aggressive in the use of State and local data sources that allow for Hispanics to be identified separately. These data sources would be useful in exploring the myriad of questions related to culture, socioeconomic status, and lifestyles that need to be answered in order to provide the necessary scientific foundation for developing appropriate prevention and intervention strategies for Hispanics.

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Minnesota Plan for Nonsmoking and Health: Multidisciplinary Approach to Risk Factor Control

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Synopsis

In 1981, the Minnesota Department of Health began a long-term program to control risk factors for the major health problems of the State as determined by an expert committee. The methods chosen to initiate programs were (a) social, economic, and epidemiologic background research and (b) a multidisciplinary statewide planning process. Smoking was considered the most important problem. During 1983-84, department staff members analyzed the epidemiology and economics of smoking in Minnesota and reviewed the literature on methods of smoking control. They and a multidisciplinary technical committee prepared a coordinated plan to increase the prevalence of nonsmoking in Minnesota. The 39 recommendations address mass communication and marketing, educational programs in schools, public and private regulation, economic disincentives through taxation, and funding of programs and evaluation of results.

The Minnesota Plan for Nonsmoking and Health was released in September 1984. During the first half year, the plan provided material for formation of a coalition of health organizations to promote nonsmoking. In June 1985, the Minnesota Legislature passed the Omnibus Nonsmoking and Disease Prevention Act, which provides $4 million over 2 years for promotion of nonsmoking through education, regulation, and public communications. These intervention activities will be funded by a portion of a 5-cent increase in cigarette excise tax. The foundations have been laid for what may be the most comprehensive statewide nonsmoking program in the United States.

PUBLIC HEALTH PROGRAMS IN CHRONIC DISEASE control face a complex challenge: producing permanent changes in behavior patterns in large populations. The task taken up by the Minnesota Department of Health in 1981 was to develop a systematic approach to controlling chronic disease risk factors, and to identify a unique, useful role for a State health department in health promotion, a field in which many other public and private groups were already active.

The first need was for broad agreement on the problems to be attacked. In 1981, therefore, the Commissioner of Health asked a group of public health, medical, epidemiologic, and statistical experts to define the major health problems of the State. There was surprising unanimity among the members on nine areas: cigarette smoking, alcohol and drug misuse, nutrition, injuries, lack of exercise, stress, environmental problems, hypertension, and maintenance of existing gains. Although most items were not given a rank order, smoking was considered the most important (*1*).

Minnesota is well positioned for confronting the smoking problem. It is a nontobacco-growing State with strong health care institutions. The Minnesota Clean Indoor Air Act, passed in 1975, regulates smoking in public places, including most workplaces, and serves as a model for other States (*2*). The University of Minnesota, a short walk from the Minnesota Department of Health, is a major center for research on the prevention of smoking in youth and on adult smoking cessation, as well as other health promotion topics. The Minnesota Medical Society had recently passed a strong antismoking resolution directed to its own staff and officers. The Minnesota Association for Nonsmokers Rights (ANSR) had been influential in passing the Clean Indoor Act, and the State had a strong network of community public health agencies with an interest in chronic disease risk factor control. It appeared that Minnesota was ready for more progressive nonsmoking efforts than were possible at the national level.

The methods chosen to initiate programs to reduce smoking prevalence were (*a*) social, economic, and epidemiologic background research and (*b*) a multidisciplinary statewide planning and consensus-building process by experts in disciplines related to mass behavior that are not necessarily part of public health. Each of these aspects will be described, with a summary of the results. Complete descriptions of the epidemiologic results and of the expert committee's conclusions are described in a report (*3*), and a separate article on the epidemiologic aspects of smoking in Minnesota is in preparation.

Minnesota Center for Nonsmoking and Health

In 1983 the Commissioner of Health established the Minnesota Center for Nonsmoking and Health, staffed by two half-time research scientists—one in psychology and the other in epidemiology—and a health educator-administrator, all working under the direction of the State Epidemiologist. Funding was committed for an initial period of 1 year, and the program's success led to its continuation.

During the first 6 months, the staff described the epidemiology and economics of smoking in Minnesota and reviewed the literature on control programs. They helped select and organize the Minnesota Technical Advisory Committee on Nonsmoking and Health, staffed the committee's meetings, and developed background statements for the recommendations. The center's staff also established an office and a collection of research literature on smoking control, which provided information to others interested in the field.

Members of the Technical Advisory Committee on Nonsmoking and Health

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Erickson Super Valu
Chairman, Minnesota Food Retailers Association
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Epidemiology and Economics of Nonsmoking

The investigation focused on existing published and unpublished materials rather than on new data collection. To provide a positive and somewhat novel perspective, results were structured around *nonsmoking* whenever possible, presenting potential benefits of nonsmoking rather than the negative impact of smoking. Because nonsmoking was the goal, the epidemiologic and economic projections focused on the results of achieving this goal.

