

Smoking during Pregnancy, 1967–80

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Abstract: Data from two national samples of live births to married mothers (the 1967 and 1980 National Natality Surveys) were used to document changes in smoking during pregnancy. Smoking among married teenagers remained essentially constant between 1967 and 1980. For married mothers age 20 and over, the prevalence of smoking during pregnancy decreased from 40 to 25 per cent among Whites and 33 to 23 per cent among Blacks. There were striking

differences in the magnitude of the decrease by educational attainment. Among the White married mothers age 20 and over, the prevalence of smoking during pregnancy decreased from 48 to 43 per cent for those with less than 12 years education and from 34 to 11 per cent for those with 16 or more years education. (*Am J Public Health* 1987; 77:823–825.)

Introduction

The deleterious effects of maternal smoking have been documented for two decades.^{1,2} Although national population surveys have demonstrated large reductions in smoking since 1965, especially among men,³ changes over time in smoking during pregnancy have not previously been measured. This study uses national samples of live births to married mothers for 1967 and 1980 to examine the changes in maternal cigarette smoking patterns during pregnancy by race, age, and education.

Methods

Data Source

The analysis is based on data from the 1967 and the 1980 National Natality Surveys (NNS), conducted by the National Center for Health Statistics. The 1967 NNS is a follow-back survey based on a probability sample of live birth certificates of US residents for 1967.⁴ A questionnaire was mailed to all married mothers in the sample. In order to increase the response rate, additional mailings, telephone calls, and personal interviews were attempted. The questionnaire included information on smoking habits and social and demographic characteristics.

The 1980 NNS is a follow-back survey based on a probability sample of live birth certificates of US residents during 1980.⁵ The survey was designed to oversample infants with birth weights less than 2,500 grams (low birthweight). Information requested in the mother's questionnaire (sent only to married mothers) included smoking habits and social and demographic characteristics. Nonrespondents to two mailings of the questionnaire were contacted by telephone and given an abbreviated version of the mailed questionnaire.

In both surveys, responses were obtained 6–9 months after the delivery. All questionnaires used essentially the same questions to ascertain smoking status:

“Did you smoke cigarettes at all during the 12 months before your delivery?”

Yes
No

(If yes): “On the average, how many cigarettes did you smoke per day after you found out that you were pregnant?”

(Write in a zero if you did not smoke any)

“Quitters” were identified as those who responded “yes” to the first question and “zero” to the second.

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Study Population

Smoking information on both surveys was available only for mothers married at the time of delivery. The proportion of births to unmarried mothers differs greatly across race, age, and other variables. In 1980, for example, 89 per cent of all White mothers were married at the time of delivery compared to only 45 per cent of Black mothers.⁶ Based on data from Missouri birth certificates, unmarried mothers are much more likely to smoke than their married counterparts.⁷ Thus, the results presented here apply only to a select subgroup of mothers (those at lower risk of poor outcome).

Of the 3,576 live births in the 1967 NNS, 2,808 were to White mothers and 694 to Black mothers. After excluding birth records for nonrespondents there were 2,576 White births (92 per cent) and 605 Black births (87 per cent) included in the 1967 study sample. Of the 7,813 married mothers included in the 1980 NNS, 6,864 were White and 700 were black. Exclusion of nonrespondents resulted in a study sample of 5,143 White mothers (82 per cent) and 409 Black mothers (64 per cent).

Statistical Analysis

Smoking status in 1967 and 1980 was tabulated according to mother's age (under 20, 20 and over) and race (White, Black). In order to examine socioeconomic differentials in smoking, we further subdivided the White mothers aged 20 and over according to educational attainment (under 12 years, 12 years, 13–15 years, 16 years or more). Blacks and teenagers were omitted from this part of the analysis because of the small sample sizes in these groups. Three measures of smoking behavior were considered:

- the proportion of mothers who smoked during the 12 months before delivery;
- of those who smoked, the proportion who quit after finding out they were pregnant; and
- the proportion who smoked during pregnancy (which is the net effect of the previous two measures).

