The Impact of Short Interpregnancy Intervals on Pregnancy Outcomes in a Low-Income Population

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ABSTRACT

Objectives. The objective of this study was to determine whether the length of the interval between pregnancies was associated with either preterm birth or intrauterine growth retardation in a low-income, largely Black population.

Methods. The study population consisted of 4400 women who had received prenatal care in county clinics and had two consecutive singleton births between 1980 and 1990.

Results. Interpregnancy intervals were positively associated with age and negatively associated with the trimester in which care was initiated in the second pregnancy. Whites had shorter intervals than non-Whites. The percentage of preterm births increased as the length of the interpregnancy interval decreased, but only for women who had not had a previous preterm birth. The association between interval and preterm birth was maintained when other factors associated with preterm birth were controlled. There was no significant relationship between intrauterine growth retardation and interpregnancy interval.

Conclusions. Women, particularly those who are poor and young, should be advised of the potential harm to their infants of short interpregnancy intervals. (*Am J Public Health.* 1998;88:1182–1185)

Introduction

A short interpregnancy interval has traditionally been viewed as a risk factor for poor pregnancy outcomes, particularly infant mortality in developing countries.[1] Researchers have offered several explanations for this finding, among them maternal depletion and postpartum stress.[2]

The maternal depletion hypothesis suggests that 1 or more years between the birth of one infant and the conception of another are essential to restore the maternal nutritional resources essential for a successful pregnancy. If maternal resources are not replenished, the fetus may not grow adequately in utero or the infant may be born too soon. Maternal depletion has been defined as "a negative change in maternal nutritional status during the reproductive cycle, . . . a change [that is] more negative the longer the periods of potential depletion and/or the shorter the periods of potential repletion."[3(p693)] Investigators have questioned whether "maternal depletion syndrome" is due to childbearing patterns (short interbirth intervals) or to inadequate food intake.[3]

Postpartum stress may influence births following a short interval because the care of an infant or very young child may place such a physical and/or emotional strain on the mother that it interferes with the growth of the fetus or the length of the subsequent pregnancy.

Although there is general agreement about the demographic characteristics associated with short interpregnancy intervals, studies in this country have reached different conclusions about the effect of interpregnancy intervals on low birthweight and on the 2 factors that contribute to it, preterm delivery and intrauterine growth retardation. Six such studies using large American data sets have been published since 1985. All found associations between short intervals, variously defined, and low birthweight and/or its components before controlling for other variables that might influence outcomes, such as demographic, socioeconomic, and medical variables; health behaviors (e.g., smoking); and previous poor pregnancy outcomes. After controlling for possible confounding variables, one study of low birthweight found no significant relationship and suggested that short interpregnancy interval was primarily a marker for women at high risk.[4] All 3 of the other studies that examined birthweight found a significant relationship between interpregnancy intervals and low birthweight, without mention of preterm delivery or intrauterine growth retardation[2,5,6]; 2 of the 4 studies that examined preterm delivery found a significant relationship[2,6–8]; and both studies that examined intrauterine growth retardation found a significant relationship.[7,9]

Methods

This paper is based on an analysis of 4400 women with consecutive singleton live births between 1980 and 1990. These data were drawn from the Obstetrical Automated Record (OBAR) system, a computerized patient information system that includes data on all women who deliver at the university hospital or the county hospital in Birmingham, Ala, after receiving prenatal care in the county health department's clinics.[10] (Women

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who received no care were not included in the data set. These women accounted for approximately 2% of deliveries.)

The interpregnancy interval (the weeks between the delivery date of the first pregnancy and the delivery date of the second pregnancy minus the gestational age of the infant at the second delivery) was measured for all women who had 2 consecutive births in the OBAR system, unless the second birth was the result of a multiple gestation. (In this data set, gestational age is determined by an algorithm based on last menstrual period and on at least 1 ultrasound examination, usually performed at less than 20 weeks' gestation. If necessary, additional ultrasound examinations are performed.) If there were more than 2 births to the same woman in this period, only the first 2 consecutive singleton births were used. A total of 4400 women met these criteria: 3358 were non-White and 1042 were White. (In the OBAR file, 99.7% of non-Whites were Black.)

Results

Sample Characteristics

The women were primarily poor (over 90% were on Medicaid) and young. More than half of the women initiated care in the second or third trimester (Table 1).

In this population, 2.4% had an interpregnancy interval of less than 13 weeks; 7.5%, between 13 and 25 weeks; 17.3%, between 26 and 51 weeks; 26.8%, between 52 and 103 weeks; and 46%, 104 weeks or longer. More than a quarter of the women had an interpregnancy interval of less than a year.

Characteristics Associated with Short Intervals

Maternal age at second delivery was related to interpregnancy interval. The youngest group, those under 20 years of age, had the highest percentage (19.4%) in the very short interpregnancy interval group, defined as less than 26 weeks. Even in the 20- to 29-year-old group, half had their second child in less than 2 years. Only in the 30 and older group did the majority of women in this population have an interpregnancy interval of 2 years or longer (see Table 1).

