

Methods Used to Quit Smoking in the United States

Do Cessation Programs Help?

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Using data from the 1986 Adult Use of Tobacco Survey, we analyzed smoking-cessation methods used by adult smokers in the United States who tried to quit. About 90% of successful quitters and 80% of unsuccessful quitters used individual methods of smoking cessation rather than organized programs. Most of these smokers who quit on their own used a "cold turkey" approach. Multivariate analysis showed that women, middle-aged persons, more educated persons, persons who had made more quit-smoking attempts, and, particularly, heavier smokers were most likely to use a cessation program. Daily cigarette consumption, however, did not predict whether persons would succeed or fail during their attempts to quit smoking. Rather, the cessation method used was the strongest predictor of success. Among smokers who had attempted cessation within the previous 10 years, 47.5% of persons who tried to quit on their own were successful whereas only 23.6% of persons who used cessation programs succeeded. We conclude that cessation programs serve a small, but important, population of smokers that includes heavier smokers, those most at risk for tobacco-related morbidity and mortality.

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THE PREVALENCE of cigarette smoking among adults in the United States has declined from 40% in 1965 to 29% in 1987.^{1,2} By 1986, almost half of all persons in the United States who reported ever smoking had quit,³ with the ranks of ex-smokers increasing by ap-

proximately 1.3 million persons each year.

These figures, however, underreport the actual magnitude of cessation activity in this country. In 1986, over 30% of persons (approximately 17 million) who

cessful each year. In other words, smoking relapse is markedly slowing the overall potential decline in smoking prevalence in the United States. The important question is whether anything can be done to improve this low success rate.

A large body of literature exists on various methods used to help smokers quit successfully.⁵⁻⁹ To evaluate the usefulness of these cessation methods, both their efficacy (the proportion of persons using these methods who successfully quit) and their effectiveness (the proportion of the total population who successfully use these methods to quit) must be considered.

Many studies have evaluated the efficacy of formal cessation programs—most report a success rate among different methods (defined as abstinence at 1-year follow-up) of between 20% and 40%.^{5,9}

No recent studies, however, have evaluated the effectiveness of cessation programs in the United States. Chapman,¹⁰ in a study of cessation programs in the United Kingdom, concluded that stop-smoking clinics have contributed little to the overall decline in cigarette smoking. Chapman suggested that cessation clinics be abandoned as a key element in the public health approach to reducing smoking prevalence.

