Family Growth, Cycle I, of the National Center for Health Statistics.

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Background of Study

Increasingly large numbers of women work during pregnancy. In a 12-month period in 1972–73, about 1,260,000 women in the United States worked during a full-term pregnancy, or about 9 percent of the female labor force of reproductive age; of all women who gave birth during that period, about 42 percent worked

during pregnancy, a work participation rate about equal to that of nonpregnant women (*1*). In a study based on legitimate live births in 1963, Kovar found that only 31 percent of the mothers had worked during pregnancy (*2*). Although the two studies are not exactly comparable, it is likely that the change between the earlier and the later study from 31 to 42 percent reflects a significant increase in the work participation rate of pregnant women.

Many pregnant women not only work during pregnancy, but work late into pregnancy. Bumpass and Sweet (*3*) report that among women who experienced their latest birth in 1970–73 and worked during the pregnancy, 48 percent worked in the last trimester. Kovar, in her study of births about 10 years earlier, found that 47 percent of pregnant workers were still employed in the last 3 months of pregnancy. Apparently the propensity for pregnant workers to continue working in the third trimester has not changed in recent years, but the increased rate at which pregnant women are working results in larger proportions working during the last 3 months of pregnancy.

Although these trends in work during pregnancy may have significant implications for the health and welfare of mothers and their infants, little epidemiologic research has been done on the health consequences of working during pregnancy. The physiology of pregnancy is known to increase susceptibility to some environmental hazards, but the relationship of that susceptibility to work participation has not often been studied. Two noteworthy studies cited by Hunt in her 1975 review of the literature (*4*) were conducted by Stewart (*5*) and McDonald (*6*). Stewart studied 1,318 mothers of babies born in England, Scotland, and Wales in March 1946 and found that the incidence of prematurity and perinatal mortality was higher among women who worked during pregnancy than in a matched sample of pregnant housewives, especially if the women worked for more than 28 weeks of their pregnancy; however, there was no difference in the incidence of toxemia, instrumental delivery, or congenital defects.

In contrast, McDonald, in her prospective study of 3,295 working mothers, found an association between heavy work in early pregnancy and the incidence of birth defects, but found no association between such work and perinatal death (*6*). Such evidence led Hunt (*7*) to conclude her 1977 review of the literature with these words: "Particular occupational conditions dangerous to women are both real and imagined. Due to inadequate monitoring and evaluation of this group of workers, the difference is scarcely known."

In addition to the question of the effect on the health of mother and child, the increasing work participation of pregnant women has also raised questions about economic welfare and equal opportunity in the workplace. Following the 1976 Supreme Court ruling that it was legal for an employer to deny pregnant women some of the benefits provided to other employees, such as sick leave and disability income, bills were introduced whose enactment would prohibit discrimination on the basis of pregnancy (*8*). Although judicial deliberation and legislative debate have focused on the rights of workers and employers, on the cost of benefits to pregnant workers, and on the effect of pregnancy on work performance, the effect of working during pregnancy on the health of the mother and child also has been considered.

In this study, hospitalization is used to indicate the health effects of working during pregnancy. Estimates are provided of the incidence of hospitalization (of mothers for complications of pregnancy and of their infants during the first year of life) in the large, representative sample of the National Survey of Family Growth. Although hospitalization is but one limited indicator of pregnancy-related morbidity, it is a significant one for health economics. The reason is that the high cost of hospitalization and the high incidence of pregnancy combine to make hospitalization for pregnancy-related morbidity a significant contributor to the nation's health care costs.

Methods

The National Survey of Family Growth (NFSG), which is periodically conducted by the National Center for Health Statistics, is designed to provide information on fertility, family planning, and those aspects of maternal and child health that are closely related to childbearing. The NSFG is comparable in many respects to the 1955 and 1960 Growth of American Families surveys and the National Fertility Studies of 1965 and 1970.

Interviews for Cycle I of the NSFG were carried out in an 8-month period centering on September 13, 1973. Respondents were selected on the basis of a multistage probability sample representing the household population of the conterminous United States. Personal interviews were completed with 9,797 women aged 15–44 who were currently married or who were previously married or single (never married) and had children of their own living in the household. Additional information about the survey design and sampling variability may be found in a special report on those topics by French (*9*).