Patterns of smoking and nonsmoking in Minnesota were derived from a 1981 telephone survey of 1,441 households, using random-digit dialing (*4*). Minnesota mortality attributable to smoking was calculated from smoking prevalence, mortality statistics for 1981 (*5*), and age-, sex-, and disease-specific relative risks for current and former smokers (*6–9*).

Direct health care costs due to smoking and indirect costs of lost income and productivity were estimated by using the methods of Rice and Hodgson (*10*). Total Minnesota direct health care costs were assigned to diagnostic categories, according to the 1980 national distribution of direct costs (*11*). Costs attributable to smoking were estimated from the ratio of smoking-attributable deaths to total deaths for each disease category (the mortality comparison method).

The results of the epidemiologic and economic analyses predicted a number of benefits from universal nonsmoking in Minnesota (*3*). First, within 15 years, 4,600 to 5,000 lives would be saved per year, amounting to 15 percent of total Minnesota mortality. Second, the 39,000 person-years of smoking-related disability per year, equivalent to 9 percent of total statewide disability, would be substantially reduced. Third, there would be a marked decrease in nonmalignant consequences of passive smoking, such as childhood respiratory diseases, eye irritation, headache, and aggravation of allergies, and possibly modest reductions in the risk of lung cancer for nonsmokers. Finally, large monetary savings would occur in at least four areas:

- Direct, smoking-related health care costs estimated at $375 million—or 82 cents for each pack of cigarettes sold in 1983;
- Lifetime income losses due to smoking, estimated to be $303 million or 66 cents per pack sold in 1983;
- Loss of income due to smoking-related disability—not estimated quantitatively because the data sources were not considered sufficiently precise, but amounting to 9 percent of disability loss; and
- Excess costs to employers amounting to $430–$770 per year for each smoker employed (1983 dollars) (*12*).

Totals for 1983 from the direct and death-related indirect losses amounted to $678 million, more than the total retail cigarette sales of $450 million and equivalent to $1.48 per pack sold.

Technical Advisory Committee on Nonsmoking

To develop a statewide program to increase nonsmoking, the Minnesota Technical Advisory Committee on Nonsmoking and Health was formed (see box). The committee was to develop strategies to accomplish three goals: prevent nonsmokers from becoming smokers, increase the numbers of current smokers who quit, and protect nonsmokers from the health effects of passive smoking.

Technical knowledge about social change was sought from a variety of disciplines. Members of the committee were enlisted from the fields of wholesale and retail sales; labor; medicine; hotels, resorts, and restaurants; law; large and small business; education; insurance; legislation; nursing; smoking cessation and prevention; smoking research; smoking epidemiology; economics; advertising; local government; community action; and teaching. Professional and trade associations proved to be helpful in locating members, and several participants were presidents of such organizations. The members were chosen after interviews by members of the staff of the Minnesota Center for Nonsmoking and Health and recommendations from a variety of sources. Because the purpose was to devise effective methods for promotion of nonsmoking and not to debate the merit of doing so, persons who earned their living predominantly through the sale of cigarettes were not recruited. The committee included several former smokers, but experts who currently smoked were, understandably, reluctant to serve. Initial opinions on the desirability of influencing public behavior ranged from strong advocacy to vocal opposition. Both points of view were aired in committee discussions, and most of the more striking differences were resolved through compromise or in light of additional information.

The committee was asked to produce a statewide plan for the promotion of nonsmoking, covering the areas of mass communication and marketing,

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school and youth education, public and private regulatory measures, economic incentives and disincentives, and information needs. These five areas formed the basis for dividing the committee into subcommittees and comprised chapters in the final report.

The first two meetings of the committee included briefings from the staff on the epidemiology and economics of smoking in Minnesota and on the literature of smoking behavior and smoking-control programs. The full committee then generated ideas for possible statewide measures in each of the subject areas. During the succeeding 3 months, subcommittees investigated and refined the recommendations, and the staff expanded the background research. The subcommittee recommendations and background statements were discussed, altered, and approved by the full committee. The final set of 39 recommendations and background research was combined with the scientific research report to produce a 198-page document, the Minnesota Plan for Nonsmoking and Health (*3,13*). The document was presented to the Commissioner of Health and released to the public in September 1984.

Events Since Release of Minnesota Plan

The first 8 months after release of the report were marked by the following major events related to nonsmoking programs in Minnesota:

Two thousand copies of the full report and recommendations were distributed.

The Minnesota Coalition for a Smoke-free Society by the Year 2000 was formed. A major goal of the coalition is implementation of the Minnesota Plan, particularly in the health care sector. Members include the Minnesota Medical Association, the Minnesota Department of Health, the Minnesota Public Health Association, other health professional organizations, major health insurance companies, health maintenance organizations, and the Minnesota chapters of the American Heart Association, the American Lung Association, and the American Cancer Society.