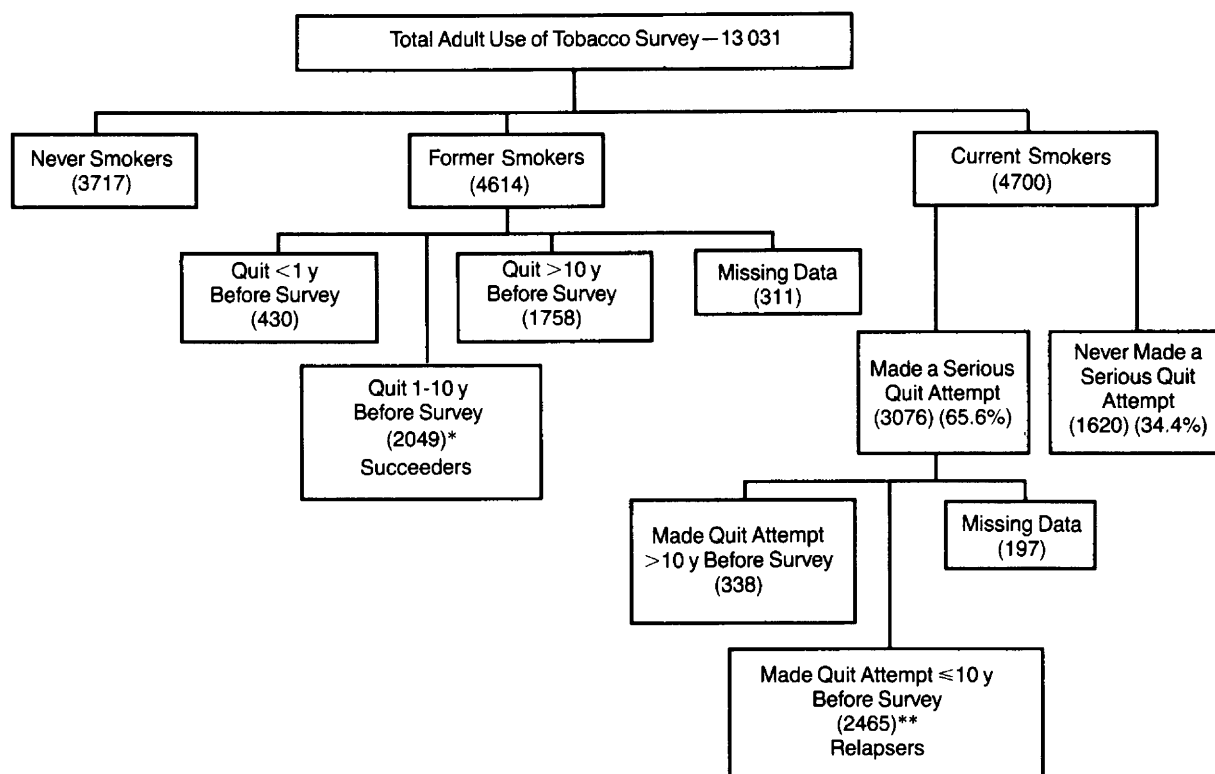
Our research addresses the same issues for the US population, using data from the 1986 National Adult Use of Tobacco Survey (Centers for Disease Control).¹¹ We have focused on the fol-

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had smoked during the preceding year reported that they had tried to quit during that period.⁴ If we consider the 1.3 million new ex-smokers as representing the succeeders among the 17 million who attempt cessation, then less than 10% of smokers who try to quit are suc-

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Population of succeeders and relapsers among all persons surveyed during the 1986 Adult Use of Tobacco Survey (unweighted data). *Includes only white and black persons. Other races were excluded, 66 of whom fulfilled the criteria for succeeders and 76 for relapsers.

lowing questions: (1) What smoking cessation methods do persons in the United States use to quit smoking? (2) Do persons who use cessation programs differ from those who try to quit smoking on their own? (3) What characteristics distinguish successful quitters from those who relapse to smoking?

METHODS

Study Population

For our analysis, we used data from the Adult Use of Tobacco Survey conducted in 1986 by the Office on Smoking and Health, Centers for Disease Control. The Adult Use of Tobacco Survey, which used a computer-assisted telephone interview protocol, surveyed 13 031 noninstitutionalized civilian US adults (≥ 17 years of age). Such self-reported data have been demonstrated to be valid for estimating prevalence of smoking in the population.³

The overall response rate was 74.3%. Data on the cessation behavior of nonrespondents are unavailable. The survey oversampled ever-smokers. Population estimates were obtained by weighting the sample according to smoking status, age, race, sex, education, and geographic region. A full description of the methods has been published.¹¹

Cigarette smoking status was defined as follows: *ever-smokers* were defined as persons who reported smoking at least 100 cigarettes in their lifetime. Respondents were further divided into current smokers or former smokers on the basis of their responses to the question, "Do you smoke now?" Respondents were asked to report the number of cigarettes smoked per day, the number of quit-smoking attempts, and whether they had ever received advice from a physician to quit smoking. If the respondent reported having made a "serious" (self-defined) quit attempt, the specific cessation method used during the most recent attempt and the method used during any other attempt were ascertained.

Sociodemographic variables used in this analysis were sex, age, race (white vs black), and education (high school graduate or less vs at least some college education).

Definitions

This study examines the cessation behavior of smokers who had tried to quit. Smokers who had never made a quit attempt were excluded. Two distinct subpopulations are described: ever-smokers who had made a serious at-

tempt to quit smoking and had succeeded (succeeders) and ever-smokers who had made a serious attempt to quit but had failed (relapsers) (Figure). We defined these two subpopulations as follows.

