

2000

Chronic Disease: The Epidemic of the Twentieth Century

Dora Anne Mills

University of New England, doraamills@gmail.com

Follow this and additional works at: <https://digitalcommons.library.umaine.edu/mpr>

 Part of the [Community Health and Preventive Medicine Commons](#), [Epidemiology Commons](#), [Health Policy Commons](#), and the [Public Health Education and Promotion Commons](#)

Recommended Citation

Mills, Dora Anne. "Chronic Disease: The Epidemic of the Twentieth Century." *Maine Policy Review* 9.1 (2000) : 50 -65, <https://digitalcommons.library.umaine.edu/mpr/vol9/iss1/8>.

This Article is brought to you for free and open access by DigitalCommons@UMaine.

Chronic Disease:

The Epidemic of the Twentieth Century

by Dora Anne Mills



One hundred years ago, the leading causes of death were infectious diseases such as tuberculosis, influenza and pneumonia. Of equal concern were water-borne diseases such as cholera and typhoid. Yet today, as a result of public health measures to clean up our drinking water and provide immunizations, and by improvements in medical care, such diseases have been eradicated. As Dora Anne Mills points out, as we begin a new century, we have much to celebrate but still more to consider. Today, we face an epidemic unlike any found in 1900. One hundred years ago only one-in-six people died of a chronic condition; today, three-quarters of Maine people die from four chronic, and mostly preventable, diseases: cardiovascular disease, cancer, chronic lung disease, and diabetes. Not only does Maine have the fourth highest death rate due to chronic disease, it also leads the nation in the three behavioral risk factors that cause or exacerbate chronic disease: tobacco use, poor nutrition, and physical inactivity. In this article, Mills first chronicles Maine's chronic disease epidemic, and second, lays out a plan for strengthening the state's disease prevention and health promotion efforts. She calls for a local as well as a statewide focus, and suggests that efforts to change Maine's health status will require whole communities to take coordinated action.

MAINE HEALTH ISSUES OF 1900

As we begin a new century, we find ourselves Aruminating on the accomplishments and failures of the last hundred years. When it comes to health, we in Maine have much to celebrate and much to consider.

For a child born in 1900, life-expectancy was only forty-seven. However, this lower life-expectancy was due not so much to adults dying in their forties, as it was due to infant deaths. One-in-eight babies born in Maine did not live to see his or her first birthday. Twenty percent of all deaths occurred in those under twenty years of age, and most of those were infants. Children of 1900 died of complications from birth, of infectious disease, and of illnesses caused by contaminated water and other aspects of poor sanitation (Office of Vital Statistics, Maine Bureau of Health, DHS).

At the turn of the century, the single leading cause of death in Maine was tuberculosis. Tuberculosis was responsible for between 1000-2000 deaths out of a total of about eleven thousand deaths. Other leading causes of death included infectious diseases such as influenza, scarlet fever, smallpox, acute pneumonia, and diphtheria. Outbreaks of such diseases were feared. The 1918 epidemic of influenza killed five thousand people in Maine and was responsible for the century's highest annual death rate (Office of Vital Statistics, Maine Bureau of Health, DHS).

Diseases such as cholera, typhoid, and other diarrhea diseases obtained by drinking contaminated water also led the list of death and disability. Although in many areas of the state, public water systems were in place and tests for contamination were available, many systems were not tested on a routine basis. For several years in the early 1900s, proposed laws requiring such tests were voted down by the Maine Legislature. Policymakers were not convinced that testing could significantly reduce water-borne diseases and they were reluctant to force intrusive regulations (Maine Board of Health Reports).

Figure 1: Maine Tuberculosis Deaths

The most dramatic decline in tuberculosis death rates occurred before 1950, when effective medications were discovered and commonly used. This decline was due to public health measures such as education, screening, nutrition and sanitation.

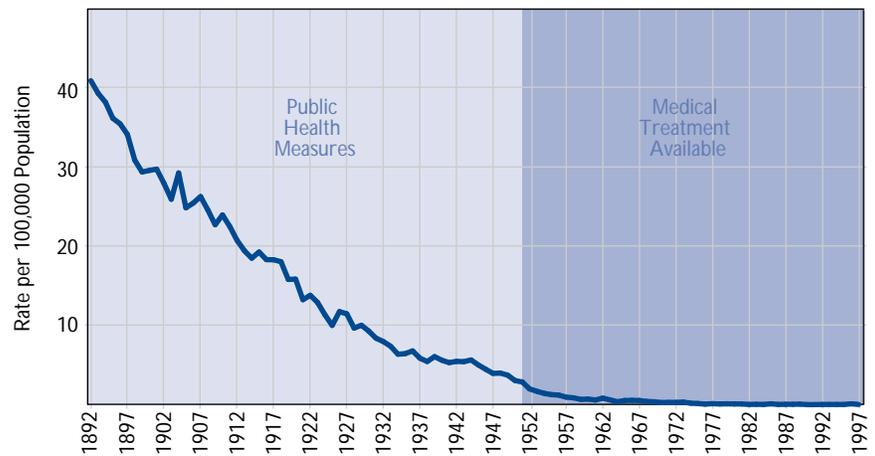
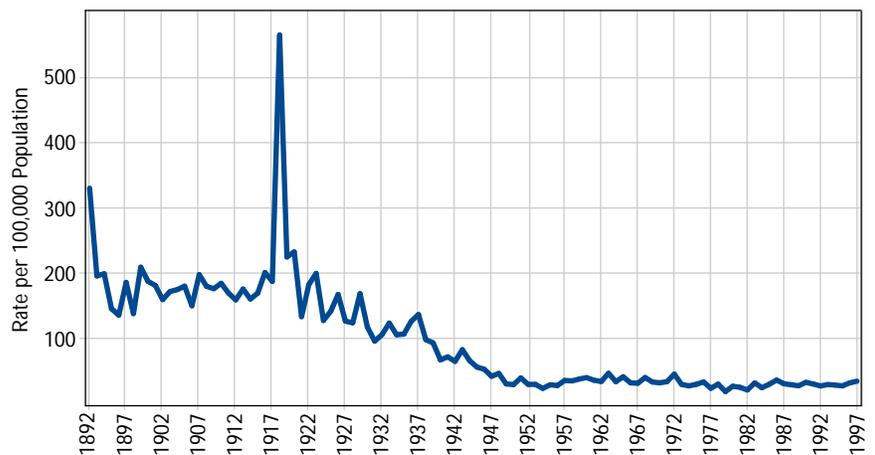


Figure 2: Maine Influenza and Pneumonia Deaths

Death rates due to influenza and pneumonia have declined by about 75%. The large spike is due to the 5,000 Maine deaths from the 1918 Flu Epidemic.



