related accidents and Alcohol, Drug Abuse, and Mental Health Services Block Grants that require States to set aside funds for alcoholism prevention programs.)

The students were encouraged by these and other Federal efforts to alert the country to the dangers of drunk driving. As one teenager put it, "National recognition like this will make it easier for us to get our communities moving."

The conference closed on an exuberant note as Dr. William Mayer, administrator of the Alcohol, Drug Abuse, and Mental Health Administration and acting director of the National Institute on Alcohol Abuse and Alcoholism, awarded certificates of achievement to the students who had presented their eight model projects throughout the weekend.

"Your presence here places you among the new leaders of the country," Mayer told the students. "From what I've seen this weekend, the future of our nation is in good hands."

Repeating an earlier pledge by Secretary Heckler, Mayer announced that the Department of Health and Human Services intends to hold similar conferences annually to mobilize future generations of students against drunk driving.

Private Sector Support

Nearly $125,000 in private contributions from 10 organizations and foundations helped sponsor this year's conference. Coordinators were James Kemper, Jr., chairman of the board of Kemper Insurance Group, and Davis Taylor, member of the Board of Directors, Boston Globe Foundation, Inc. Both men received the Secretary's Volunteer Award for stimulating private sector support of the conference.

Other contributors included: Allstate Foundation; Dow Jones and Company, Inc.; GEICO Philanthropic Foundation; Philip L. Graham Fund (The Washington Post); Knight-Ridder Newspapers, Inc.; Lee Enterprises; Liberty Mutual Insurance Company; and The New York Times.

Transportation Secretary Elizabeth Dole: 'Drunk driving is a form of homicide—and the young generation suffers from it disproportionately. Your generation also is stigmatized by drunk drivers. We don't hear much about responsible teenage drivers.'

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The Life Expectancy of Nonsmoking Men and Women

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The article is based on a presentation by Dr. Miller to the 5th World Conference on Smoking and Health, in Winnipeg, Manitoba, Canada, July 14, 1983.

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SYNOPSIS

The pronounced difference in life expectancy between men and women in the United States and other industrialized countries has been attributed to a variety of causes, among them, differential rates of cigarette smoking. A study was undertaken to eliminate the confounding factors of imprecision in the taking of smoking histories and exaggeration of

early traumatic deaths in life expectancy calculations.

Survey data were collected on the lifetime smoking habits of adults in Erie County, Pa., as of 1972–74. In the survey interviews, careful distinctions were made between respondents who had formerly smoked and respondents who had never smoked. The survey data were combined with data collected from surviving relatives about the smoking habits of people who had died in Erie County during the years 1972–74. After deaths attributable to traumatic causes (accidents, suicides, and homicides) were removed, life tables were calculated for male and female nonsmokers over age 30. The resulting life expectancy figures for nonsmoking men and women of parallel age were virtually identical. Thus, differential rates of cigarette smoking are apparently the overwhelming cause for the male-female longevity difference. Actuarial tables should be divided by smoking behavior to reflect this finding. The results of the study suggest that the present longevity difference between men and women will disappear.

THE DIFFERENCE IN LIFE EXPECTANCY between U.S. males and females is substantial and has been increasing for many years. A longevity difference of 2 years in favor of women in the early part of the 20th century widened to a difference of 8 years in women's favor in 1979 (*1*). A number of theories have been proposed to explain this difference. Fisher (*2*), Berkson (*3*), Montagu (*4*), and others have attributed the male-female longevity difference (MFLD) to genetic differences. London and associates (*5*) and Stamler and associates (*6*) proposed that higher estrogen levels provided women with differential protection from cardiovascular diseases, thus enabling them to live longer than men. Rosenman and associates (*7*), Russek (*8*), Jenkins (*9,10*), Hayes and Feinleib (*11*), and Waldron (*12*) have proposed that the stress associated with the type A behavior pattern that is so prevalent among males contributes significantly to increased cardiovascular disease.