The Minnesota Plan was formally adopted by the Commissioner of Health at a press conference in January 1985, with announcement of smoking-control legislative proposals.

Smoking-control legislation was introduced in the Minnesota Legislature with bipartisan support and the support of the Governor of Minnesota in March 1985.

Surgeon General C. Everett Koop appeared before the Minnesota House of Representatives, before the Minnesota Press Club, and at a formal dinner on March 14, 1985. Dr. Koop spoke in support of the Minnesota Plan, the Minnesota Coalition, and the proposed nonsmoking legislation.

Enforcement of the Minnesota Clean Indoor Air Act was consolidated in the Department of Health, rather than being partially in the Department of Labor and Industry too.

An employee nonsmoking-smoking policy was developed by a committee of employees of the Minnesota Department of Health. The policy provides for progressive expansion of nonsmoking areas in the department over the next 2 years. It was adopted by the Commissioner of Health in June 1985.

"The Path to Nonsmoking" (*14*), an illustrated summary of the Minnesota Plan for broad public distribution, was published.

The legislation, entitled "The Omnibus Nonsmoking and Disease Prevention Act," was finally passed and ratified in June 1985. The Act provides for

- Appropriation of $2,657,900 to the Department of Health and of $1,324,000 for the Department of Education over the next 2 years for nonsmoking programs.
- An increase in State cigarette excise tax of 5 cents per package, beginning on July 1, 1985, making Minnesota's tax rate 23 cents per pack. Any decrease in federal cigarette tax will be automatically offset by an increase in State tax.
- Funds and technical assistance for school boards through the State Department of Education for

tobacco-use prevention programs for training of teachers or staff, curriculum materials, community and parent awareness programs, and evaluation of curriculum programs in addition to those already in place.

- Grants to public health agencies and other nonprofit organizations for community and statewide smoking-prevention programs.
- A long-term, statewide, public communications program that includes public service announcements, public education forums, and mass media and written materials. The program is to promote nonsmoking and must include background survey research and evaluation of results. The program is to be designed to run at least 5 years, subject to the availability of funds.
- Authorization for six additional positions in the Department of Health.

The Act directs the Commissioner to (*a*) assist workplaces in developing policies that promote nonsmoking, (*b*) provide technical assistance, evaluation, and materials to local health departments and communities for promotion of nonsmoking, (*c*) collect and disseminate information and materials for smoking prevention, (*d*) evaluate new and existing smoking prevention programs, (*e*) conduct surveys in school-based populations regarding smoking rates and program effectiveness, and (*f*) prepare biennial reports to the legislature on results and recommendations.

Discussion

There is a great deal of literature in the field of health promotion and behavioral change in communities, but reports of State or nationwide programs that combine communication, regulatory, and economic methods come mainly from Norway (*15*) and Sweden (*16*).

The Province of Ontario in Canada conducted an organized planning effort in smoking control and published a plan that has been widely distributed (*17*). The Ontario Committee consisted primarily of public health and smoking-control experts. The Minnesota effort built on this approach and broadened the committee to include a majority of experts in societal change, in addition to those from public health backgrounds.

During the development of the Minnesota Plan for Nonsmoking and Health, several principles evolved which, although not all proven in practice, may be helpful in other statewide planning efforts. The first assumption was that broad epidemiologic and economic estimates of disease impact (*3,18*) should be the basis for program planning and are also useful in crystallizing public and legislative opinion. Estimates of State or nationwide costs of illness due to risk factors had been made previously by Cady (*19*), Luce and Schweitzer (*20*), and Rice and Hodgson (*10*). We therefore estimated economic impact and possible benefits for the entire State as accurately as possible, using available data. Minnesota results were used whenever possible, since national information has less impact at the State level.

'The planning process has brought some of the urgency, excitement, and problem-solving collaboration that characterize acute disease epidemiology into the field of chronic disease risk-factor control. We believe that many exciting opportunities lie ahead in population-oriented risk-factor control.'

There is inaccuracy in both economic and epidemiologic estimates of the impact of smoking (*21*), and a number of simplifying assumptions are required. The Minnesota calculations are based on methods recently discussed at a national workshop sponsored by the Office of Technology Assessment (Staff memorandum, U.S. Office of Technology Assessment: Smoking-related deaths and financial costs, September 1985). The estimates could be improved considerably if information on cost of illness by disease, age, and sex categories was available at the State level. The use of proportions derived from mortality statistics is a reasonable but less desirable alternative.

Economic estimates of similar levels of precision are widely used in public policymaking, and it is the responsibility of public health agencies to assemble available data in the most expert fashion possible at a given time and place. At many steps in the calculations, conservative assumptions were made, and we believe that the results are a reasonable estimate for public decisionmaking.