The population statistics in tables 1–7 were estimated from the National Survey of Family Growth, Cycle I.

Table 1 shows the percentages of women ever hospitalized for complications of pregnancy. It is based on the responses of women in the survey with any pregnancy terminations to the question: Other than hospitalization of the mother or infant which was related you ever been hospitalized because of pregnancy? These women are classified by number of pregnancy terminations (gravidity) and by race; the numbers on which the percentages are based are also shown.

Table 2 shows the percentages of women whose latest baby was hospitalized in the first year after birth. It is based on the responses of women with any live births to the question: Did your last child have to be hospitalized any time during the first year after [he or she] was born? These women are classified by the number of live births (parity) and by race; the numbers on which the percentages are based are also shown.

Although it may be assumed that a high proportion of the hospitalizations of the mothers and children were required by some abnormal condition, it may not be assumed that most abnormal conditions associated with pregnancy or infancy result in hospitalization. Hospitalization depends not only on the diagnosis of a condition indicating hospitalization, but also on the accessibility of hospital care. For that reason, the morbidity associated with pregnancy and infancy is probably underestimated when hospitalization is the only indicator.

Tables 3–6 are restricted to women whose only pregnancy ended in a live birth, here called "primaparas." The analysis is restricted to these women because of the wording of the survey questions about hospitalization and because the objective of the analysis was to describe the association of work during a pregnancy with hospitalization of the mother or infant which was related to that pregnancy. As already mentioned, the mother was asked if she had been hospitalized because of any

Table 1. Hospitalization because of pregnancy (excluding labor) of ever-married, ever-gravid U.S. women 15–44 years of age, by gravidity and race, 1973

Gravidity	All women [1]		Whites		Blacks	
	Total number (thousands)	Percent hospitalized	Total number (thousands)	Percent hospitalized	Total number (thousands)	Percent hospitalized
1 or more	25,767	21.4	22,642	22.0	2,863	17.6
1	5,217	9.4	4,570	10.0	591	5.1
2	7,227	14.0	6,482	14.1	647	13.8
3	5,563	22.6	5,012	23.3	515	17.0
4	3,185	33.0	2,815	33.7	345	27.7
5 or more	4,575	37.5	3,762	39.8	764	26.6

[1] Includes white women, black women, and women of other races.

NOTE: The sum of the numbers may not equal the total (1 or more) because of rounding.

Table 2. Hospitalization in first year of life of latest born child of ever-married, ever-parous U.S. women 15–44 years of age, by parity and race, 1973

Parity	All women [1]		Whites		Blacks	
	Total women (thousands)	Percent with latest child hospitalized in 1st year	Total women (thousands)	Percent with latest child hospitalized in 1st year	Total women (thousands)	Percent with latest child hospitalized in 1st year
1 or more	25,031	12.7	21,998	12.3	2,776	15.2
1	5,919	12.0	5,155	11.5	694	16.1
2	8,044	11.7	7,259	11.2	687	14.7
3	5,422	14.1	4,926	13.9	462	14.6
4	2,722	13.5	2,375	13.1	318	16.5
5 or more	2,925	13.4	2,283	13.2	615	14.5

[1] Includes white women, black women, and women of other races.

NOTE: The sum of the numbers may not equal the total because of rounding.

pregnancy, while the question about hospitalization of the child referred only to the latest pregnancy that ended in a live birth. If a woman had had more than one pregnancy, her answers to the two questions could refer to two different pregnancies. However, if the woman had had only one pregnancy and that ended in a live birth, then the answers to the two questions would refer to the same pregnancy. Only by restricting the sample to the latter group could the study objective be achieved.

Table 3 shows the numbers and percentage distribution of primaparas by various durations of work during pregnancy and by selected characteristics. Classification of the primaparas by the duration of work during the pregnancy was based on their responses to the question: How long before the birth of your [last] child did you stop working? Women answering that they had not worked at all or had stopped working 10 or more months before the birth were classified as not having worked during the pregnancy. Women answering that they had stopped work 3 to 9 months before the birth were classified as having worked less than 6 months during the pregnancy. Women answering that they had stopped work 2 months or less before the birth were classified as having worked 6 to 9 months during the pregnancy.