ACCOMPLISHMENTS OF THE TWENTIETH CENTURY

Figure 3:
Maine Infant Deaths

In 1900 about one-in-eight babies born in Maine did not live to see their first birthday. Today, this has been reduced to one-in-one thousand for babies not born prematurely. This success is primarily due to a variety of public health measures that have improved the health of pregnant women and infants.

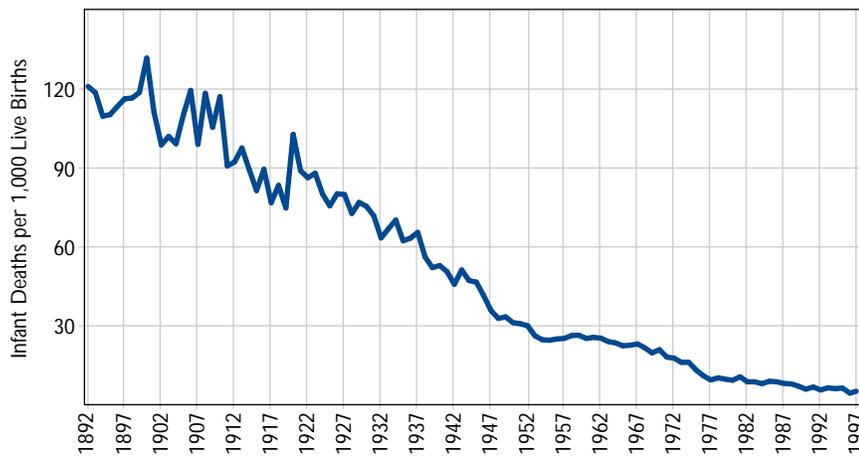
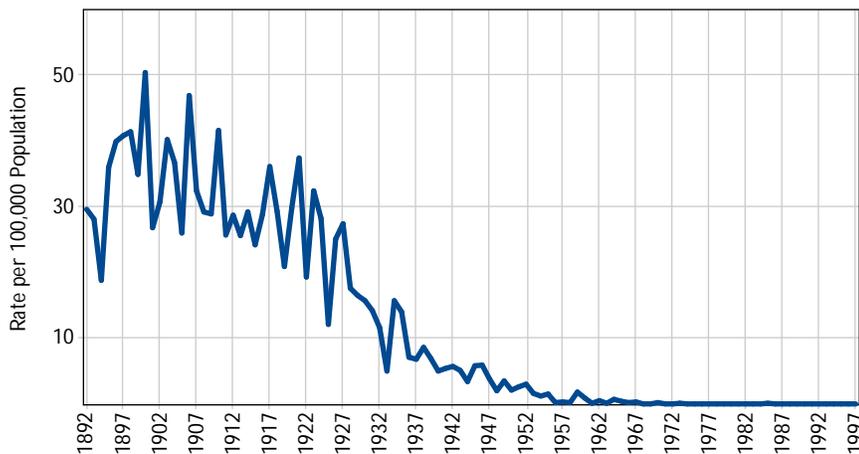


Figure 4:
Maine Childhood Vaccine-Preventable Deaths

Vaccines (for diseases such as smallpox, diphtheria, whooping cough, tetanus, polio, measles, mumps, rubella and chicken pox) are a public health measure that have resulted in dramatic improvements in our children's health.



Our ancestors could not foresee the many public health and medical achievements of the twentieth century; life-expectancy has climbed from forty-seven to seventy-seven years for men, and to almost eighty years for women. Infant mortality has dropped so astonishingly that for full-term babies born in Maine today, only one-in-one thousand fails to reach his or her first birthday. In fact, Maine's infant mortality rate is now one of the lowest in the nation.

Maine's tremendous improvement in children's health can be attributed greatly to its success in promoting high immunization rates. In 1929, smallpox was eliminated as a cause of death in Maine and, by the late 1970s, smallpox disease was eliminated entirely from the world. Immunizations also have made it possible for paralytic polio infections to be eliminated from the Western Hemisphere. Furthermore, vaccines have reduced measles, mumps, rubella, and diphtheria by at least 99% each. In Maine, the last fatal case of diphtheria occurred in 1964, of whooping cough in 1967, and of tetanus in 1970.

Because of the widespread efforts to clean up our water systems and to establish routine regulations and testing, deaths due to water-borne illnesses also have plummeted. For instance, typhoid, which killed several hundred per year at the beginning of the century, has not killed anyone in Maine since 1954. The last cholera death occurred in 1930.

During the first half of this century, Maine's injury death rate increased steadily. However, with improved safety features such as seat belts, speed limits and smoke alarms, Maine's injury death rate has dropped by half in the last sixty years (Office of Vital Statistics, Maine Bureau of Health, DHS).

In summary, one of Maine's biggest accomplishments over the last one hundred years has been to dramatically reduce the death

rates from acute conditions such as infection and injury. In 1900, almost one-half of all deaths were due to acute conditions, yet as we close the twentieth century, only about one-in-ten deaths is due to an acute condition (CDC, 1997).

**BIGGEST HEALTH ISSUE OF 2000:
THE EPIDEMIC OF CHRONIC DISEASE**

We now face an epidemic unlike any found in 1900. One hundred years ago only one-in-six people died of a chronic condition. In contrast, three-quarters of Maine people currently die of four chronic and mostly preventable diseases: cardiovascular disease (which includes heart disease and stroke), cancer, chronic lung disease, and emphysema (Office of Vital Statistics, Maine Bureau of Health, DHS). These diseases are all considered “chronic” because the disease process takes years to take its toll. Unfortunately, Maine nearly leads the nation in this epidemic with the fourth highest death rate due to chronic disease (CDC, 1998).

