

Smoking Behavior among Participants in the Nurses' Health Study

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Abstract: We analyzed smoking behavior of 91,651 married female nurses, aged 30–55 years in 1976. The prevalence of smoking was similar among all birth cohorts. The largest percentage increase in starting to smoke occurred between ages 15 and 25 years; by age 25, 50 per cent had started smoking. The cessation rate was lowest in earlier birth cohorts and among nurses starting to smoke at earlier ages. The cessation rate increased substantially between 1963–73 compared with the period 1948–58. (*Am J Public Health* 1987; 77:628–630.)

Introduction

An epidemic of smoking-related disease among women is now appearing! Women with the greatest intensity of smoking are now aged 30–50 years; as they age, and continue to smoke, their burden of smoking-related disease will increase.¹

Despite being health professionals, a greater proportion of female nurses smoke than women in general.¹ In a 1975 survey, 38.9 per cent of the registered nurses were current smokers, and 22 per cent were ex-smokers.² Among US adult women over the age of 20, 32.0 per cent were current smokers in 1976.³ These cross-sectional data raise concern regarding smoking prevalence, but they cannot reveal potentially important trends in smoking behavior over time.

We therefore examined the starting and stopping cigarette smoking behavior over a 40-year period among five successive five-year birth cohorts of US female nurses.

Methods

The study population was established in 1976 by mailing a questionnaire to all female, registered nurses aged 30 to 55 years, residing in one of 11 larger states.⁴ The overall response rate was 71 per cent.⁵ Respondents and nonrespondents were quite similar with regard to age, education, state of residence, employment status, field of employment, and major specialty.⁶

The 1976 questionnaire inquired if women were currently smoking cigarettes and, if so, how many cigarettes per day, and the age they started to smoke. Current nonsmokers were asked if they had ever smoked cigarettes regularly in the past, how many cigarettes were last smoked regularly, and age at starting and stopping.

From the total of 121,700 nurses who completed the questionnaire, we utilized data from the 91,651 respondents in 1976 who reported never having been diagnosed with

hypertension, coronary heart disease, high cholesterol, cancer, or diabetes mellitus, since illness has been shown to be related to smoking cessation.⁷ Five birth cohorts were defined by year of birth: 1921–26 ($n = 18,297$), 1927–31 ($n = 16,938$), 1932–36 ($n = 19,477$), 1937–41 ($n = 19,513$), and 1942–46 ($n = 17,426$).

Life table analyses⁸ were used to determine the proportions of nurses starting to smoke and stopping smoking. Log rank tests⁹ were used to compare differences between birth cohorts.

Results

Prevalence

Overall, 34.4 per cent were current smokers; 23.4 per cent were ex-smokers; and 42.2 per cent were never smokers in 1976. Although the prevalence of current smokers was similar for the five birth cohorts in 1976, the cohorts exhibited different patterns of initiation and cessation of smoking.

Likelihood of Starting to Smoke

The percentage of non-smokers starting to smoke before age 20 increased in each successive cohort (Table 1); the percentage who started to smoke dropped off sharply in successive cohorts after age 25. The greatest percentage increase in smoking occurred between the ages of 20–25 for the two older cohorts and between ages 15–20 for the three younger birth cohorts.

The cumulative incidence of starting to smoke by age 30 was similar for all cohorts. The younger birth cohorts tended to start smoking earlier, but the proportionate increase between the ages 20–25 was less than the older cohorts and by age 35 the cumulative incidence for the youngest birth cohort was the lowest.

Probability of Stopping Smoking

Within each of the five cohorts, women who started smoking earlier had a lower rate of stopping in every subsequent five-year interval (Table 2).

Women in the younger birth cohorts stopped smoking at a faster rate than those in the older groups (Table 2). For example, among women who started to smoke between the ages of 17 and 21, the proportions stopping within 10 years were 8.7, 10.2, 13.6, 21.6, 29.5 for the oldest to youngest birth cohorts.

Finally, we examined the effect of calendar time on smoking cessation (Figure 1). Among women starting to smoke between 17–21 years, the rate of cessation (the slope of the cumulative incidence line) increased around the early 1960s, when there was increasing information on the health hazards of cigarettes. The proportion stopping smoking in the interval 1948–58 was 10.0 per cent, 10.1 per cent and 11.6 per cent for the cohorts born 1921–26, 1927–31, and 1932–36, respectively. For the interval 1963–73, the corresponding proportion stopping smoking were 24.9 per cent, 25.6 per cent, and 26.3 per cent. The similarity of the proportions within time periods and the two-fold difference between time periods is consistent with an impact of the Surgeon General's Report.¹⁰ The net effect has been that all birth cohorts

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TABLE 1—Percentage of Nonsmokers Starting to Smoke during Five-Year Age Intervals and the Cumulative Percentage Starting to Smoke by the End of the Interval among Five Birth Cohorts

Age Interval	Percentage (%) of Nonsmokers Who Started Smoking*				
	1921–1926	1927–1931	1932–1936	1937–1941	1942–1946
10–15	0.9 (0.9)†	1.2 (1.2)†	1.5 (1.5)†	1.5 (1.5)†	1.9 (1.9)†
15–20	23.8 (24.4)†	30.5 (31.3)†	34.5 (35.5)†	35.7 (36.7)†	37.5 (38.7)†
20–25	33.9 (50.0)†	35.2 (55.5)†	32.1 (56.2)†	30.0 (55.7)†	23.9 (53.4)†
25–30	8.1 (54.1)†	6.3 (58.3)†	5.1 (58.5)†	3.0 (57.0)†	2.3 (54.5)†
30–35	3.3 (55.6)†	2.3 (59.2)†	1.7 (59.2)†	1.7 (57.7)†	2.1 (55.4)†
35–40	1.6 (56.3)†	1.3 (59.8)†	1.3 (59.7)†	1.1 (58.2)†	—
40–45	1.2 (56.8)†	1.0 (60.2)†	1.0 (60.1)†	—	—
45–50	0.6 (57.1)†	0.6 (60.4)†	—	—	—

—Cohort had not completed interval at time data were collected.