Succeeders.—These were former smokers who had quit smoking within the preceding 10 years (and thus were at low risk for relapse) and had been ex-smokers for at least 1 year. Persons who had quit more than 10 years before were excluded for two reasons: (1) the availability and use of cessation methods 10 years before the survey may not reflect current cessation methods and patterns, and (2) recall of behavioral changes in the distant past may be selective. Persons who quit within the last year were excluded because of the high recidivism rate during the first year after quitting.¹² Among all persons surveyed, 2049 fulfilled these criteria (Figure).

Relapsers.— These were current smokers who had made at least one serious attempt to quit in the past 10 years but had relapsed and were smoking at the time of the survey. Among all persons surveyed, 2465 fulfilled these criteria (Figure).

We divided cessation methods into

the following two categories (Table 1).

Unassisted Methods of Cessation.—These included quitting “cold turkey”; gradually decreasing the number of cigarettes smoked per day; using low-tar or low-nicotine cigarettes; quitting with friends, relatives, or acquaintances; us-

ing special cigarette filters or holders; using other nonprescription products; or substituting another tobacco product (snuff, chewing tobacco, pipes, or cigars).

Assisted Methods of Cessation.—These included attending a program or course for a fee, attending a program or course for free, consulting a psychiatrist or psychologist, using hypnosis, using acupuncture, or using nicotine gum. The latter method was included as an “assisted” method because nicotine gum requires a prescription and the physician is urged to provide cessation counseling with the gum.

Respondents who had used both unassisted and assisted cessation methods were categorized as having used an assisted method. When cessation methods other than those listed above were cited, they were reviewed in detail and, if clearly appropriate, were reclassified as either an unassisted or an assisted method. No single “other” method was cited by more than 1% of respondents.

Assignment of assisted vs unassisted categories was based solely on the respondent's report of methods used during prior cessation attempts. Thus, advice to quit smoking, such as that provided by a physician, would not be

reflected in the categorization of a respondent by method of smoking cessation.

Analysis

We performed two multivariate logistic regression analyses using SAS statistical software (SAS Institute, Cary, NC).¹³ The outcome variable in the first model was whether the respondent used an assisted or an unassisted method of cessation during any quit attempt. The other variables were the sociodemographic characteristics cited in the methods, number of quit-smoking attempts, and number of cigarettes smoked per day.

The outcome variable in the second model was whether the respondent was a successer or a relapser. The other variables were sociodemographic characteristics, number of quit-smoking attempts, number of cigarettes smoked per day, and cessation method (assisted vs unassisted) used during any quit attempt.

For both models, unweighted data were analyzed. Results for each parameter, including odds ratios and their 95% confidence intervals, were computed. The variable “physician's advice” was excluded from analysis because it was impossible to determine whether the advice preceded or followed the quit attempts.

RESULTS

Characteristics of Successers and Relapsers

Overall, successers and relapsers differed little by sex and race distributions, number of cigarettes smoked per day, and whether they had ever received a physician's advice to quit smoking (Table 2). Relapsers tended to be younger than successers. Successers tended to be more educated—42% of successers and only 30% of relapsers had completed at least some college. Successers were less likely to have used an assisted method of smoking cessation—20% of relapsers and only 8% of successers had used an assisted method. A high percentage of both successers (74%) and relapsers (69%) had received advice from a physician to quit smoking. About 30% of both successers and relapsers were heavy smokers (≥ 25 cigarettes per day).