The selected characteristics analyzed included (*a*) two characteristics of mothers that were presumably related to both work patterns and pregnancy outcome, namely, race and age at time of the birth and (*b*) two characteristics of the health care situation that were presumably related to hospitalization, namely, the provider of prenatal care and the payer of the hospital bill. The classification by race was based on the interviewer's observation; age at the birth was computed as the number of complete years between the respondent's birth date and her first baby's birth date.

From lists of providers and payers given them by the interviewers, the respondents were asked to indicate who were the providers of their prenatal care and the payers of their hospital bills. Women who selected "own medical doctor or group of doctors" as the source of their prenatal care were classified as having had prenatal care from their own physicians. Women who had no prenatal care or who had received such care from some other provider on the list were classified as having had care from "all other providers;" most of these women had prenatal care at a clinic.

Women who answered that the hospital bill for the baby's delivery was paid for by "insurance only" or by "own income and insurance" were classified as having had the bill paid wholly or partly by insurance. About equal numbers of women in this category selected each of the two possible responses. Women who had no hospital care or who selected any other response were classified as having had the bill paid by "all other payers;" most of these women paid the bill from their own income, but the payer for many of the others was Medicaid or public welfare.

Table 4 shows the percentages of the primaparas who were hospitalized for complications of pregnancy.

Table 3. Numbers (thousands) and percentage distribution of ever-married primaparous U.S. women 15–44 years with selected characteristics, by duration of work during pregnancy, 1973

Characteristic	All women [1]	No work		Worked less than 6 months		Worked 6–9 months	
		Number	Percent	Number	Percent	Number	Percent
Total	4,271	1,690	39.6	1,224	28.7	1,357	31.8
Race:							
White	3,700	1,413	38.2	1,078	29.1	1,209	32.7
Black	514	249	48.4	141	27.4	124	24.1
Age at birth:							
Less than 20 years	1,327	782	58.9	305	23.0	239	18.0
20 years or more	2,944	908	30.8	918	31.2	1,118	38.0
Provider of prenatal care:							
Own physician	3,310	1,194	36.1	996	30.1	1,120	33.8
All other providers	960	497	51.8	228	23.8	236	24.6
Payer of hospital bill:							
Insurance, part or all	2 016	521	25.8	678	33.6	817	40.5
All other payers	2,255	1,170	51.9	546	24.2	539	23.9

[1] Includes white women, black women, and women of other races.

NOTE: The sum of the numbers may not equal the total because of rounding.

Table 5 shows the proportions of primaparas whose babies were hospitalized in the first year after birth. Table 6 shows the proportions of primaparas who either were hospitalized themselves or whose babies were hospitalized.

Results

From table 1 it is apparent that hospitalization for complications of pregnancy was not unusual; about one-fifth of the women who had ever been pregnant had been hospitalized for complications, and the cumulative fraction of such women ever hospitalized increased regularly with the number of pregnancies to nearly two-fifths among the women with five or more pregnancies.

Black women were less likely than white women to have been hospitalized for complications of pregnancy (table 1). This result may reflect a lower rate of complications among black mothers, less access to hospital care, or both.

Table 2 shows the percentages of women whose latest baby was hospitalized in the first year. Since these percentages are not cumulative, as were those in table 1, they would not be expected to increase with the number of children ever born unless there were some increase in risk associated with higher parity, and they did not increase. In contrast to hospitalization of the mother, hospitalization of the baby was more frequent among black than white women, especially among women who had borne only one child.

As already explained, in examining the associations between (*a*) hospitalization of mother and child, (*b*) working during pregnancy, and (*c*) other selected characteristics, the analysis had to be limited to primaparous women, that is, to women whose only pregnancy had ended in a live birth. These women are described in terms of the duration of their work during pregnancy and selected characteristics in tables 3 and 4.

About three-fifths of the primaparas had worked at some time during pregnancy, and nearly one-third had worked in the last trimester (table 3). The estimated proportions of white women working during pregnancy and of white women working during the last trimester are somewhat higher than the corresponding proportions of black women, but the differences are not statistically significant. Working late into pregnancy was more common for mothers who were over 20 years of age, who had insurance to pay the hospital bill, and who were provided prenatal care by a private physician, although the latter difference was not statistically significant.