These four chronic diseases—cardiovascular disease, cancer, chronic lung disease, and diabetes—take a much bigger toll than one imagines. Besides killing three-quarters of Maine people, they also cause major disability. For more than one-in-ten Americans, these four chronic diseases cause major limitations in daily activity such as the inability to work, drive a car, dress, or bathe (CDC, 1994). Of all adults with disabilities, over one-third of the disabilities are due to one of these four chronic diseases (CDC, 1994). Direct medical costs of chronic diseases account for nearly two-thirds of the nation’s total medical costs. In Maine, health care and lost productivity due to chronic diseases cost well over \$1.5 billion annually, which extrapolates to over \$1,700 per adult per year (U.S. DHHS, 1998).

The irony of this epidemic is that it is mostly preventable. This is the biggest difference between the health issues faced by our forebears and those we face in 2000. In 1900, our ances-

Figure 5:
Maine Cholera and Typhoid Fever Deaths

Water-borne diseases such as cholera and typhoid were once common causes of disease and death, especially in children. The availability of clean drinking water has eliminated many of these diseases.

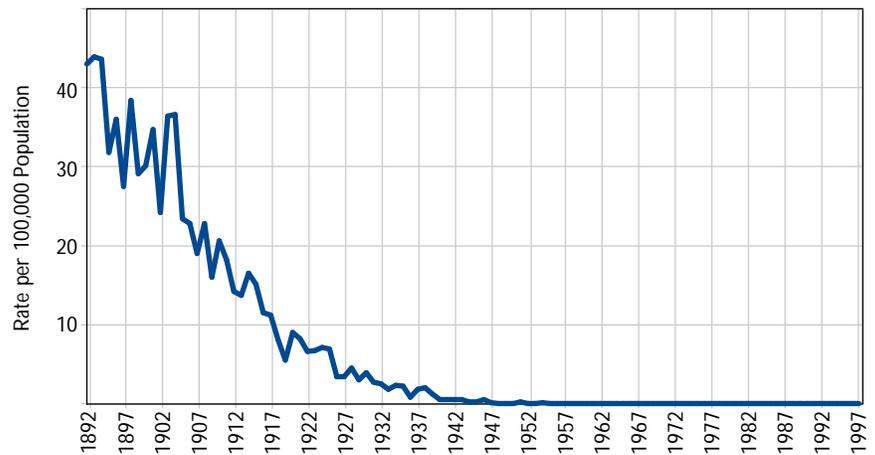


Figure 6:
Maine Accidental Deaths

Although accident death rates increased until the early 1940s, they have dropped by half since then, mostly due to public health and safety measures.

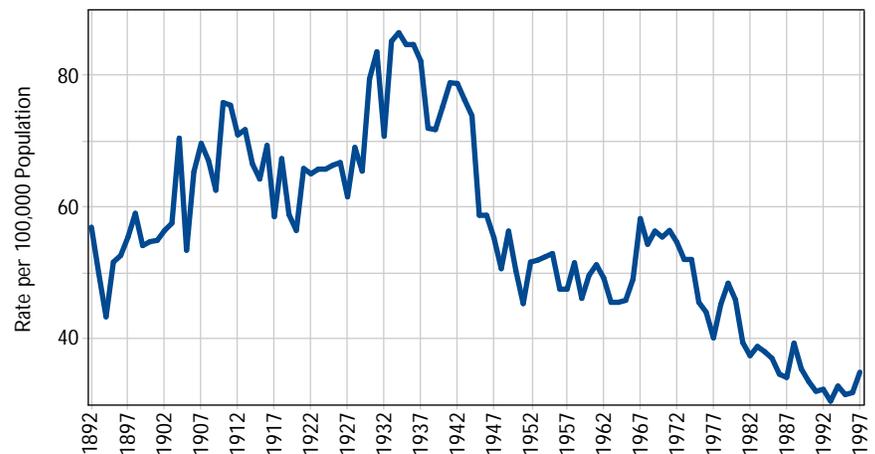


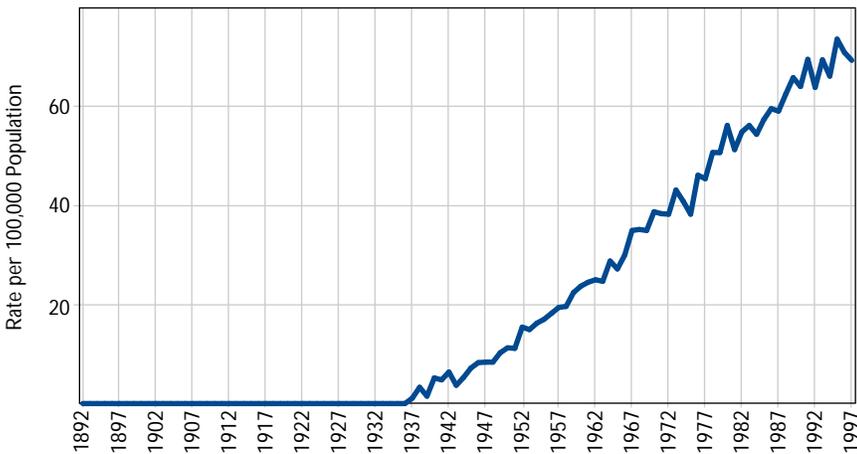
Figure 7:
Maine Cancer Deaths

Cancer death rates have risen steadily over the past one hundred years. Its preventable risk factors such as tobacco addiction and poor nutrition have likewise risen.



Figure 8:
Maine Lung Cancer Deaths

This graph tells a story of the tobacco epidemic of the twentieth century. The latency period for lung cancer is twenty years. The first mass marketing and mass production of tobacco occurred around the time of World War I. Twenty years later is when the lung cancer epidemic began. Today, it is the leading cause of cancer deaths.



tors did not know how to prevent many of the leading causes of death. Yet in 2000, we know how to prevent most of the causes of death and disability that we face.

Three behavioral risk factors account for causing or exacerbating most cases of these diseases: tobacco addiction, poor nutrition, and physical inactivity. These three risk factors are directly responsible for causing over one-third of all deaths in the United States, and alcohol is responsible for another 5% (McGinnis and Foege, 1993). It is not surprising that these three major risk factors are mostly products of a twentieth-century lifestyle. For example, in 1900, tobacco addiction and its resulting diseases were hardly heard of, but through the twentieth-century creations of mass production and mass marketing, tobacco has become one of the leading preventable cause of death and disability. In Maine, tobacco now kills more people than car accidents, HIV/AIDS, homicide, suicide, and all other drug use combined (CDC, 1997). On average, tobacco kills seven Maine people every day. One of these is a non-smoker, who dies of secondhand smoke-related illness, mostly heart disease. Tobacco use costs Maine about \$5 million every week in direct medical expenses alone (U.S. DHHS, 1998).