Sample weights were used to estimate proportions in order to adjust for oversampling of low birthweight infants in 1980. Approximate standard errors were calculated using weighted proportions and actual sample sizes, i.e., $\sqrt{pq/n}$.

Results

For mothers 20 years of age and over the proportion who smoked during the 12 months before delivery decreased substantially between 1967 and 1980 (Table 1) for both White mothers (from 45 per cent to 30 per cent) and Black mothers (from 40 per cent to 25 per cent). For married teenagers, however, there was essentially no change in smoking (approximately 45 per cent of Whites and 30 per cent of Blacks). As a result, in 1980, married teenage mothers were more

TABLE 1—Smoking Characteristics^a by Race and Age: Married Mothers 1967 and 1980

Race and Age	1967	1980
<i>Percent who smoked before pregnancy</i>		
White		
Under 20 years	44 (2.7)	46 (2.3)
20 years or over	45 (1.0)	30 (0.6)
Black		
Under 20 years	32 (4.7)	30 (7.4)
20 years or over	40 (2.2)	26 (2.2)
<i>Percent who quit^b</i>		
White		
Under 20 years	12 (2.7)	16 (2.5)
20 years or over	11 (1.0)	17 (0.9)
Black		
Under 20 years	16 (6.4)	12 (8.5)
20 years or over	17 (2.6)	11 (2.9)
<i>Percent who smoked during pregnancy</i>		
White		
Under 20 years	38 (2.7)	39 (2.3)
20 years or over	40 (1.0)	25 (0.6)
Black		
Under 20 years	27 (4.4)	27 (7.2)
20 years or over	33 (2.1)	23 (2.1)

^aNumbers in parentheses are standard errors.

^bOf those who smoked before pregnancy.

likely to smoke than their older counterparts, especially among Whites.

Among White mothers, both teenagers and those age 20 and over showed increased proportions who quit smoking after becoming pregnant (11 per cent in 1967 to 17 per cent in 1980). Among Blacks, however, the trend was reversed with 17 per cent quitting in 1967 compared to 11 per cent in 1980. The net effect was a 15 percentage point reduction in smoking during pregnancy among married White women age 20 and over and a 10 point reduction among married Black women age 20 and over.

White mothers age 20 and over were further subdivided by educational attainment. Although all four educational levels showed decreases in smoking over time, there were striking differences by education in the magnitudes of the declines (Table 2). The proportion of smokers among those with less than 12 years education decreased from 54 per cent to 47 per cent, while it decreased from 38 per cent to 15 per cent

TABLE 2—Smoking Characteristics^a by Education: White Married Mothers 20 years of Age and Over, 1967 and 1980

Years of Education	1967	1980
<i>Percent who smoked before pregnancy</i>		
Under 12 years	54 (2.1)	47 (2.0)
12 years	41 (1.5)	34 (1.0)
13–15 years	43 (2.6)	25 (1.3)
16 years and over	38 (3.4)	15 (1.1)
<i>Percent who quit^b</i>		
Under 12 years	11 (1.8)	9 (1.6)
12 years	10 (1.4)	17 (1.3)
13–15 years	12 (2.6)	20 (2.4)
16 years and over	12 (3.7)	27 (3.5)
<i>Percent who smoked during pregnancy</i>		
Under 12 years	48 (2.1)	43 (2.0)
12 years	37 (1.5)	28 (0.9)
13–15 years	38 (2.5)	20 (1.9)
16 years and over	34 (3.3)	11 (1.0)

^aNumbers in parentheses are standard errors.

^bOf those who smoked before pregnancy.

cent among those with 16 or more years. Furthermore, there was essentially no change in the proportion quitting among smokers with less than 12 years education (11 per cent in 1967 versus 9 per cent in 1980) but the proportion quitting more than doubled among those with 16 or more years (12 to 27 per cent). The net effect of these changes was a large increase in the educational differential in smoking: in 1967, the proportion of mothers who smoked during pregnancy ranged from 48 per cent for those with less than 12 years education, to 34 per cent for those with 16 or more years. In 1980, the corresponding percentages were ranged from 43 to 11.