The principal evidence on the association between working during pregnancy and hospitalization is shown in tables 4–6. Although several types of comparison are possible, the focus here is on two types: (*a*) between women who worked less than 6 months and those who worked more, within categories of the selected characteristics; (*b*) between women in each category of the

Table 4. Percentage of ever-married, primaparous U.S. women 15–44 years of age with selected characteristics who were hospitalized because of pregnancy (excluding labor), by duration of work during pregnancy, 1973

Characteristic	All women [1]	No work	Worked less than 6 months	Worked 6–9 months
Total	4.1	4.4	3.6	4.1
Race:				
White	4.2	5.0	3.4	4.0
Black	3.5	1.5	5.1	5.7
Age at birth:				
Less than 20 years	4.4	5.9	2.1	2.3
20 years or more	3.9	3.1	4.1	4.5
Provider of prenatal care:				
Own physician	4.3	5.4	3.6	3.7
All other providers	3.4	2.1	3.7	5.9
Payer of hospital bill:				
Insurance, part or all	3.3	3.5	4.1	2.5
All other payers	4.7	4.8	2.9	6.5

[1] Includes white women, black women, and women of other races.
NOTE: Statistics in boldface have relative standard error of 25 percent or more.

Table 5. Percentage of ever-married, primaparous U.S. women 15–44 years of age with selected characteristics whose babies were hospitalized in the first year, by duration of work during pregnancy, 1973

Characteristic	All women [1]	No work	Worked less than 6 months	Worked 6–9 months
Total	11.4	10.7	10.2	13.3
Race:				
White	10.8	10.5	10.1	11.9
Black	15.2	13.0	10.9	24.6
Age at birth:				
Less than 20 years	13.3	12.5	13.5	15.9
20 years or more	10.5	9.1	9.1	12.7
Provider of prenatal care:				
Own physician	10.1	10.5	9.3	10.4
All other providers	15.8	11.1	14.2	27.3
Payer of hospital bill:				
Insurance, part or all	10.2	11.2	9.6	10.1
All other payers	12.4	10.5	10.9	18.1

[1] Includes white women, black women, and women of other races.
NOTE: Statistics in boldface have relative standard error of 25 percent or more.

selected characteristics who worked during the third trimester of pregnancy.

About 4 percent of the primaparas reported they had been hospitalized for complications of pregnancy (table 4). The proportions hospitalized vary from category to category, and there are some patterned differences in both kinds of comparison between the women who worked more and those who worked less than 6 months and among women of different characteristics who worked for 6 months or more. However, none of those differences are statistically significant. Because hospitalization for pregnancy is a relatively rare event and primaparas comprise a relatively small population, the sampling variability of the differences is so large that these differences could have occurred by chance even if there were no true differences in the population.

The problem of sampling variability is mitigated to some extent in table 5, which shows that about 11 percent of the primaparas reported that their babies had been hospitalized in the first year after birth. Again, there are patterned differences, parallel to those in table 4, between women who worked more and less than 6 months and among the various categories of women who worked for 6 months or more. Since hospitalization of the first baby is more common than hospitalization of the mother, the sampling variability of the differences between the percentages related to the baby are generally less than those related to the mother. Some of the differences are statistically significant, but most are not.

Table 6. Percentage of ever-married, primaparous U.S. women 15–44 years of age with selected characteristics who were hospitalized because of pregnancy (excluding labor) or whose babies were hospitalized in the first year, by duration of work during pregnancy, 1973

Characteristic	All women [1]	No work	Worked less than 6 months	Worked 6–9 months
Total	15.0	14.5	13.3	17.1
Race:				
White	14.6	14.9	13.2	15.5
Black	18.4	14.3	**15.3**	30.3
Age at birth:				
Less than 20 years	17.0	17.2	**15.7**	**18.2**
20 years or more	14.1	12.2	12.6	16.8
Provider of prenatal care:				
Own physician	13.8	15.1	12.3	13.7
All other providers	19.2	**13.1**	**17.9**	33.2
Payer of hospital bill:				
Insurance, part or all	13.3	13.9	13.6	12.6
All other payers	16.5	14.8	13.1	23.8