Specific Methods of Smoking Cessation Used During Quit Attempts

The overwhelming majority of successers and relapsers attempted to quit smoking on their own (Table 3). For both groups, the method of cessation used during the last quit attempt paral-

Table 1.—Classification of Cessation Methods

Unassisted Methods of Cessation	Assisted Methods of Cessation
Quit “cold turkey”	Program/course for a fee
Gradually decreased the number of cigarettes smoked per day	Program/course for free
Used low-tar/nicotine cigarettes	Psychiatrist/psychologist counseling
Quit with friends, relatives, or acquaintances	Nicotine gum and counseling
Used special filters or holders	Hypnosis
Used other nonprescription product	Acupuncture
Substituted another tobacco product (snuff, chewing tobacco, pipes, cigars)	Other*
Other*	

*Some survey respondents reported methods of cessation other than those listed. These “other” responses were reviewed and, if clearly appropriate, reclassified as one of the listed methods of cessation. No single “other” method was reported by more than 1% of the populations.

Table 2.—Characteristics of Successers and Relapsers*

Characteristics	Successers, %	Relapsers, %
Males	56.4	51.5
Females	43.6	48.5
Whites	90.9	87.5
Blacks	9.1	12.5
Age, y		
17-24	7.2	14.8
25-44	49.4	55.7
45-64	28.6	23.8
≥ 65	14.7	5.7
Education, y		
≤ 12	57.5	70.3
≥ 13	42.2	29.5
Unknown	0.3	0.2
Smoked < 25 cigarettes per day	69.0	69.0
Smoked ≥ 25 cigarettes per day	31.0	29.1
Unknown	0	1.9
Used an assisted method of cessation—any quit attempt		
Yes	8.0	20.4
No	91.8	79.5
Unknown	0.2	0.2
No. of quit attempts		
1-2	66.0	55.3
3-4	19.6	26.0
5+	11.8	15.6
Unknown	2.6	2.8
Ever advised by a physician to quit smoking		
Yes	74.1	69.3
No/unknown	25.9	30.7

*Based on data from the 1986 Adult Use of Tobacco Survey (Centers for Disease Control) using sample of 4514 persons (successers, 2049; relapsers, 2465) described in Figure. These analyses exclude smokers who have never made a quit smoking attempt. Weighted to reflect the adult US population.

Table 3.—Percentage of Succeeders and Relapsers Who Utilized Various Cessation Methods to Quit Smoking During Their Last or Any Quit Attempt*

Methods of Cessation	Succeeders: Quit Attempt		Relapsers: Quit Attempt	
	Any, %	Last,† %	Any, %	Last, %
Unassisted	91.8	95.3	79.5	88.9
Quit "cold turkey"	88.4	84.9	84.0	75.6
Gradually decreased number	25.7	12.7	41.7	16.7
Used low-tar/nicotine cigarettes	15.3	4.6	27.2	5.2
Quit with friends, relatives, or acquaintances	12.7	5.1	21.6	6.6
Special filters or holders	6.7	1.2	13.3	2.9
Other nonprescription products	2.8	1.0	5.4	2.0
Substituted other tobacco products	6.8	4.0	6.8	2.1
Assisted	8.0	4.3	20.4	10.8
Program/course for a fee	2.4	1.3	4.0	1.7
Program/course for free	1.4	0.5	3.3	1.2
Psychiatrist/psychologist	0.6	0.1	0.9	0.3
Hypnosis	1.9	1.2	5.3	2.6
Acupuncture	0.2	<0.1	0.9	0.4
Nicotine gum	2.6	1.2	12.2	5.5
Other methods‡	12.3	14.5	12.3	14.1

*Based on data from the 1986 Adult Use of Tobacco Survey (Centers for Disease Control) using sample of 4514 persons (succeeders, 2049; relapsers, 2465) described in Figure. These analyses exclude smokers who have never made a quit smoking attempt. Weighted to reflect the adult US population. Totals are greater than 100% because some respondents used two or more methods to quit. Missing data are excluded and represent less than 0.5% of succeeders or relapsers.

†Represents cessation method used during their successful quit attempt.

‡"Other" indicates miscellaneous responses, none of which were cited by more than 3% of any group.