White women were more likely than non-Whites to have a very short interpregnancy interval. Whites were also less likely than non-Whites to have intervals of more than 2 years.

Initiation of prenatal care in the second pregnancy was correlated with interval. The shorter the interval, the later care started.

Outcomes Associated with Short Intervals

In their second pregnancies, 11.8% of the study population delivered infants weighing less than 2500 g. More than 14% of the women in this study experienced either a spontaneous or an indicated preterm delivery, defined as delivery before 37 weeks' completed gestation. Six percent of the infants were growth-retarded, that is, they were below the 10th percentile in weight for gestational age according to the standards established by Brenner, Edelman, and Hendricks.[11] Mean birthweight in the first pregnancy was not associated with subsequent interval. The length of the interval had an effect on preterm delivery but not on intrauterine growth retardation.

In the bivariate analysis, the percentage of preterm deliveries decreased as the interval lengthened. This relationship was found in both races, with one exception (an interval of 52–103 weeks for Whites). The rates of preterm deliveries at intervals of less than 13 weeks were almost double those at intervals of 104 weeks or longer (Table 2).

Because a previous preterm delivery puts a woman at higher risk for a subsequent preterm delivery, the interpregnancy interval was analyzed by this variable. A short interpregnancy interval was significantly associated with preterm delivery in the second pregnancy only in women who delivered at term in the first pregnancy. For these women, as the length of the interval increased, there was a significant linear decrease in the rate of preterm delivery (from 20.2% at the shortest interval to 11.0% at the longest interval; $P = .03$). Women who delivered preterm in their first pregnancies did not show a consistent decrease in rates of preterm delivery as intervals increased (Table 3).

In a multivariate logistic regression controlling for race, preterm delivery in previous pregnancy, age, nulliparity, female infant, smoking, trimester prenatal care initiated, and low maternal prepregnancy weight (<50 kg before pregnancy or <55 kg at first prenatal visit), an interval of less than 13 weeks remained a significant predictor of a preterm delivery (odds ratio [OR] = 1.9; 95% confidence interval [CI] = 1.1, 3.1). An interval of 13 to 25 weeks was also associated with a greater risk of preterm delivery than was an interval of

TABLE 1—Length of Interpregnancy Interval by Sample Characteristics at Time of Second Birth: Low-Income Women in Birmingham, Ala, 1980–1990

			% of Sample with Specified Interpregnancy Interval				
	No.	% of Sample	<13 wk (n = 106)	13–25 wk (n = 332)	26–51 wk (n = 762)	52–103 wk (n = 1178)	104 wk (n = 2022)
Total sample	4400	100.0	2.4	7.5	17.3	26.8	46.0
Age, y							
<20	728	16.5	5.1	14.3	28.6	33.9	18.1
20–29	3145	71.5	2.0	6.3	15.3	26.0	50.5
≥30	526	12.0	1.1	5.9	13.9	21.5	57.6
	($P < .001$)						
Race							
Non-White	3358	76.3	2.0	7.1	17.5	25.7	47.8
White	1042	23.7	3.8	9.0	16.9	30.1	40.1
	($P < .001$)						
Trimester of initiation of prenatal care							
1st (<14 wk)	1949	44.3	1.2	4.6	13.8	25.0	55.4
2nd (14–27 wk)	1961	44.6	2.8	9.0	19.2	28.5	40.4
3rd (≥28 wk)	489	11.1	5.7	13.3	23.7	26.8	30.5
	($P < .001$)						

TABLE 2—Preterm Delivery and Intrauterine Growth Retardation, by Length of Interpregnancy Interval and Race: Low-Income Women in Birmingham, Ala, 1980–1990

	Total Sample		Non-Whites		Whites	
Interpregnancy interval, wk	No.	%	No.	%	No.	%
	Preterm delivery					
<13	24	22.6	16	24.2	8	20.0
13–25	59	17.8	43	18.1	16	17.0
26–51	122	16.0	95	16.2	27	15.3
52–103	164	13.9	136	15.7	28	8.9
≥104	262	13.0	214	13.3	48	11.5
	(*P* = .03)		(*P* = .007)		(*P* = .054)	
	Intrauterine growth retardation					
<13	9	8.5	8	12.1	1	2.5
13–25	18	5.4	14	5.9	4	4.3
26–51	44	5.8	35	6.0	9	5.1
52–103	75	6.4	55	6.4	20	6.4
≥104	117	5.8	94	5.9	23	5.5
	(NS)		(NS)		(NS)	

Note. NS = not significant.

TABLE 3—Preterm Delivery Rates (%), by Length of Interpregnancy Interval and Outcome of Previous Pregnancy: Low-Income Women in Birmingham, Ala, 1980–1990

Interval, wk	Previous Preterm Delivery (n = 544)	Previous Term Delivery (n = 3856)
<13	41.7	20.2
13–25	31.1	15.7
26–51	37.5	12.3
52–103	38.7	10.3
≥104	28.9	11.0
	(NS)	(*P* = .007)

Note. NS = not significant.