The impact of smoking on mortality has been the subject of extensive scientific investigation, but few of the studies have dealt directly with the male-female longevity difference. Preston (*13*), analyzing mortality changes in 16 countries, concluded that the international increase in MFLD from 1930 to 1963 was due largely to cigarette smoking. Retherford (*14*), using data from the American Cancer Society's sample of 1 million volunteers (*15*), estimated that less than half (47 percent) of the U.S. MFLD in 1962 was due to cigarette smoking. Surveys by Haenszel and Associates (*16*), Godley (*17*), and Enstrom and Godley (*18*) indicated some differences in the MFLD in the nonsmoking segment of their samples. Casey and Casey (*19*) in Ireland and Miller (*20*) in the United States investigated data from certain rural communities where cigarette smoking was virtually nonexistent and found no female longevity advantage.

The mortality data in the studies reviewed generally included all causes of death or the deaths from lung cancer. We hypothesized that the differences among results related to male-female longevity might be due to varying incidences of deaths from traumatic causes, such as fatal accidents and suicides, and to differences in the methods used to identify and classify study participants as nonsmokers. Therefore we undertook to test the hypothesis that no male-female longevity differences would be found if the effects of fatal injury were removed and particular care was taken to exclude former smokers from the nonsmoker category.

Design of the Study

The statistical method used in the study was a two-sample, cross-sectional analysis devised by Haenszel and associates (*16*). The advantage of this technique is that by combining data from a deceased population (numerator data) with data from a living population (denominator data), good estimates of mortality ratios and life tables can be obtained in a much shorter time than life tables generated by prospective studies. In this kind of study, however,

'We hypothesized that the difference among results related to male-female longevity might be due to varying incidences of deaths from traumatic causes, such as fatal accidents and suicides, and to differences in the methods used to identify and classify study participants as nonsmokers.'

two sets of data must be obtained instead of one, and the possibility exists that the representation will not be as precise.

Using the two-sample, cross-sectional technique, we combined previously collected retrospective data (*21*) on the lifetime smoking habits of adult men and women who had died in Erie County, Pa., in the years 1972–74 (data derived from interviews with close relatives of the deceased) with new lifetime survey data on the smoking habits of men and women who lived in Erie County 1972–74 (data we obtained by reverse projection from a 1979 survey). In both surveys, telephone interviews were used because we believed that the data obtained in this way would be more accurate than data from self-administered questionnaires. Identical items were used in the interviews in both surveys. Roget and Reid (*22*) have shown that data on decedents' smoking habits which are carefully collected from survivors are as reliable as data obtained on living populations.

Study Population

Erie is a medium-sized urban area in the northeastern United States. According to the 1970 U.S. Census, the population of Erie County was 263,654. The city of Erie was the third largest municipality in Pennsylvania and had a population of 129,341. The county has had a history of low migratory rates. According to records provided by the Pennsylvania Department of Health, Division of Health Statistics and Research, the total in and out migration in the last 20 years has been approximately 7 percent. In the years 1972–74, Erie County had an annual death rate of 9.9 per 1,000, which is typical for a northeastern Standard Metropolitan Statistical Area. The male-female difference in life expectancy for persons in Erie County age 30 and older was approximately 6 years in favor of women, a difference that closely approximates the national figure.

Data on the decedent population. In 1973, Miller (*21*) began the Northwestern Pennsylvania Study on Smoking and Health to determine retrospectively the smoking habits of deceased residents of Erie County based on telephone interviews with the decedents' relatives. Death notices for the years 1972–74 (their publication in a local newspaper is a usual requirement) provided the names of nearly every person who had died in Erie County in these years along with the names of their closest surviving next of kin. In the study, telephone numbers of up to three surviving relatives were identified for each death notice, if possible. No telephone number could be obtained, however, for the survivors of 15 percent of the decedents because, for example, they had no surviving relatives in Erie County, telephone listings were not available, or the decedent was a transient. In order to focus on the impact of smoking, all deaths caused by accident, homicide, or suicide and all decedents under age 30 were eliminated from the analysis.

When telephoning, the interviewers briefly explained the purposes of the study to the relatives they contacted and solicited their cooperation. Information was collected on the exact cause of death and the decedent's age, occupation, and smoking history. The interviewers recorded any detailed comments by the respondent and coded the data.