Nationally, physical inactivity and poor nutrition account for an estimated three hundred thousand deaths each year, which results in an estimated four deaths per day in Maine (McGinnis and Foege, 1993), mostly from heart disease, strokes, and diabetes. In reality, this figure may be much higher since a recent study shows that people who are obese increase their risk of death from all causes by 50-100%—a higher rate than previously thought (Calle, et al., 1999). Obesity, a product of physical inactivity and poor nutrition, has an economic drain on Maine of about \$450 per year per adult (Mokdad, et al., 1999).

Unfortunately, Maine leads the nation not only in chronic disease but also in the associated behavioral risk factors. Our tobacco addic-

tion rates are consistently among the highest in the nation. Three-quarters of Maine adults do not eat the recommended five servings of fruits and vegetables per day, and about two-thirds of Maine people consume at least one-third of their calories from fat. Only about one-in-seven Maine people exercise regularly, and our exercise rate is the sixth lowest in the nation. It is no wonder then, that 57% of Maine adults are overweight, and that this represents an astonishing 20% increase in only ten years. Maine also has the highest rates in New England of obesity and people being overweight (Maine BRFSS; Mokdad, et al., 1999).

It is even more unfortunate that these legacies of the twentieth century may linger long into the next century as the risk factors associated with chronic disease are worse among Maine's youth and young adults; in particular, over one-third of adult Maine men and women of child-bearing age (18-44) are tobacco addicted. Indeed, Maine has the highest tobacco addiction rate in the nation among young adults ages 18-30. In addition, the tobacco-addiction rates among youth ages 14-18 have been consistently among the highest in the nation. Youth in this age range are four times more likely than adults over age fifty-five to be smoking cigarettes (Maine YRBS; Maine BRFSS), and for every young person who starts smoking regularly, 60% of them eventually will die from a tobacco-related illness (CDC, 1999).

To make matters worse, young adults in Maine also are half as likely as those over age sixty-four to eat the recommended five servings of fruits and vegetables per day. In addition, the rates of physical inactivity in Maine's young adults (18-44) are about the same as those for adults over age sixty-four. Yet one would expect young adults to be more physically active than older adults (Maine YRBR; Maine BRFSS).

As these youth and young adults age, the chronic diseases associated with their behavioral risk factors will take their toll on Maine. By 2020, over 25% of our population is expected

Figure 9:
Maine Chronic Obstructive Pulmonary Disease Deaths

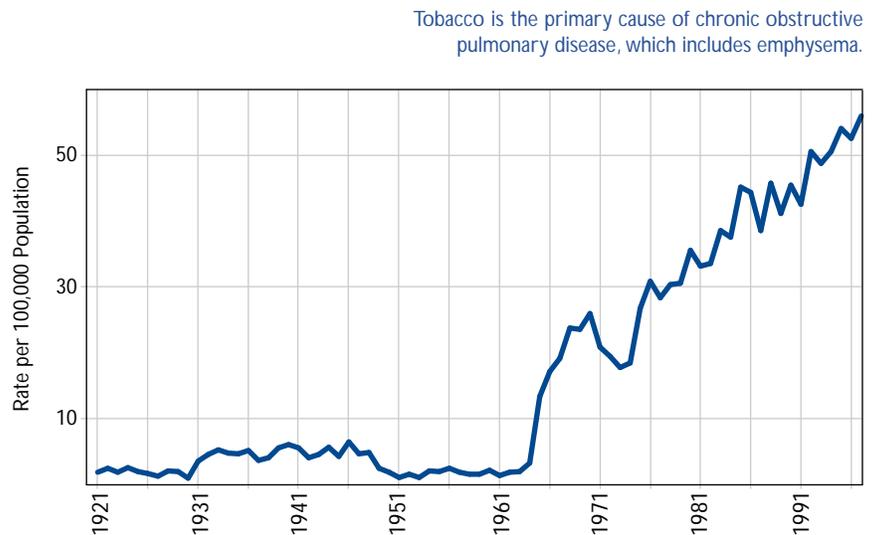
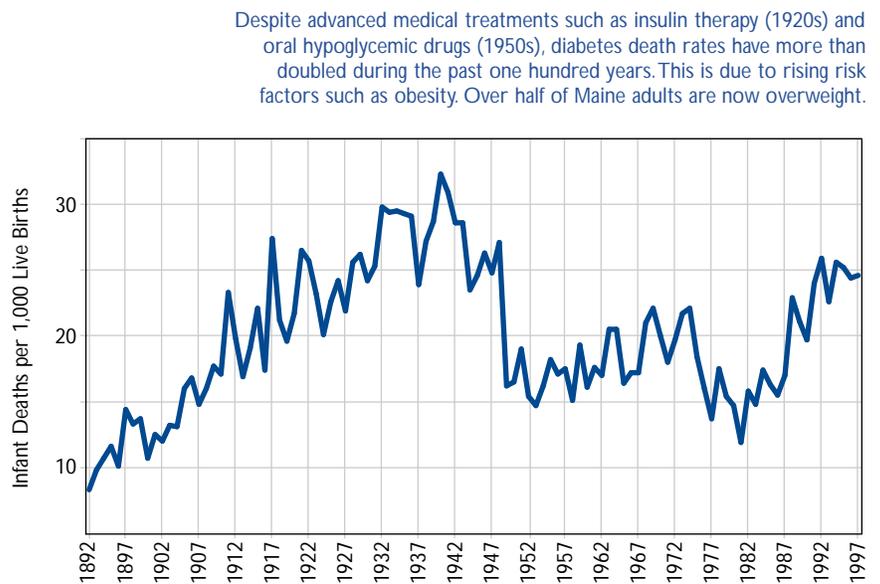


Figure 10:
Maine Diabetes Deaths



to be over age sixty and, unfortunately, many of them may be disabled by these legacies of the twentieth century (CDC, 1997). In short, as we head into the twenty-first century, this chronic disease epidemic is the leading health issue in Maine. We are not powerless. We know how to effectively prevent this cycle of suffering and premature death. However, if we do not break this cycle, it will break us.

PREVENTING DISEASE / PROMOTING HEALTH

Most of us want to eat better, exercise more, and live tobacco-free lives, but barriers exist in our lives today that make these choices difficult. Successful initiatives in preventing disease (or promoting health) are those that reduce these barriers especially with high-risk populations.