Table 4.—Methods of Smoking Cessation: Univariate Characteristics of Persons Using Assisted Methods of Quitting and Logistic Regression Model of Predictors of Use of Assisted Methods*

Characteristics	Univariate Analysis†: % Using an Assisted Cessation Method	Logistic Regression Model‡	
		Odds Ratio	95% Confidence Interval
Total	14.9
Males	13.4	1.00	...
Females	16.8	1.61	1.36-1.91
Blacks	11.4	1.00	...
Whites	15.4	1.38	0.99-1.93
Age, y			
17-24	9.5	1.00	...
25-44	15.2	1.63	1.15-2.31
45-64	18.5	1.94	1.34-2.79
≥65	10.4	1.16	0.74-1.81
Education, y			
≤12	14.1	1.00	...
≥13	16.6	1.21	1.02-1.43
No. of quit attempts			
1-2	12.1	1.00	...
3-4	15.9	1.45	1.19-1.77
5+	25.3	2.51	2.02-3.10
Cigarettes per day			
<25	12.7	1.00	...
≥25	20.3	1.83	1.53-2.18

*Based on data from the 1986 Adult Use of Tobacco Survey (Centers for Disease Control) using our sample of 4514 persons (succeeders, 2049; relapsers, 2465) described in Figure. These analyses exclude smokers who have never made a quit smoking attempt.

†Based on weighted data to reflect the adult US population.

‡Model includes all main effects listed. Analysis was computed using unweighted data.

leled that used during any attempt. A synopsis of cessation methods used during the last quit attempt and during any attempt follows.

Last Quit Attempt.—The majority of both succeeders and relapsers had used an unassisted method during their last quit attempt. Succeeders were

more likely than relapsers to quit cold turkey, whereas relapsers were slightly more likely to have gradually decreased their daily consumption of cigarettes. Few respondents had used any of the assisted methods except for nicotine gum. Approximately 20% of respondents used more than one cessation

method during their last quit attempt.

Any Quit Attempt.—The majority of both succeeders and relapsers had used unassisted methods of smoking cessation exclusively during any of their quit attempts. Succeeders were somewhat more likely than relapsers to quit cold turkey. Relapsers were more likely than succeeders to gradually decrease daily cigarette consumption, use low-tar or low-nicotine cigarettes, or employ special filters or holders in trying to quit. Relapsers were more likely than succeeders to have tried assisted methods of smoking cessation; the largest difference was in the use of nicotine gum.

Analyses of Use of Assisted and Unassisted Cessation Methods

Fifteen percent of all respondents used an assisted method of cessation during any of their attempts to quit smoking (Table 4). Univariate analysis of data weighted for other characteristics shows that slightly more women than men, whites than blacks, middle-aged than younger or older persons, and college-educated persons than persons without college training used an assisted method of cessation during any of their quit attempts. Persons who had made more quit-smoking attempts were more likely to have used an assisted method. Finally, heavy smokers were much more likely than lighter smokers to use an assisted method.

Multivariate logistic regression analysis of factors influencing the choice of cessation method shows that more women than men, more college-educated persons than persons without college training, and more middle-aged persons than other age groups chose an assisted method (Table 4). Persons who had made more quit-smoking attempts were much more likely to have used an assisted method of cessation than persons who had made fewer quit attempts. A strong predictor of using an assisted method of smoking cessation was the number of cigarettes smoked per day. Heavier smokers were much more likely to use an assisted method than were persons who smoked fewer than 25 cigarettes each day.