In the National Mortality Survey (*17,18*) and the earlier survey of lung cancer mortality upon which it was modeled (*16*), survivors' reports on decedents' smoking habits were compared with the decedents' medical records and the decedents' own reports before death. The data provided by the survivors were found to be satisfactory in respect to recent smoking status; agreement was nearly perfect. However, the distinction between lifetime nonsmokers and long-time former smokers was much less reliable. Some survivors did not report the decedent's former smoking when responding on the self-administered questionnaire to the single item that distinguished between lifetime nonsmokers and former smokers. In our telephone survey, therefore, particular attention was paid to probing deeper into an initial response about prior use of cigarettes if the decedent was reported as not having smoked.

Although the interviewers called the telephone numbers of survivors five times or more if necessary, no telephone contact could be made in approximately 10 percent of the cases. However, of the relatives contacted, 95 percent provided the information needed for the study. Of the 6,930 persons aged 30 and older who had died in Erie County in the years 1972–74, usable interviews were obtained for 63 percent, or 4,394 decedents. For the purposes of this report, only the lifetime nonsmokers—2,195 persons who had smoked less than 20 packs of cigarettes during their lifetime—were considered for analysis.

Data on the living population. To determine the smoking habits of the living population of Erie County for the years 1972–74, a 2 percent random sample of household telephone numbers was taken from Erie County telephone directories for these years. About 88 percent of the households in the

Erie Standard Metropolitan Statistical Area had telephones available (*23,24*). The names listed and the telephone numbers were compared with those in the 1979 directory. A current listing was not obtained for approximately 14 percent of the 1972–74 sample because the persons had moved from the area, had subsequently obtained an unlisted number, or had discontinued telephone service.

The items used in telephone interviews with the living population were identical to those used in interviewing the relatives of decedents except that inapplicable items such as "Cause of death" were omitted. Information on each household member 30 years of age or older was obtained. The telephone interviewing began in April 1979 and was completed in July 1979. Information was obtained on a total of 3,916 residents of Erie County, a 96 percent response rate. This information was then analyzed to determine whether in the year of the directory listing from which the respondent's name had been drawn (the "base year"), the respondent had been a current cigarette smoker, a former smoker (at least 1 year had elapsed since quitting), or a nonsmoker (less than 20 packs smoked during his or her lifetime). The National Research Council's Committee on Substance Abuse and Habitual Behavior assisted with this segment of the study.

Analysis of Life Tables

The percentages of nonsmoking men and women by age group, as retrospectively estimated in the 1972–74 population of Erie County, were as follows:

5-year cohorts	*Nonsmoking men*	*Nonsmoking women*
30–34	38.2	59.9
35–39	31.8	56.7
40–44	27.7	59.6
45–49	24.4	61.0
50–54	30.9	59.8
55–59	26.7	64.3
60–64	21.7	62.4
65–69	26.3	62.2
70–74	30.6	72.2
75–79	35.4	82.4
80–84	31.4	83.0
85 and over	36.8	89.3

Results of calculation of the abridged life tables for nonsmokers in Erie County, Pa., for 1972–74, by sex and age group

Sex and 5-year cohort	*Deaths 1972–74*	*Population*	*Age-specific mortality rate*	*Chiang constants*	*Adjusted probability function*	*Number alive at beginning of age interval*	*Number dying during age interval*	*Stationary population in age interval*	*Stationary population in designated age interval + all subsequent age intervals*	*Life expectancy at entrance to each age category*
Males										
30-34	2	8,241	.00024	.52	.00120	100,000	120	499,700	5,085,945	50.9
35-39	3	6,215	.00048	.54	.00240	99,880	240	498,800	4,589,245	46.0
40-44	3	5,790	.00051	.54	.00255	99,640	254	497,565	4,087,445	40.9
45-49	11	5,545	.00198	.54	.00986	99,386	980	494,480	3,589,880	36.2
50-54	13	6,983	.00186	.53	.00926	98,406	911	489,752	3,095,400	31.5
55-59	30	5,431	.00552	.52	.02724	97,495	2,656	480,835	2,605,648	26.7
60-64	40	3,576	.01118	.52	.05444	94,839	5,163	461,287	2,124,813	22.4
65-69	41	3,121	.01313	.52	.06364	89,676	5,707	434,112	1,663,526	18.6
70-74	39	2,648	.01472	.51	.07104	83,969	5,965	404,932	1,229,414	14.6
75-79	69	2,030	.03399	.51	.15688	78,004	12,237	359,427	824,482	10.6
80-84	103	1,051	.09800	.48	.39050	65,767	25,682	264,630	465,055	7.1
85 and older	78	1,048	.07442	...	1.00000	40,085	40,085	200,425	200,425	[1] 5.0
Females										
30-34	5	13,975	.00035	.52	.00175	100,000	175	499,562	5,060,248	50.6
35-39	6	11,969	.00050	.54	.00250	99,825	250	498,500	4,560,686	45.7
40-44	14	13,641	.00102	.54	.00509	99,575	507	496,667	4,062,186	40.8
45-49	22	15,275	.00144	.54	.00718	99,068	711	493,562	3,565,579	36.0
50-54	40	14,859	.00269	.53	.01337	98,357	1,315	488,497	3,072,017	31.2
55-59	50	14,257	.00350	.52	.01735	97,042	1,684	481,000	2,583,520	26.6
60-64	92	11,586	.00794	.52	.03896	95,358	3,715	467,502	2,102,520	22.0
65-69	141	9,285	.01518	.52	.07323	91,643	6,711	441,437	1,635,018	17.8
70-74	188	8,558	.02196	.51	.10419	84,932	8,849	402,537	1,193,581	14.1
75-79	328	7,342	.04467	.51	.20132	76,083	15,317	342,122	791,044	10.4
80-84	411	4,831	.08507	.48	.34831	60,766	21,165	250,917	448,922	7.4
85 and older	466	4,482	.10397	...	1.00000	39,601	39,601	198,005	198,005	[1] 5.0

