Smoking Prevalence in 2010: Why the Healthy People Goal Is Unattainable

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In 1990, the US Public Health Service released Healthy People 2000, its public health objectives for the nation for the year 2000. Included was a very ambitious goal of reducing the prevalence of adult smoking from 25.5% (1990) to 15%. With smoking prevalence at nearly 24% in 1997, the nation will fall far short of this objective. Using formal modeling and examining data through 1994, Pechmann et al. recently projected a prevalence of 21% in 2000 if the steady decline of 0.7 percentage point in effect since the 1970s persists until 2000.

In 1998, the Office of Disease Prevention and Health Promotion circulated draft goals for the year 2010 objectives for the nation. The adult smoking prevalence goal was set at 13%, a modest reduction from the goal for 2000 but a substantial decline from the prevalence likely to exist at that time. The question addressed in this study is what changes in rates of smoking initiation and cessation would be needed to realize the 2010 objective. This in turn permits an assessment of the likelihood that the objective will be realized.

Methods

We employed a dynamic model of smoking prevalence that uses population demographics model, developed by our research team and described elsewhere. The model, which computes smoking prevalence over time by tracking the inflow of new smokers and the outflow caused by death or smoking cessation, compares the resulting number of smokers with the size of the overall population, which is also tracked by the model. It includes age- and smoking-specific death rates and age cohort-specific initiation and quitting rates estimated from National Health Interview Survey (NHIS) data. It recognizes different cessation rates for 3 age groups: 18 to 30 years, 31 to 50 years, and 51 years and older. The estimated current annual cessation rates for these groups are 0.21%, 2.15%, and 5.96%, respectively. In this study, we report cessation rates as a “factor” of these values. For example, a cessation factor of 1.5 corresponds to cessation rates 1.5 times each of these annual cessation rates. As in our earlier work, prevalence in this study is consistent with the definition of “current smoker” used in the NHIS before 1992. A change in the definition that year led to the inclusion of some nondaily smokers previously omitted from the category of current smoker. Inclusion of these individuals raises the estimates of prevalence by approximately 1 percentage point.

We used the model to investigate different combinations of cessation and initiation rates that would produce an adult smoking prevalence of 13% by 2010, under 2 different sets of assumptions. First, we assumed that initiation and cessation rates would change instantly, in 2000, from their current values to their 2010 values, and then would remain constant throughout the decade. Although this is obviously not realistic, it demonstrates the extreme case of success in controlling tobacco use. Second (the more plausible scenario), we assumed that beginning in 2000, cessation and initiation rates would change linearly from their current values to their 2010 values, and then would remain constant throughout the decade. Although this is obviously not realistic, it demonstrates the extreme case of success in controlling tobacco use. Second (the more plausible scenario), we assumed that beginning in 2000, cessation and initiation rates would change linearly from their current values to their final values in 2010. We also examined prevalence rates for 2010 that would result from realistic improvements in initiation and cessation.

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Results

Figure 1 shows the combination of smoking initiation rates and increases in smoking cessation rates necessary to achieve the 2010 adult smoking prevalence objective. The curve on the left assumes that the indicated initiation and cessation rates are achieved instantaneously in 2000 and maintained throughout the subsequent decade. The curve on the right assumes that the indicated rates are approached linearly beginning in 2000 and are finally attained in 2010.

In both instances, the smoking prevalence objective is unattainable if it is to be achieved exclusively by reducing the rate of young people’s smoking initiation. Even if that rate falls from its current level of 30% to 0% immediately in 2000—that is, no young person ever starts to smoke regularly after 1999—adult smoking prevalence will necessarily exceed the 13% goal in 2010. This result reflects the fact that adult smokers in 2000 will continue to dominate the determination of smoking prevalence 10 years later. At current rates of smoking cessation, the complete absence of new smokers will not have a substantial impact on adult smoking prevalence until many years beyond 2010.

The goal is theoretically feasible through increases in cessation alone, without changes in the initiation rate. However, even if the needed cessation rates could be achieved instantly at the outset of the decade, they would have to increase (at all ages) from their current rates by a factor of more than 3.5. For adults older than 50 years, this would require that the annual cessation rate, currently 5.96%, increase to over 21%.

If one considers the more plausible situation depicted on the right-hand side of the graph in Figure 1 (i.e., with the eventual initiation and cessation rates approached linearly throughout the decade), cessation rates would eventually have to rise by a factor of 6.3 to attain the objective for 2010. Again, for middle-aged and older adults—those who currently have the highest level of smoking cessation—the annual cessation rate would have to rise to nearly 40%.

Given simultaneous progress in decreasing initiation rates and increasing cessation rates, instantaneous attainment of needed changes in 2000 (the left-hand curve) would result in a 13% smoking prevalence if, for example, the initiation rate halved, falling to 15%, while all annual cessation rates rose by a factor of 2.3. With the more realistic assumption that the eventual changes in initiation and cessation would be achieved gradually over the decade (i.e., linearly, as depicted in the right-hand curve), halving the initiation rate would have to be paired with more than a 4-fold increase in cessation rates.

Table 1 shows predicted adult smoking prevalence in 2000, 2005, and 2010 under different scenarios concerning potentially achievable improvements in initiation and cessation rates during the next decade, assuming a gradual (linear) change in these rates over the course of the decade. The one exception is the first row, which corresponds...
Discussion

The Public Health Service is caught between a rock and a hard place in setting the 2010 smoking prevalence objective. The objective should not be implausible, yet it would be awkward to set the objective at a figure higher than that established for the 2000 objective (15%). Unfortunately, as this analysis demonstrates, given the current size and distribution of America’s smoking and nonsmoking populations, the 13% objective is essentially unattainable. Only implausible increases in cessation rates could yield such a low overall rate of smoking. This is true whether one assumes instantaneous or linear achievement of the smoking initiation and cessation changes needed, or anything in between.

National health objectives have proven to be an important mechanism for directing public health efforts. A 1997 survey showed that 46 states have used Healthy People 2000 to set their own health goals. National objectives should challenge the nation to utilize public health resources in a manner that will significantly improve upon otherwise anticipated results. Experience in states that have implemented aggressive tobacco control programs, such as California and Massachusetts, illustrates how this can be achieved.8,9 With this energized effort, however, the goals ought to be attainable. If they are not, as in the present case, even heroic public health efforts will be preordained to fail. Given the demographics of our population, if smoking prevalence falls to 16% or 17% by 2010, the nation will have realized a truly impressive public health achievement. It should be recognized as such, rather than as an effort that fell short.

Where feasible, data-driven analysis can and should be used in setting the objectives for the nation, a message also conveyed recently by Allison et al.10 These authors used a “pared-mean” method to evaluate the best achievable rate of screening mammography and found the Healthy People objective wanting. Formal data analysis can help to avoid “blunders,” such as the 2000 smoking prevalence objective of 15%, which an analysis such as this one would have demonstrated to be impossible. It can also guide the establishment of realistic but challenging goals for the subsequent decade. Data-driven methods can and should be used in setting other Healthy People objectives, such as for rates of physical activity and obesity.

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References