Analysis of Success and Relapse

Among our population of smokers who had tried to quit in the preceding 10 years, 44.0% were successful in stopping smoking. Univariate analysis of weighted data (Table 5) showed that more men than women, more whites than blacks, more older than younger persons, and more college-educated persons than persons without college training were successful in quitting

Table 5. — Success vs Relapse: Univariate Characteristics of Succeeders and Logistic Regression Model of Predictors of Success During Quit-Smoking Attempts*

Characteristics	Univariate Analysis†: % Successful	Logistic Regression Model‡	
		Odds Ratio	95% Confidence Interval
Overall	44.0
Males	46.2	1.00	...
Females	41.4	0.94	0.82-1.06
Blacks	36.4	1.00	...
Whites	44.9	1.28	1.01-1.61
Age, y			
17-24	27.7	1.00	...
25-44	41.1	1.83	1.45-2.30
45-64	48.5	2.71	2.11-3.48
≥65	66.9	5.56	4.11-7.51
Education, y			
≤12	39.1	1.00	...
≥13	52.9	1.76	1.55-2.00
Cigarettes per d			
<25	44.0	1.00	...
≥25	45.5	1.09	0.95-1.26
No. of quit attempts			
1-2	48.2	1.00	...
3-4	37.2	0.66	0.57-0.77
5+	37.2	0.61	0.51-0.74
Assisted cessation method used during any quit attempt			
No	47.5	1.00	...
Yes	23.6	0.31	0.26-0.38

*Based on data from the 1986 Adult Use of Tobacco Survey (Centers for Disease Control) using our sample of 4514 persons (succeeders, 2049; relapsers, 2465) described in Figure. These analyses exclude smokers who have never made a quit smoking attempt.

†Based on weighted data to reflect the adult US population.

‡Model includes all main effects listed. Analysis was computed using unweighted data.

smoking. Persons who had made fewer quit-smoking attempts were more likely to have successfully quit than those who had made more quit attempts. Large differences in success were observed based on method used to stop smoking. About 48% of persons who quit smoking on their own and only 24% of persons using an assisted method of cessation were successful. Only very small differences in success rates were noted between heavier smokers and lighter smokers overall. Stratifying by number of cigarettes smoked per day and method of cessation, 21% of lighter smokers and 31% of heavier smokers using assisted methods succeeded in quitting compared with 49% of lighter smokers and 51% of heavier smokers using unassisted methods who succeeded.

Multivariate logistic regression analysis shows that sex and number of cigarettes smoked per day were not significant predictors of success in quitting smoking (Table 5). However, college-educated persons were more likely than persons without college training to successfully quit smoking. Whites were more likely than blacks to quit successfully. Age was also a significant independent predictor of success—older persons were more likely than younger

persons to quit successfully. Persons who had made fewer quit smoking attempts were more likely to have successfully quit than those who had made more quit attempts. Finally, the model predicted that persons who used an assisted method during any quit attempt were much less likely to succeed than persons who used an unassisted cessation method.

COMMENT

This report describes smoking-cessation behavior among the US population and highlights three important findings about quitting smoking. First, most cigarette smokers who try to quit do so on their own. Second, persons who try to quit on their own are more likely to be successful than those who seek help in quitting. Finally, persons who seek help tend to be heavier smokers and to have made more cessation attempts than those who quit unaided.

These findings raise questions regarding the generalizability of research results based solely on the evaluation of formal cessation programs. Because only 15% of the overall population of quitters use cessation programs, comparing results from this group with results from the much larger group of American smokers who try to quit on

their own may not be appropriate. This possibility is underscored by our observation that, among smokers who made a quit attempt during the preceding 10 years, only 24% of program users were successful in quitting, whereas 48% of smokers who quit on their own succeeded.

Our analyses do not address the larger issue of how best to spend limited financial resources in controlling the epidemic of tobacco use. Specifically, do cost-intensive smoking-cessation programs warrant their expense if they serve less than 20% of those smokers who are trying to quit? This issue is particularly relevant to public policy decision makers, who must often choose between spending scarce resources on cessation vs prevention activities in their efforts to decrease tobacco use.

This study, with a large sample size and representative population, provides important information on cessation behavior in the United States. Some limitations of the data, however, must be highlighted. Misclassification of type of cessation method may have occurred as a result of selective recall bias. For example, successful quitters may have been more likely than relapsers to selectively recall their last or successful cessation attempt. If this occurred at the exclusion of reporting the use of formal programs, then our findings might underestimate the role of cessation programs. Selective recall bias may also have occurred regarding number of quit-smoking attempts if persons who successfully quit underestimated their number of quit attempts. Additionally, not all selected individuals participated in this study. If use of cessation programs or success differed among the 25% nonrespondents, the generalizability of our findings may be affected.