*Percentage of nonsmokers at beginning of age interval who started smoking during the interval.

†Cumulative percentage of cohort who started smoking by end of age interval in parenthesis.

TABLE 2—Percentage of Nurses Stopping Smoking by Interval Since Starting in Relation to Age Period Starting to Smoke and Birth Cohort

Interval Since Starting	Age Period Starting to Smoke	Birth Cohorts				
		1921–26	1927–31	1932–36	1937–41	1942–46
5 Years	<17	0.6	0.7	0.9	1.5	2.9
	17–21	3.9	4.6	6.0	8.7	13.7
	22–26	4.2	4.5	7.2	12.8	21.7
	>26	7.2	8.6	13.5	19.5	32.8
10 Years	<17	2.5	3.7	4.6	8.8	12.7
	17–21	8.7	10.2	13.6	21.6	29.5
	22–26	8.4	11.3	16.8	26.1	39.7
	>26	16.0	18.6	27.2	38.3	—
15 Years	<17	5.1	8.3	12.1	20.5	25.3
	17–21	13.5	17.7	24.7	34.0	45.4
	22–26	14.2	21.1	29.4	40.7	—
	>26	24.6	30.6	44.3	—	—
20 Years	<17	7.8	13.1	22.0	31.5	41.6
	17–21	19.4	27.1	34.6	46.1	—
	22–26	22.5	30.5	40.0	—	—
	>26	33.0	41.9	—	—	—
25 Years	<17	15.3	22.7	31.0	43.7	—
	17–21	28.4	36.2	44.5	—	—
	22–26	32.3	39.4	—	—	—
	>26	44.1	—	—	—	—
30 Years	<17	22.0	30.7	42.0	—	—
	17–21	36.3	44.6	—	—	—
	22–26	39.8	—	—	—	—
	>26	—	—	—	—	—
35 Years	<17	27.5	40.8	—	—	—
	17–21	46.3	—	—	—	—
	22–26	—	—	—	—	—
	>26	—	—	—	—	—

—Cohort had not completed interval at time data were collected.

reached approximately the same cumulative per cent of smoking cessation by 1976.

Discussion

A larger percentage of respondents started smoking at ages 10–15 and 15–20 in each successive cohort in calendar time, whereas the reverse was true for older ages.

The younger the age of starting, the smaller the proportion of smokers who quit, independent of birth cohort; this finding supports the need for programs of prevention at young ages, especially adolescence.

Between the later and earliest birth cohort, there was a three-fold increase in the proportion of women who had stopped smoking. The rates of stopping smoking were consistently higher in later periods of calendar time, particularly

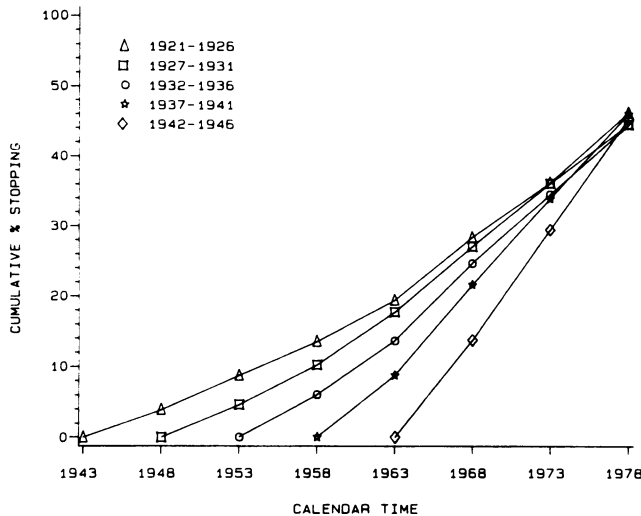


FIGURE 1—Cumulative Incidence of Stopping Smoking by Calendar Time among Five Birth Cohorts Who Started Smoking between 17–21 Years of Age

among the three earlier birth cohorts. Further follow-up of the later birth cohorts is needed to see if these trends have continued in calendar time. Scientific information probably had an effect on increasing the cessation of smoking.

Our findings about smoking among nurses are similar to women in general.¹ The nurses in this study were married women, which may limit generalizability. Married women have cessation rates higher than single and widowed women but lower than separated and divorced women.³

Although nurses are starting to smoke at younger ages, they are also quitting earlier and more rapidly, lending encouragement to health promotion programs. These findings have important implications since nurses who smoke are

less likely to discuss risk modification with patients than nonsmoking nurses.² The prevention and reduction of smoking by nurses would enhance and promote their personal health, the health of the public, and the goal of a smoke-free environment by the year 2000.

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National Immunization Conference Announced

The 21st National Immunization Conference will be held on June 8–11, 1987, at the Fairmont Hotel in New Orleans, Louisiana. This year's conference will celebrate the 25th anniversary of the Vaccination Assistance Act of 1962. This Act was the first multi-year authorization for financial support to state and local health agencies to conduct immunization programs against DTP and polio.

Plan to join the other attendees at the "Look Back—Take Stock—Move Ahead."

Date savers, as well as preregistration and hotel forms, have been widely distributed. For information about registration, contact: Conrad P. Ferrara, Conference Chairman, Division of Immunization, Center for Prevention Services, Centers for Disease Control, Freeway Park, 1600 TC, Atlanta, GA 30333. Tel: (404) 329-1836.