[1] Estimated, based on U.S. population from U.S. Bureau of Vital Statistics. NOTE: Leaders (...) indicate Chiang constant not applied.

Persons who died between 1975 and 1979 could not be accounted for in these estimates. Because smokers experience a higher death rate than nonsmokers (*25*), the figures in the table somewhat overestimate the percentage of lifetime nonsmokers, mainly in the older age groups. Because of the higher prevalence of smoking among males, this overestimation is probably greater for them than for females, and it thus may exert a stronger upward bias in subsequent calculations of male than of female nonsmokers' life expectancy. A simulation of this biasing effect—if we assume a high smoker-to-nonsmoker mortality ratio for all cohorts—yields an upward bias for males of less than one-half year in life expectancy. We considered this difference too small to require adjustment of the raw data for the life table, but we have taken it into account in interpreting the life table results.

Population estimates for 1973, provided by the Division of Health Statistics and Research, Pennsylvania Department of Health, were multiplied by 3 because the mortality data covered 3 years, and the results were then multiplied by the proportions of nonsmoking men and women in the top table on page 346. These computations provided the denominators needed for calculating the mortality rates for each age-sex cohort, the numerators being the nonsmoker deaths recorded in the Northwestern Pennsylvania Study on Smoking and Health. The number of deaths in each age group in column 2 of the life table was divided by the total number of persons in the living population in column 3 to establish the age-specific mortality rate in column 4. These rates were multiplied by the Chiang constants in column 5 to produce the adjusted probability function (Q_x) in column 6 (*26*). The life table computations in columns 7 to 10 were done according to the standard demographic procedures used by Shryock and Siegel (*27*):

l_x = number living at the beginning of the age interval;
d_x = number dying during the age interval;
L_x = stationary population in the age interval;
T_x = stationary population in the designated age interval plus all subsequent age intervals; and
e_x = life expectancy at entry to each age category (reported in column 11 of the life tables).

The table shows that values for life expectancy are similar for both male and female nonsmokers in all age groups above 30 years. Standard errors for life expectancy at age 30, calculated according to the method of Keyfitz (*28*), are 0.55 years for men and 0.30 years for women. The standard errors decline for each older age group. The life expectancy values for men and women overlap the standard errors in each age group, but the male expectancies are on the whole slightly higher, possibly because of the bias already discussed in connection with estimating the base percentage of nonsmokers.

Discussion

The table shows a consistent pattern of similarity in the life expectancy for all 5-year cohorts of nonsmoking men and women over age 30 in Erie County. The nearly identical life expectancy that is found when traumatic deaths (fatal accidents, homicides, and suicides) are removed and better procedures for classifying nonsmokers are instituted corroborates our hypothesis that differences in smoking habits are responsible for observed male-female longevity differences. The result supports Preston's conclusion that virtually all the increase in the difference between male and female longevity since 1930 is attributable to the effects of cigarette smoking. The data from our study, combined with more than four decades of research showing the destructive force of cigarette smoke and the fact that men have a greater number of smoking years than women (*25*), provides ample evidence of the impact that smoking has on the MFLD. Our results also agree with those of Casey and Casey (*19*) and Miller (*20*).