Within the health promotion profession, there are two major ways to look at prevention efforts—by how they target a particular population or by the setting in which they occur. Initiatives can target a population by using either primary, secondary, or tertiary prevention approaches. Maintaining a balance of these three types of prevention is the same as balancing long-term with short-term investments. For example, prevention efforts can focus on producing long-term risk reductions in the entire population (primary prevention); they can focus on reducing risk or disease in those who are already at risk (secondary prevention); they can focus on those who already have a chronic disease (tertiary prevention).

These three types of approaches tend to differ in terms of what population they target. Primary prevention efforts are targeted toward all people in a population with the objective of reducing preventable risk factors. For example, public ads to discourage smoking are aimed at the entire population, with the objective of preventing people from starting tobacco use. Secondary prevention efforts target those people who are at risk for disease (meaning they have identifiable risk factors, such as they smoke, are overweight, have high blood pressure, etc.). The objectives in secondary prevention are to reduce the already present behavioral risk factors and to prevent subsequent disease. Examples are programs designed to screen and treat people for elevated

blood pressure or cholesterol levels or to help people lose weight. Tertiary prevention efforts target those who already have disease, with the objective of reducing further disease. An example is cardiac rehabilitation programs for those who have had a heart attack.

Because it focuses on those with existing disease, tertiary prevention shows results in the shortest time period (e.g., within a year for cardiac rehabilitation). On the other hand, secondary prevention—because it focuses on those with identifiable risk factors—shows results in a longer time period, and primary prevention—with its focus on an entire population—shows results in the longest time period. In essence, these types of prevention can be thought of as short-, intermediate-, and long-term investments in our health. Just as a family needs to make both short-term investments such as procuring an automobile and long-term investments such as saving for their children's education, all types of prevention investments are necessary for a healthy future.

Prevention initiatives also occur in varied settings. Although there are any number of settings in which to consider initiating disease prevention and health promotion activities, the three main ones are communities, schools, and health care systems. There is a lot of overlap among these settings; in fact, when there is a high degree of overlap and coordination among initiatives, they tend to be more effective in achieving their goals.

Community-based prevention activities focus on general education and the promotion of healthy choices; they also focus on reducing the barriers to good health in communities (e.g., promoting policies in the workplace that enable employees to exercise during the workday, developing bicycle trails and footpaths for outdoor recreation). Often a coalition of community members that includes health care professionals, employers, school officials, community leaders and other interested parties collaborates to address the barriers to healthy behaviors in their community. Successful community-based prevention activities actually change the community environment to one that is more supportive of healthy behaviors and healthy choices among its residents (Fortmann, et al., 1995).

Health care system-based prevention is carried out through existing venues such as hospitals, health care

provider organizations, and the insurance industry with linkages to community-based efforts. For instance, screening a population for health risks such as high blood pressure, cholesterol, obesity, and tobacco addiction is an example of secondary prevention that is most effective when carried out by a partnership between the local health care system and the community. Outreach and educational activities for those with diabetes, cancer, heart disease, or emphysema are tertiary prevention activities that are also most effective when included in both the health care system and the community.

When it comes to school settings, the Centers for Disease Control and Prevention (CDC) estimates that for every dollar spent on school-based comprehensive health education, at least \$14 is saved in future direct health care costs. However, less than 5% of schools in the United States offer comprehensive health education. What is a comprehensive school health program? It is one that contains school health education K-12, physical education that promotes lifelong physical activity, school health services, nutritious food services, school counseling and social services, school-site health promotion programs for staff, family and community members, and an overall healthy school environment. No school in Maine is considered to have a fully comprehensive and coordinated school health program.

A variety of experts recognize that we need to do more to pursue comprehensive health education. For instance, after an eighteen-month process to determine the most effective means for reducing cancer morbidity and mortality, the American Cancer Society concluded that, "if we are serious about reducing cancer morbidity and mortality, we must do more to help move along the agenda for comprehensive school health education" (John Seffrin, chief executive officer, ACS). In short, we teach our children about history and math, but we do not teach them how to be healthy. Comprehensive health education efforts become even more effective when they are linked with community-based efforts and are part of a coordinated school health program (CDC, 1997).

How do we combine prevention efforts that contain a balance of primary, secondary, and tertiary prevention along with those set in communities, schools, and our health care system? Drunk driving

Examples of Community-Based Chronic Disease Prevention and Health Promotion Activities

Promoting Physical Activity

- Assess the barriers to physical activities in a community and develop an action plan to reduce these barriers
- Open school gyms during evening and weekend hours for physical activities
- Create and distribute maps of safe walking and bicycling routes that are well lit and are plowed in the winter
- Work with employers to provide opportunities for employees to incorporate moderate physical activity into their work lives
- Work with schools to ensure that youth have access to physical education as well as extracurricular physical activities
- Create walking clubs, especially for populations such as parents with young children, pregnant women, senior citizens, people with disabilities, minorities, etc.

Promoting Healthy Nutrition

- Work with restaurants, schools, and employee cafeterias to provide low fat, high fruit and vegetable menu selections
- Post healthy, economic, and easy to cook recipes in grocery stores alongside all the necessary items needed to buy in order to cook the menu item
- Promote positive messages such as "Let's all eat five a day—five fruits or vegetables a day."
- Educate the public on how to read food labels for fat content

Promoting a Tobacco-Free Lifestyle

- Award and promote those workplaces and public places that are 100% smoke free
- Provide effective tobacco cessation counseling and access to pharmaceuticals during easily accessible hours and places in the community where people congregate or work (during lunch hour in the middle of town, at a bank's conference room or at a large employer's workplace)
- Promote education and role models for youth and young adults to be tobacco free

Monitoring the Effectiveness of Prevention Programs

Various indicators from a number of statewide surveys (i.e., Youth Risk Behavior Survey, Behavioral Risk Factor Surveillance System) help to assess the effectiveness of chronic disease prevention and health promotion programs. Below is a partial list of indicators that are regularly monitored by such surveys:

Tobacco

- Consumption (numbers of tobacco products sold per year), and tobacco addiction rates (for specific geographical areas, for pregnant women, for youth and young adults)
- Percent of work places and public places that are 100% smoke free

Physical Activity

- Percent of adults and youth participating in leisure time physical activity
- Numbers of reduced barriers to physical activity in a community
- Numbers of reduced barriers for special populations such as youth, senior citizens, people with disabilities, pregnant women, employees, etc.

