

Adult Cigarette Smoking Prevalence: Declining as Expected (Not as Desired)

David Mendez, PhD, and Kenneth E. Warner, PhD

We compared observed smoking prevalence data for 1995–2002 with predictions derived from a previously published population dynamics model to determine whether the recent trend in smoking prevalence is consistent with the downward pattern we predicted. The observed data fit our projections closely ($R^2 = .89$). Consistent with the logic underlying the model, we conclude that adult smoking prevalence will continue to fall for the foreseeable future, although at a rate approximately half that of the decline experienced during the 1970s and 1980s.

From 1970 to 1990, adult cigarette smoking prevalence fell steadily, from 37.4% in 1970 to 25.5% in 1990. The 1990s presented a very different picture, however. By 1994, successive annual surveys showed that adult smoking prevalence had remained essentially unchanged for 5 years. Some observers concluded that, having gotten rid of the least addicted smokers, the United States was left with a group of “hardcore” smokers who could not quit. Others blamed inadequacies in the deployment of tobacco control resources, some calling for more emphasis on prevention, others blaming inadequate attention to cessation.¹

In 1998, we published a model that described the adult smoking prevalence process, using data from the National Health Interview Survey (NHIS).² We concluded that smoking prevalence had not, in fact, stalled. Rather, it followed the downward pattern of the previous 2 decades. Furthermore, it would necessarily continue to fall in the future, albeit gradually. These conclusions were derived from the fact that the overall annual smoking cessation rate exceeded the initiation rate, a condition likely to continue into the future. Also, the apparent stalling of smoking preva-

lence was likely to be the result of a measurement problem. Because of the continuous flattening of smoking prevalence and the increase of smoking survey frequency during the 1990s, year-to-year changes in prevalence were not large enough to show as statistically significant. In addition, as noted below, in 1992 the NHIS changed the definition of current smoker in a subtle manner that likely increased the prevalence rate slightly.³

Five years have passed since we published our model, and recent survey results indicate that prevalence is indeed falling. As our analysis was based on data up to 1994, we are now able to compare the observed prevalence data from 1995 to 2002 with our published predictions to examine whether the recent trend is consistent with the downward pattern we predicted.

METHODS

Our smoking demographics model has been described elsewhere.² Our projections for 1995–2002 assume the smoking initiation rate in effect in 1995, which was 30%. Observed prevalence data were taken from the annual NHIS results,³ except for 1996, when the NHIS did not collect smoking data. The prevalence data for 2002 was reported as preliminary.⁴

Since 1992, the definition of current smokers has explicitly included nondaily smokers, which increased prevalence computations by about 1 percentage point.⁵ Because our published predictions were developed according to the pre-1992 definition, we augment our forecasts by 1 point to be consistent with the current computations of smoking prevalence.

RESULTS

Figure 1 shows actual prevalence observations for 1995–2002 and our predicted values. Table 1 presents the specific values of actual prevalence and our forecasts. Our forecasts closely track the actual experience ($R^2 = 0.89$). Over the 7-year period, actual prevalence fell 2.2 percentage points, identical to our prediction of 2.2 points. Thus, prevalence fell an average of 0.3 points per year, or 1.3% of the average annual prevalence rate during the period.

DISCUSSION

Our model accurately predicted not just the continuous decline in adult smoking prevalence but also its magnitude. Since 1999, observed prevalence has fallen slightly below the model predictions. These “below-the-line” outcomes could well reflect successful tobacco control initiatives following the 1998 Master Settlement Agreement,⁶ including substantial increases in cigarette prices⁷ and the national youth antismoking media campaign (the “truth” campaign).⁸ Indeed, decreases in youth initiation resulting from these interventions would be consistent with our initiation rate-specific forecasts (Figure 1).

Our main conclusions from the 1998 article remain unchanged. The general dynamics that govern adult smoking prevalence exhibit a large degree of inertia and are likely to prevail for years to come. Smoking prevalence will continue to fall. This conclusion should relieve those concerned that the decline in adult smoking prevalence has stalled. At the same time, the validation of our model implies that the annual decrease in smoking prevalence is necessarily slowing down and that ambitious tobacco control prevalence goals will be difficult to achieve. From 1970 to 1990, prevalence fell by 0.6 percentage points per year, or 1.9% of the average prevalence rate. During the most recent 7-year period, our period of forecast, prevalence declined at a rate only slightly greater than half that of the earlier period.