Although all studies in which the MFLD has been investigated have revealed a substantial detrimental impact of cigarette smoking, several of the investigators have reported residual MFLD not accounted for by smoking. There are two likely explanations for this residual difference. First, according to the Vital Statistics of the United States, traumatic deaths due to accidents, suicides, and homicides occur in the greatest numbers among men in the lower age brackets—ages 20 through 55—and these relatively early deaths produce a disproportionate impact on longevity statistics. In our study, this effect was eliminated. In any new research on the MFLD or in reexamination of earlier studies, investigators will need to take traumatic deaths into account.

Second, a review of the methods used in other studies shows ambiguities in distinguishing between nonsmokers and former smokers. An indeterminate number of interviewees, when answering questions about their own smoking habits or those of their relatives, initially classify themselves or their relatives as nonsmokers even though they may have smoked in the past. This inaccuracy is particularly common among more distant relatives and among younger

'. . . standard census data on life expectancy in the United States and elsewhere merge the two very different mortality rates of smokers and nonsmokers, producing inaccurate estimates for each category when these categories are considered separately. Therefore, in any discussion or actuarial use of the male-female longevity difference based on such merged data, for example, calculation of pension benefits or life insurance premium rates, these categorical differences should be taken into account.'

relatives, who may not have been familiar with the early-life smoking habits of the decedents. Also, many respondents have a tendency to automatically classify themselves or anyone who has quit smoking at some time during their lives as nonsmokers even when they know of past smoking. This imprecision results in the classification of deceased former smokers as nonsmokers and thus increases the mortality rates attributed to nonsmokers. In our study, we were able to minimize this potentially confounding factor. Investigators conducting new studies should use the most precise methods for classification of smoking status.

The results of our study have two implications. First, standard census data on life expectancy in the United States and elsewhere merge the two very different mortality rates of smokers and nonsmokers, producing inaccurate estimates for each category when these categories are considered separately. Therefore, in any discussion or actuarial use of the MFLD based on such merged data, for example, calculation of pension benefits or life insurance premium rates, these categorical differences should be taken into account.

The second implication is that a person's sex-role behavior has an impact on health and morbidity and, consequently, on longevity. In a recent article, Lewis and Lewis (*29*) attributed the present MFLD to men's excessive smoking, their suicidal and accident-risk behavior, their greater alcohol consumption, and male disdain for "minor" medical assistance. These authors also noted the trends for female behavior to become similar to male behavior, and they commented on the adverse impact of this trend on female health and morbidity. The most significant change in younger women's health habits in the United States over the past decade has been a large increase in teenage and preteenage smoking. The 1981 Surgeon General's report on the health consequences of smoking for women (*30*) indicates that teenage girls have surpassed teenage boys in the percentage of smokers. When cohorts of women who have smoked as much as men reach the later decades of life, the results of our study suggest that their lives will be shortened as much as men's and that the present differences in longevity between men and women (MFLD) will disappear.

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Status of Nutrition Surveillance Activities in 24 State and Metropolitan Health Departments

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SYNOPSIS

A study was undertaken to examine nutrition surveillance activities and their usefulness in managing programs of nutrition intervention. Questionnaires were returned by 24 of 26 directors of nutrition units in State or metropolitan health departments participating in 1981 in the coordinated nutrition surveillance system of the Centers for Disease Control, which monitors high risk pediatric patients and pregnant women.

The mean years of experience in surveillance activities among the agencies was 4. Only 25 percent of the responding departments reported a self-sufficient computerized surveillance system. Personnel most involved in the coordinating, analyzing, and interpreting of the data were nutritionists who spent an average of 17 hours per month.

Major uses of surveillance data reported for purposes of the nutrition programs were to (a) *identify collection sites with problems such as errors in measuring heights and weights and hematocrits warranting checks for quality control,* (b) *define the extent of nutrition-related disorders in the target populations,* (c) *provide objective local data to assist in*