Nutrition

- Percent of people in the community eating at least five servings of fruits and vegetables per day
- Percent of public eating places that offer heart healthy menu items
- Percent of people eating less than one third of their calories from fat
- Percent of overweight people

Secondary Prevention

- Percent of those screened for cholesterol, blood pressure, diabetes, and cancer

Overall Prevention Efforts

- Death rates due to each chronic disease

School-Based Prevention (in addition to the indicators already identified)

- Numbers of schools that have a staff designated to coordinate school health programs
- Numbers of schools that have opportunities for students to be physically active during the school day
- Numbers of schools with health promotion and wellness programs
- Scores on Maine Education Assessment health tests

is an example of a behavioral issue for which many of these prevention strategies have been successfully employed. School-based efforts educate youth through drivers' education programs. Community-based efforts often have emanated through such organizations as Mothers Against Drunk Driving and local public safety agencies. Health care system efforts have focused on educating health care providers and reaching out to people seen in emergency departments and alcohol treatment programs.

A variety of primary, secondary, and tertiary prevention efforts have been launched that target the general public (primary prevention), people at risk, such as drinkers (secondary prevention), and those who already have a record of drunk driving (tertiary prevention). These efforts often have focused on removing barriers to sober driving, such as making it acceptable to name a "designated driver" or to call a taxi. Finally, a combination of these efforts has made it possible for the passage of legislation to reinforce educational efforts.

Although prevention works best at lowering the risk factors in a population when all three types of prevention are emphasized, Maine faces a substantial gap in the area of primary prevention. There are a number of reasons for this:

- Some tertiary and secondary prevention activities are reimbursable. For example, many insurance companies pay for cardiac rehabilitation.
- When funding cuts are made, primary prevention is often the first to be cut because the full impact of the cuts often takes several years.
- Primary prevention does not have such a motivated constituency to defend it as does secondary or tertiary prevention. For example, cardiac rehabilitation program participants are easily mobilized to advocate for the importance of such programs.
- In the past, primary prevention has not always been accountable, and has sometimes relied more on creating awareness of different issues than being accountable for actually reducing the risk factors of a population.

MEASURING THE EFFECTIVENESS OF PREVENTION

How do we know whether prevention works? Our ability to determine whether a program is successful is easiest in the case of tertiary prevention because such programs target a specific population of people and operate within a relatively short time frame. Comparisons can be drawn between those who participate and those who do not. For example, Heartwarmers is a tertiary prevention program serving Franklin County that integrates cardiac rehabilitation and telephonic nurse care support for people with coronary heart disease and/or congestive heart failure. Launched in 1997, Heartwarmers has served over two hundred patients and already shows substantial improvements in activity levels and health indicators such as cholesterol levels as well as very low hospital admission rates among its participants. These preliminary results are similar to a North Carolina study that showed a 21% decline in overall health care costs in participants over non-participants (Record, 1999).

In contrast, measuring the effectiveness of primary and secondary prevention programs is more complex because such programs target a wide range of individuals living under varied circumstances, and the impacts of such programs can show up over a much longer time period. Despite such complexities, it is important to demonstrate the success of such efforts. In Maine, surveillance systems such as the Youth Risk Behavior Survey and the Behavioral Risk Factor Surveillance System help to monitor trends in the three major risk factors: tobacco addiction, physical inactivity, and poor nutrition. Below are some examples from Maine and elsewhere that exemplify effective primary and secondary prevention.

PARTNERSHIP FOR A TOBACCO-FREE MAINE

Primarily prevention efforts underway to address Maine's tobacco addiction have already shown some success. In November 1997, the tobacco tax was raised from thirty-seven cents per pack to seventy-four cents per pack, and six months later a statewide media campaign along with some community-based and school-based initiatives were launched. These programs

are modeled after successful initiatives in California and Massachusetts in which the main objectives are preventing tobacco addiction, helping those who wish to quit, and protecting the public from the hazards of secondhand smoke.

Since the tax was raised, tobacco consumption has dropped 16% as measured by tobacco sales through the Maine Bureau of Revenue Services. Because tobacco is a highly addictive product, consumption usually drops before smoking rates do. However, smoking rates have also preliminarily shown some decrease, from 25% of all adults in 1996 to 22.4% in 1998. However, with Maine leading the nation in youth and young adult tobacco addiction and with about one-third of young adult pregnant women smoking throughout pregnancy, we have a long course ahead (Maine BRFSS; Maine PRAMS).

FRANKLIN COUNTY CARDIOVASCULAR WELLNESS PROGRAM

For twenty-five years the Franklin County Cardiovascular Wellness Program has provided secondary prevention services, such as risk factor screening, counseling, and referral at community, work site, and health care settings, to over half of the region's adults. Results show a 9% greater drop in deaths from heart disease and 7% greater drop in total deaths compared to the whole state and up to 16% compared to adjoining counties.

This decline represents an estimated 123 fewer deaths and 615 fewer major hospitalizations due to heart disease in Franklin County than expected during the twenty-one year period 1974-1994. Since the budget to run the program is roughly \$20,000 per year, it has cost \$569 per event prevented, which clearly results in substantial net savings in health care costs (Record, 1999).

CARDIOVASCULAR DISEASE PREVENTION AMONG MAINE NATIVE AMERICANS

Cardiovascular disease deaths among Maine Native Americans have decreased by almost half (45%) from 1988-1992 compared to 1993-1997 after both intensive primary and secondary prevention efforts

were initiated (Office of Vital Statistics, Maine Bureau of Health, DHS). Primary prevention included diet and exercise initiatives targeted toward the entire population residing on reservations in Maine. Secondary prevention included aggressive education of those with diabetes (Kuehnert, 1999).

NORTH KARELIA, FINLAND

In the early 1970s, middle-aged Finnish men had the highest mortality from cardiovascular disease in the world. Finland then embarked on population-based primary- and secondary-prevention efforts in the North Karelia Province, aimed at reducing risk factors and mortality of heart disease.