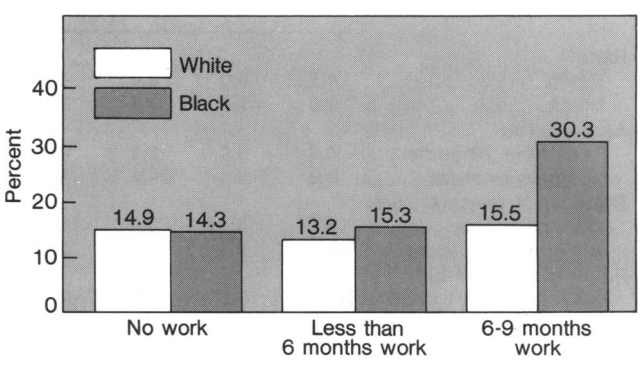
[1] Includes white women, black women, and women of other races.
NOTE: Statistics in boldface have relative standard error of 25 percent or more.

Table 6 and the chart show the proportions of women who were themselves hospitalized or whose babies were hospitalized. According to some medical opinion, a combination of the two types of hospitalization is justifiable. Diddle, for example, notes that "Generally, situations endangering the fetus would also harm the mother (*10*)." The pattern of the differences between women who worked more and less than 6 months is similar in table 6 to the patterns observed in tables 4 and 5. Overall, and in each category of the characteristics considered, hospitalization of mother or child was more likely among women who worked in the last trimester than among women who stopped working earlier. Most of those differences are small and not statistically significant, but in two categories they are large and significant. Black women and women without insurance coverage who worked late in pregnancy were about twice as likely to have had a hospitalization themselves or of their babies as those who stopped working earlier.

Among the women who worked in the last trimester, there are significant differences between pairs of categories in three of the four characteristics considered. Black women were nearly twice as likely as white women to have had a hospitalization of mother or child. Women whose prenatal care was not provided by a private physician were twice as likely as women with their own physicians to have had a hospitalization. Women without insurance to pay for the hospital bill were about twice as likely as women with insurance to have had a hospitalization.

These differences may not be independent of each other. For instance, the difference between black and white mothers may arise because black women are less likely than white women to receive prenatal care from their own physician. A larger sample or a different ana-

Percentages of ever-married, primaparous U.S. women 15-44 years of age who were hospitalized because of pregnancy (excluding labor) or whose babies were hospitalized in their first year, by race and duration of work during pregnancy, 1973



lytical technique would be required to investigate such relationships among three or more variables.

Conclusion

Although many of the differences estimated from the study sample were not large enough to be statistically significant, there were some large, statistically significant differences which, combined with the consistency of the other differences observed, indicate that working late in pregnancy was associated with increased rates of hospitalization for mother and child, at least among women whose only pregnancy had ended in a live birth. Furthermore, this association was stronger among groups with restricted access to health care—black women, women without the services of a private physician for prenatal care, and women whose pregnancy-related hospital expenses were not covered by an insurance plan.

Of course it should not be inferred from these data alone that working late in pregnancy and being medically disadvantaged cause hospitalization of the pregnant woman or her infant. Data from a general-purpose, cross-sectional study such as the National Survey of Family Growth are not well suited for testing such causal hypotheses. The data presented here, however, may help to justify and give direction to epidemiologic and medical studies that are better suited to investigations of the underlying causes of the hospitalization of pregnant workers and their children. Knowledge of those causes is needed as a basis for public policy affecting the large and growing numbers of pregnant workers.

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SYNOPSIS

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Large and increasing proportions of women work late into pregnancy and resume work soon after delivery. If work in those periods injures their health or that of their infants, this trend would be of public health concern. Data on ever-married primaparas from the National Survey of Family Growth conducted by the National Center for Health Statistics were used to investigate the relationship between working in the last trimester of pregnancy and two indicators of illness—hospitalization of women for complications of pregnancy and hospitalization of their infants during the first year of life.

Hospitalization of the mother or child occurred for 15.0 percent of the primaparas. For primaparas who worked in the last trimester of pregnancy, the percentage was slightly higher—17.1 percent. In two groups, black women and women without hospital insurance for delivery, the percentage of mothers or infants hospitalized was much higher among the mothers who worked in the third trimester than among those who did not. The association of working late in pregnancy with higher rates of hospitalization does not mean, necessarily, that working is a cause of hospitalization. It does indicate, however, the need for epidemiologic and medical research on the relationship.