Consideration of the dynamics of smoking initiation and cessation should assist in the formulation of reasonable expectations with regard to the potential impact of tobacco control policies. Such evidence-based logic has not always been used, however. For example, in 1999, when it was obvious that the national goal of 15% adult prevalence for the year 2000 was not going to be met, the Centers for Disease Control and Prevention (CDC) set a new goal of 12% for the year 2010. Using our model, we concluded that the 2010 target was essentially unattainable.⁹ The CDC recently acknowledged that the current rate of decline is not sufficient to reach the target.¹⁰

The CDC also concluded, however, that “full implementation of comprehensive

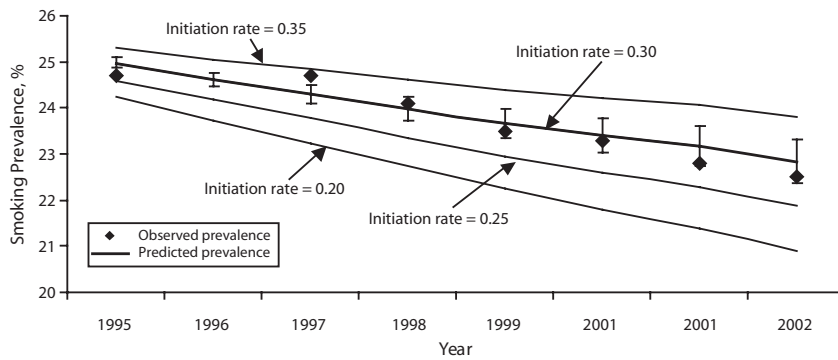


FIGURE 1—Observed versus predicted adult smoking prevalence in the United States (with confidence intervals).

tobacco-control programs could help meet these objectives.”¹⁰ As we explained in our earlier article,⁹ the dynamics of smoking initiation and cessation indicate that even with the implementation of comprehensive tobacco control programs, the goal set for 2010 is extremely unlikely to be attainable. Establishing unrealistic goals risks turning achievements worth celebrating into perceived evidence of the inadequacies of control programs. In the future, the government should link its goals to sound projections of outcomes in the absence of enhanced tobacco control efforts. An ambitious goal can then be set with realistic expectations of improvements on results that would otherwise occur in the absence of such efforts.

Tobacco control can and does work.¹¹ Arguably, the achievements of tobacco control since the 1960s represent the single greatest contribution to public health in the past half century.¹² There is every reason to anticipate continued successes in the coming decades. The population dynamics of smoking highlight the realm of what is possible. ■

About the Authors

David Mendez and Kenneth E. Warner are with the Department of Health Management and Policy, University of Michigan School of Public Health, Ann Arbor.

Requests for reprints should be sent to David Mendez, PhD, M3232 SPH II, 109 S Observatory St, Ann Arbor, MI, 48109-2029 (e-mail: dmendez@umich.edu).

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Contributors

Both authors were involved in the conception and design of the study and the writing of the brief. D. Mendez was responsible for generating the model projections.

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Human Participant Protection

No protocol approval was necessary for this study.

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TABLE 1—Predicted Smoking Prevalence vs Observed Smoking Prevalence: 1995–2002

Year	Predicted Prevalence, % (95% Confidence Interval)	Observed Prevalence, %
1995	25.0 (24.9, 25.1)	24.7
1996	24.6 (24.4, 24.8)	... ^a
1997	24.3 (24.1, 24.5)	24.7
1998	24.0 (23.7, 24.3)	24.1
1999	23.7 (23.4, 24.0)	23.5
2000	23.4 (23.0, 23.8)	23.3
2001	23.2 (22.7, 23.6)	22.8
2002	22.8 (22.4, 23.3)	22.5

^aThe National Health Interview Survey did not produce an estimate of smoking prevalence for 1996.