Most Smokers Quit on Their Own

Our first finding provides empirical support in the United States for Chapman's¹⁰ conjecture that cessation programs do not play a major role for the vast majority of people who quit smoking. Barriers to the use of these programs, however, may limit their utilization. We question, therefore, his conclusion that evidence is sufficient to advocate abandoning these programs.

The low utilization of assisted cessation programs may reflect inaccessibility. Programs typically use a small-group, face-to-face strategy and are labor intensive. Enrollment is limited by the number of interested people for whom the day, time, and location are convenient. Such barriers have previously been identified in other areas of

health education.¹⁴

Another barrier to accessibility may be related to the cost (both direct and indirect) of such programs. Trend analyses suggest that cigarette smoking is increasingly a behavior of the less educated and socioeconomically disadvantaged segments of our society.^{15,16} These individuals may have limited financial resources and are probably the least likely to enroll in cessation programs. Access may be further limited by current insurance policies, which rarely reimburse for smoking-cessation activities.^{3,17}

A final barrier to the use of cessation programs may be that they are unacceptable to certain segments of the population, including those with the highest smoking prevalence rates.¹⁸ Blue-collar workers, for example, may not respond to advertisements and program materials that are targeted primarily toward white-collar workers.¹⁹ Similarly, Hispanics and blacks may be better assisted by culturally specific materials. Finally, smoking-cessation literature is often written at a level beyond the literacy skills of many smokers.²⁰ The National Cancer Institute is currently assessing cessation programs designed specifically for minority populations.²¹

Factors That Contribute to Successful Cessation

The finding that persons who attempt to quit smoking on their own are almost

twice as likely to succeed as persons who seek help is not surprising given the observation that cessation programs may attract the most strongly addicted smokers. The lower success rate among persons using cessation programs may be explained by the finding that program users differ from persons who try to quit on their own (ie, number of previous quit attempts, number of cigarettes smoked per day, etc). Possibly, self-quitters have more confidence in their ability to quit because they are less nicotine dependent than persons who seek help in quitting.²² Pharmacological agents to promote cessation, such as nicotine gum, have been cited as aids to increase success.^{9,23-25} Our data do not support this conclusion, with few successful quitters in our study reporting nicotine gum use as a method of cessation. Its limited availability at the time of this survey and improper gum use,²⁶ however, may have contributed to the low utilization rate in this study.

Our data also provide indirect evidence of the importance of the physician in helping smokers to quit. More than 70% of succeeders and relapsers had been urged to quit by a doctor (Table 2). In contrast, only 46% of all smokers surveyed in the Adult Use of Tobacco Survey had been advised by a doctor to quit smoking.¹¹ Moreover, our classification of cessation method was based exclusively on the method used to quit and may have underestimated the impor-

tance of a physician's advice to motivate a smoker to make a quit attempt. For example, if a respondent had been urged by his or her physician several times over a period of years to stop smoking and then quit cold turkey, the respondent would still be categorized as having used an unassisted method of cessation. Recent studies have indicated that, with a little training, physician intervention can significantly increase the proportion of smokers who successfully quit.²⁷ The National Cancer Institute has summarized these findings in its recent publication, *How to Help Your Patients Stop Smoking*.²⁸

Value of Cessation Programs

We conclude that cessation programs play a limited, but important, public health role. They appear particularly to be treating heavy smokers, the group at highest risk for the dose-dependent morbidity and mortality associated with cigarette smoking. In addition, even though the percentage of persons using cessation programs is small, the actual number is large. Consider the 17 million smokers who reported having attempted to quit in 1986.³ If 15% of these smokers used cessation programs, the number of persons using these methods would exceed 2 million each year.

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