TABLE 4—Odds Ratios (ORs) and 95% Confidence Intervals (CIs) for Preterm Delivery and Intrauterine Growth Retardation: Low-Income Women in Birmingham, Ala, 1980–1990

	Preterm Delivery	Intrauterine Growth Retardation
Risk Factor	OR (95% CI)	OR (95% CI)
Non-White race (vs White)	1.5 (1.2, 1.9)	1.7 (1.2, 2.3)
Preterm delivery in previous pregnancy (vs term)	3.8 (3.1, 4.7)	1.2 (0.9, 1.8)
Age < 20 y (vs 20–29 y)	1.1 (0.9, 1.4)	1.0 (0.7, 1.4)
Age ≥ 30 y (vs 20–29 y)	1.3 (1.0, 1.8)	1.3 (0.9, 2.0)
Nulliparity (vs parous in 1st pregnancy)	1.0 (0.8, 1.2)	1.2 (0.9, 1.5)
Female infant (vs male)	1.1 (0.9, 1.3)	1.5 (1.1, 1.9)
Smoker (vs nonsmoker)	1.6 (1.3, 1.9)	2.5 (1.9, 3.3)
Care initiated in 2nd trimester (vs 1st)	1.3 (0.9, 1.4)	1.2 (0.9, 1.6)
Care initiated in 3rd trimester (vs 1st)	1.2 (0.9, 1.6)	0.8 (0.5, 1.3)
Low maternal weight[a]	1.6 (1.3, 2.0)	1.6 (1.2, 2.2)
Interpregnancy interval <13 wk (vs ≥ 26 wk)	1.9 (1.1, 3.1)	1.6 (0.8, 3.2)
Interpregnancy interval 13–25 wk (vs ≥ 26 wk)	1.4 (1.0, 1.9)	0.9 (0.5, 1.5)

[a]Defined as prepregnancy weight of less than 50 kg or weight at first prenatal visit of less than 55 kg.

26 weeks or longer (OR = 1.4; 95% CI = 1.01, 1.9) (Table 4).

In contrast, there was no clear trend for the percentage of growth-retarded births to decrease as the interval lengthened, with the exception of the under-13-weeks interval among non-Whites. Neither the bivariate analysis nor the multivariate logistic regression showed a significant association between interval and intrauterine growth retardation (Tables 2 and 4).

Discussion

This study is based on a population of low-income women and its findings should not be generalized to women of all income groups. Moreover, although the researchers controlled for most of the factors known to influence low birthweight, preterm delivery, and intrauterine growth retardation, the possibility remains that the findings are due to 1 or more uncontrolled factors that women with short interpregnancy intervals have in common and that are related to preterm delivery. Also, it is possible that some women's economic status improved between their first and second births and that they sought care for the second pregnancy in the private sector; such women would not be included in this analysis. Since the shorter the interval, the less likely the women were to experience an improvement in economic status, this possibility should not have led to any systematic bias.

These analyses suggest that among low-income women, the length of the interval between a delivery and the conception of the next child has a significant impact on preterm deliveries, a major cause of low birthweight and other problems for infants and children. This study also shows that within a poor population, minority women are not at a disadvantage in regard to short intervals. Other studies of the OBAR population have shown that its White population is very deprived and may represent an atypical White group.

The reasons for the association between a short interpregnancy interval and late initiation of prenatal care are unclear. It may be that some of the women had not yet resumed a regular menstrual cycle and therefore did not realize that they were missing periods; or women with very young infants at home may have been too busy to seek care; or this correlation may reflect a high incidence of unintended pregnancies. It is well documented that unintended pregnancy is associated with seeking prenatal care late.[12]

The differences in findings between this and earlier studies are probably due to differences in populations and in methods. This study's population was predominantly poor

and Black and included more teenagers than populations in other studies. The inclusion of women with a wider range of socioeconomic characteristics in the other studies may have hidden the associations found in this study, which included the populations most at risk for adverse pregnancy outcomes—women who are poor, Black, and young. Many experts have long believed that short interpregnancy intervals are potentially more harmful among poor women, who are often less well-nourished and under more physical and social stress, than among middle- and high-income women, who have the resources to minimize the impact of the short interval. Other possible reasons for the differences in findings between this and other studies are the absence of data on fetal deaths and the inclusion of infants who were both preterm and growth-retarded—that is, this study did not analyze the impact of interpregnancy interval on infants who were only preterm or only growth-retarded.[8,9]

This and other studies of interpregnancy intervals offer a clear message about the importance of interconception care, and particularly of family planning after a pregnancy. Women, particularly poor, Black, and young women, should be advised of the importance of planning their pregnancies and of the potential harm to their infants of short intervals between pregnancies. Access to family planning services and strong encouragement to use them can help improve the outcomes of pregnancy. □

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