As a result of these efforts, smoking rates, cholesterol averages, and blood pressure measurements dropped significantly during these twenty-five years. Major dietary changes also occurred with a drop in fat consumption. Average cholesterol dropped by 15%; blood pressure by 11%; smoking rates among men by 16%. During this same period, cardiovascular disease mortality declined by 68%; heart disease by 73%; cancer by 44%; lung cancer by 71%; and all cause mortality by almost 50%. Statistical analysis shows these successes are primarily a result of the decrease in the targeted risk factors (Vartiainen, et al., 1994).

Estimates of health care savings show these efforts in the North Karelia Province resulted in annual savings of \$700 million for all Finnish people over thirty-five years of age. Although the project was focused in only one province, this represents annual health care savings of about \$300 for every Finnish adult over thirty-five (Kiiskinen, et al., 1995).

CALIFORNIA TOBACCO PREVENTION PROGRAM

From 1988 to 1996, California's anti-smoking program reduced the percentage of adults who smoked by about 1% per year, dropping from 27% to 18%. The amount of money spent in California on their mass media and community-based programs is about equal to the savings in direct short-term medical costs

due to the reduced heart attacks and strokes alone (Lightwood and Glantz, 1997).

WHAT IF MAINE REDUCED ITS BEHAVIORAL RISK FACTORS?

If Maine, like California, was successful in reducing the percentage of adults smoking by 1% per year for seven years, then 385 fewer people would suffer heart attacks, 171 fewer people would suffer strokes, and \$16 million would be saved in direct health care costs from this decrease in heart attacks and strokes alone. This amount does not include other savings from smoking reduction, such as those from reducing tobacco use by pregnant women, or from reducing the incidences of other tobacco-related illnesses such as lung cancer, other cancers, emphysema, chronic lung disease, and secondhand smoke-related illnesses, or from reducing the amount of lost work and productivity.

Similarly, if Maine reduced its fat intake by just 3%, in only ten years, 464 fewer Maine people would die prematurely from heart attacks (CDC, 1999). If Maine could decrease physical inactivity among people with sedentary lifestyles, one-third fewer people would develop heart disease (CDC, 1997).

Once an individual takes on a healthy lifestyle, substantial savings in health care costs can be seen in only eighteen months. For example, when the health care costs of individuals were totaled for an eighteen-month period, physically active non-smokers with a healthy weight incurred half the annual health care costs of overweight and physically inactive smokers. Yet for every additional day of the week that study participants took part in at least twenty minutes of physical activity, their health care costs were further reduced by 5% (Pronk, et al., 1999).

These types of changes, when extrapolated to a community or state, result in millions saved in health dollars. For example, a study conducted by Duke University indicated that proposed cuts in Medicare would not be necessary if improved prevention of chronic disease risk factors were implemented. As an example, the researchers showed that postponing the physical dependency of older Americans by just one

month would save the nation \$5 billion in health care and custodial costs (Manton, et al., 1997).

If Maine reduced its incidence of tobacco addiction, physical inactivity and poor nutrition, we not only would cut health costs substantially, we also would live longer and better lives. For instance, those elderly with healthy lifestyle behaviors delay the onset of functional disability by seven years compared to those elderly with unhealthy lifestyle behaviors. This means that those elderly who are tobacco-free, physically active, and not obese not only stand to live longer, but also have a much better chance of lengthening the time they can live independently, continuing the activities they enjoy the most (Vita, et al., 1998)

If Maine were to set even more ambitious goals for reducing the presence of risk factors in its population, then it might consider a state like Utah. Utah has a tobacco addiction rate 10% lower and a physical inactivity rate half that of Maine. Were Maine to achieve similarly low rates of these two behavioral risk factors, then twelve fewer Maine people would die per week from cardiovascular disease; sixteen fewer Maine people would die per week from cancer; ten fewer Maine people would die per week due to lung cancer; three fewer Maine people would die per week due to emphysema; one less person would die per week due to colorectal cancer; and 1.2 fewer Maine women would die per week from breast cancer.

More generally, if Maine had the same mortality rate from cardiovascular disease as the average of the five states with the lowest cardiovascular disease mortality (Utah, Colorado, Idaho, New Mexico, Washington), then nine fewer Maine people would die per week from heart attacks and strokes. If Maine had the same mortality rate from cancer as the average of the five states with the lowest cancer mortality (Utah, Hawaii, Colorado, New Mexico, Idaho), then twelve fewer Maine people would die per week from cancer. If Maine had the same mortality rate from lung cancer

as the average of the five states with the lowest lung cancer mortality (Utah, Hawaii, Colorado, New Mexico, Idaho), then seven fewer Maine people would die per week from lung cancer.

Why does Maine have such higher chronic disease rates than these other states, even after adjustments for age and income are made? Maine has higher mortality rates than these states mainly because we have higher

If Maine reduced its incidence of tobacco addiction, physical inactivity and poor nutrition, we not only would cut health costs substantially, we also would live longer and better lives.

contributing risk factor rates such as tobacco addiction, physical inactivity, and poor nutrition. Why do we have such high burdens of risk? Multiple factors in these other states are associated with lower rates of behavior risk, and consequently of chronic disease. They include fewer environmental barriers (e.g., lack of available places such as sidewalks for walking), comprehensive health education taught throughout all grades in school, and an established and coordinated system for launching prevention efforts (e.g., public health departments, other community-based systems). All three of these factors are weak in Maine.

WHAT CAN WE DO TO STEM MAINE'S EPIDEMIC OF CHRONIC AND MOSTLY PREVENTABLE DISEASES?

If our state's health goals include improving the health status of Maine people, and controlling skyrocketing health costs, then investing resources in evidence-based public health measures is a most effective way to move us toward these goals. While we could pour all available resources into acute health care services, the demands and costs for such services will continue to escalate until we also address preventable risk factors that lead to such demands.

While we could pour all available resources into acute health care services, the demands and costs for such services will continue to escalate until we also address preventable risk factors that lead to such demands.

For instance, having health insurance is only one of many determinants of health status. As an example, pregnant women in Maine who have Medicaid insurance have good rates of early prenatal care. Yet 50% of them smoke cigarettes throughout pregnancy. This leads to major health problems and costs, not only to the smoker but also to her infant, such as low birth weight, sudden infant death syndrome, childhood asthma, pneumonia, and ear infections. Preventable risk factors, such as tobacco addiction, physical inactivity, and poor nutrition, are most effectively addressed through population-based disease prevention and health promotion delivered through communities, schools, and the health care system. All of these venues address the health status needs of the insured as well as the uninsured.