Discussion

Although smoking during pregnancy among married women decreased for most race, age, and education groups between 1967 and 1980, mothers aged 20 and over with higher educational attainment showed the largest decreases. As a result, by 1980 cigarette smoking during pregnancy was considerably more prevalent among teenagers and mothers with low educational attainment. It should be re-emphasized that these data refer only to married mothers. Between 1967 and 1980, the proportion of births to unmarried mothers increased from 5 per cent to 11 per cent among Whites and approximately 30 per cent to 55 per cent among Blacks.⁶ Other recent data show that smoking during pregnancy is considerably more prevalent among unmarried mothers,⁷ but data for this group prior to the 1970s are unavailable.

It is difficult to assess the effects of nonresponse to the surveys and incorrect reporting of smoking among the respondents on the results presented here. The nonresponse rates for the 1980 NNS were higher than in 1967 (18 per cent versus 8 per cent for Whites and 36 per cent versus 13 per cent for Blacks). Adjusting the results for known characteristics of nonrespondents (age, race, parity, education) by imputation does not change the results appreciably. However, results from other studies⁸ (not limited to pregnant women) suggest that survey nonrespondents are more likely to smoke even after adjustment for known covariates. If so, the results presented here may overestimate the decline in smoking.

In addition to nonresponse the results are limited by the reliance on self-reported smoking behavior. Studies of the validity of self-reported smoking behavior suggest that, while there may be serious underreporting of smoking in the context of evaluating smoking cessation programs, self-reports in general population surveys provide reasonable estimates.⁹ It is also possible that there is differential bias by educational level (e.g., smokers with higher educational attainment may be more likely to be nonrespondents or to deny their smoking). However, the extent of such bias would have increased substantially between 1967 and 1980 in order to account for the differences in secular changes by education seen in Table 2. Although this seems unlikely to us, the magnitude of such differential bias (and how it has changed between 1967 and 1980) cannot be determined.

The trends in Tables 1 and 2 are very similar to those observed in the general population. In fact, between 1965 and 1980 the proportion of women aged 20–44 who smoked decreased from 43 per cent to 33 per cent (with little variation by race).³ In addition, the proportion of women aged 17–18 who smoked increased from 19 per cent in 1968 to 26 per cent in 1979.¹⁰

These differentials in smoking account for a substantial portion of the excess incidence of low birthweight among mothers in the lower educational groups. One study² of White married women aged 20–34 (based on the 1980 NNS) esti-

mated that elimination of smoking would reduce the incidence of low birthweight by 11 per cent for those with more than 12 years education and by 35 per cent for those with less than 12 years education.

These results emphasize the need to develop effective smoking cessation programs especially for individuals with low educational attainment. Targeting pregnant women in particular has special appeal since cessation will benefit both the mother and infant, and women may be more receptive to behavioral change during pregnancy. However, the most effective strategies for convincing pregnant women to stop smoking are not clear. One report of a randomized trial of smoking cessation methods in public health maternity clinics showed that a program specifically tailored to the pregnant smoker was more effective in changing smoking behavior than the standard advice to quit.¹¹ Nevertheless only 14 per cent of the smokers in the tailored program stopped smoking. Another randomized trial of smoking cessation in a more heterogeneous population (but primarily patients of private obstetricians) showed greater reductions in smoking (43 per cent quit) and a consequent increase in birth weight.¹² Furthermore, there appeared to be little variation by maternal characteristics in cessation or reduction in smoking.¹³

Another issue which needs further study is whether smoking cessation during pregnancy continues after the delivery. Preliminary data from a follow-up of the randomized trial in Maryland¹² suggest that a substantial portion of the women who quit during pregnancy resume smoking after the delivery (M. Sexton, personal communication). National data on this issue will soon be available from a 1986 telephone follow-up to the 2,000 female respondents in the 1985 National Health Interview Survey who had a live birth in the preceding five years. The questionnaire used in the telephone

follow-up included detailed information on smoking before, during, and after pregnancy.

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