The epidemiologic estimates produced—that 70 percent of adult Minnesotans are nonsmokers and that nonsmoking could potentially prevent 4,600

deaths per year and 82 cents in excess health care costs per pack of cigarettes sold—received wide press coverage. They were used by the Governor's Office in supporting nonsmoking legislation and by Blue Cross-Blue Shield in deciding to offer one of the nation's first health care policies with differential rates for nonsmokers (although many such policies are available in the life insurance field).

The second principle followed was that public health expertise alone is not sufficient to design measures that change societal behavior patterns. The process of turning broad goals (for example, reducing smoking rates) into practical results requires consensus building, translation of terms into those of other disciplines, and education of specialists in each discipline about basic facts in other specialties. In addressing possible nonsmoking promotion methods, it became clear that each discipline has working principles that are not well known to experts in other fields. Members of the committee learned many details, for example, about the attitude of legislators toward dedicated tax proposals, the difficulties educators face in introducing new social measures through the school system, the difficulties of government-sponsored mass communications as viewed by advertising professionals, the complexity and fluidity of the insurance industry, the views of supermarket owners toward sale of cigarettes, and the limitations imposed by the Federal Cigarette Labeling and Advertising Act.

The third principle underlying the nonsmoking program is that regulatory and economic measures, when they can be used, are important methods of influencing public behavior. Minnesota was unusual in having broad legislation on smoking in public places, and thus further legislation was not required to provide the legal basis for policies in the workplace. Much remains to be done, however, before compliance and understanding in the workplace reach the high levels already achieved in restaurants and retail shops in Minnesota.

Regulation has been applied effectively in other areas of public health affecting individual behavior, such as immunization (*22*). Regulation and education are the primary methods used to influence behavior for motor vehicle safety. The literature on economics of smoking and review of the Minnesota experience suggested that cigarette sales would decline 2–5 percent for every 10 percent increase in the price of cigarettes, and that the effect would be greater for young males than for other groups (*3*).

The fourth assumption, that promotion of nonsmoking will be a more effective theme than avoidance of smoking, has not been tested. It stems from the observation that few products are sold commercially with advertising that stresses negative themes. Most advertising attempts to associate the product with pleasure rather than pain, even though the association may be completely fictitious, as in advertising connecting cigarette smoking with restful forest scenes.

The fifth principle is that multidirectional approaches will be more effective than a single approach. A national report on health education techniques recommends the encouragement of "programs that coordinate two or more of the specific methods of health education in preference over programs employing only one technique or method" (*23*).

Research on health promotion in communities or in schools often employs single-approach methods, since the goal of research is often to measure effects of a specific intervention. In public health work, however, the principal goal is health promotion or disease reduction, not knowledge. If interventions can be carried out simultaneously by several different resources and the monetary cost is not great, it may be better to trust the cargo to many ships rather than one, particularly if none stands out as clearly superior.

Multifocal approaches, involving regulation, economics, education, and mass communication, have the possibility of synergistic effects, in which the end result is greater than the sum of single-strategy interventions. Certainly social change is not a linear process, and there is every possibility of such synergism with appropriate measures at the right time and place.

The question is sometimes raised whether it is legitimate for a State health department to attempt to influence individual behavior with regard to smoking and other chronic disease risk factors. Even some public health workers feel that health departments should limit their activities toward individuals to providing information and services. History suggests, however, that public health agencies have not only the right but the duty to use any legal means to improve public health, including those that influence public behavior through regulation or economics. Home canning practices, infant feeding, immunization, housing and plumbing codes, and regulation of foods and drugs are a few areas in which such methods have been applied. In the case of smoking in Minnesota, the Commissioner of Health is required by legislation

to "advise the governor and legislature on matters relating to the public's health," and the legislature supplemented the existing regulation of smoking in public places with a new act incorporating economic, educational, and mass communication techniques.

In 1978, when this planning effort was first conceived, the Minnesota Department of Health's Section of Chronic Disease conducted programs in hypertension and cancer epidemiology, but lacked an overall strategy for reducing chronic disease risk factors. The conceptual framework and planning methods described here have not only provided a plan for the future, but the planning process mobilized resources and provided focus for a number of groups outside of State government. Organizations of many types have used the research results of the Minnesota plan, and its major recommendations have now been approved and funded by the Minnesota Legislature. Because smoking is a quantitative phenomenon, evaluation of results is built into the recommendations and will be pursued through surveys and other means.

The planning process has brought some of the urgency, excitement, and problem-solving collaboration that characterize acute disease epidemiology into the field of chronic disease risk-factor control, where the number of lives saved potentially numbers in the thousands per year for Minnesota. We believe that many exciting opportunities lie ahead in population-oriented risk-factor control. From our perspective, the focus at the State level should be on multidisciplinary expert planning efforts to provide concrete information and proposals for community and statewide programs.

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