How is this best done? In essence, we need to re-invent the lifestyle of our ancestors at the turn of the century by making it easier for us to re-integrate physical activity and good nutrition into our daily lives and reversing nearly one hundred years of tobacco mass production and marketing.

First, we must address the primary cause of the chronic disease epidemic—tobacco. What do we need to do? We need to continue and intensify statewide and local efforts such as the multimedia, school, and community-based initiatives to discourage young people from starting to consume tobacco, to protect the public from the hazards of secondhand smoke, and to support those who wish to quit their tobacco addiction. We also need to devote substantial efforts to setting up a support system for those who wish to quit. For example, we need to train and certify tobacco cessation specialists

around the state, operate quit lines where smokers can call for counseling and referral, and purchase pharmaceuticals and cessation counseling for those who cannot afford them.

Second, in order to reduce the tobacco-related burden of disease, we need to address the related risk factors of physical inactivity and poor nutrition. These risk factors greatly increase the toll tobacco takes on the body, so efforts that address all three risk factors have a much bigger impact than those that address only one or two. Furthermore, people who have one disease risk factor are more likely to incur another. For instance, people of lower socioeconomic status are at high risk for all three risk factors. Therefore, it is most effective to reach out to those at highest risk in a comprehensive manner.

To address the issues of physical inactivity and poor nutrition, local communities, schools and health systems need to work together to determine what are the barriers to healthy behaviors, assess who is at highest risk, then initiate or advocate for reducing those barriers, with a focus on the highest risk populations.

What kind of organizations could take on these efforts locally? In many communities, hospitals and/or community health centers are the logical leaders to help coordinate community-based and health care system-based prevention efforts since they are knowledgeable about the health issues of the areas they serve. It is important that groups such as consumers at the highest risk for health issues, employers, town officials, and faith communities be involved in such efforts since many of the interventions may involve them. It is also vitally important that schools work on reducing these three main risk factors through coordinated school health programs that include comprehensive school health education at all grade levels.

The impact of these efforts is augmented and made more sustainable if they are all linked and coordinated. For instance, school-based efforts should have a lot of overlap with community-based and health care system-based efforts. An example is a community coalition that serves as the board of directors for a region's prevention efforts, and includes as members the lead agencies of the health care system, schools,

and community-based efforts. These organizations are then empowered with the resources to reduce the barriers to healthy behaviors in their communities. In return, such groups are held accountable for reducing rates of tobacco addiction, physical inactivity, and poor nutrition in the populations they serve.

Besides providing access to healthier choices for all of us, and reducing the three major risk factors that lead to so much suffering, these prevention efforts would have several secondary effects. First, these initiatives would assist our community health care delivery systems in making the transition from solely an illness-based, patient-focused source of treatment to also being a health-based, population-focused source of health care. In other words, their function would change from being simply buildings where people go when they are ill to becoming leaders in all aspects of health in their communities.

Another secondary benefit to such investments in prevention is strengthening Maine's system of prevention. Currently, we are one of the only states without such a system. Most states have a system of local public health departments that work with communities, health care systems, and schools on a variety of health issues. If we empower our communities to address the behavioral risk factors associated with chronic disease, we also are building the capacity for them to address other preventable health issues, such as mental health problems, violence, and infectious disease epidemics.

Finally, what should be the role of state government in this vision of chronic disease prevention and health promotion throughout the state? It should be to:

- make available to local organizations the necessary funds through a competitive grant process to implement effective chronic disease prevention and health promotion programs throughout the local community;
- provide the necessary resources, such as training and technical assistance, to local organizations and schools on how to implement effective measures;
- ensure accountability for achieving changes in the rates of behavioral risk factors in

the populations served by evaluating local efforts through such tools as the Behavioral Risk Factor Surveillance System and the Youth Risk Behavior Survey; and

- ensure coordination at the state and the local level. For instance, state agencies such as the Departments of Education and of Human Services need to work together on the grant-making, technical assistance, and evaluation processes so that these are coordinated and not redundant or in conflict. At the same time, grants to organizations should also require coordination of efforts at the local level.

Why is it the responsibility of state government to provide this funding and other resources for chronic disease prevention and health promotion? First, no other stakeholder in the health system has the resources to fully address this issue. Second, it is the state that has the most to gain; the vast majority of health costs are paid for by taxpayer dollars through the Medicaid and Medicare systems. Third, the state is being reimbursed for some of the financial drain tobacco has siphoned off the Medicaid system. Therefore, it makes sense that the state put forth the resources to stem this drain.

GAUGING THE LEVEL OF MAINE'S INVESTMENT

How much will it cost to address Maine's tobacco-related chronic disease epidemic? The Centers for Disease Control and Prevention (CDC) recommend that at least \$11-25 million be spent. Currently, Maine appropriates \$3.5 million annually. CDC's recommendations include not only a statewide component for media, technical assistance for local initiatives, and tobacco cessation, but also funds for local communities to address the tobacco-related, chronic-disease epidemic, including physical inactivity and poor nutrition through local communities, schools, and the health care system.

This investment will result in improved health for all of us and lower acute health care costs. There are a number of already existing resources available to gauge

success of this investment. For instance, to measure these goals, some of the available data sources include:

- Department of Human Services for Maine's Behavior Risk Factor Surveillance System, Pregnancy Risk Assessment Monitoring System, Vital Statistics such as death rates due to chronic disease, and Medicaid claims data;
- Department of Education for Maine's Youth Risk Behavior Survey; and
- Department of Mental Health and Mental Retardation and Office of Substance Abuse for the Maine Youth Drug and Alcohol Use Survey and the Office of Substance Abuse Data System.

In addition, there are a number of secondary benefits to achieving these goals that can at least be indirectly measured. For instance, with fewer burdens from behavior risk factors and chronic disease, we will be able to work longer and more productively. We will not only feel healthier, but also be able to live longer and less dependently on others for activities such as driving, shopping, and dressing. And, finally, our children will be more likely to enjoy the presence of their parents and grandparents for many more years.

SUMMARY

What is envisioned for our future? Our ancestors hardly could have envisioned that in only one hundred years life in Maine would be relatively free from fears of tuberculosis, smallpox, typhoid, and cholera, and that full term newborn babies would have a 99.9% chance of living through their first birthday.

We are more fortunate than our ancestors since we have the knowledge and capacity to prevent our leading causes of disability and death. However, to do so requires us to reinvent some aspects of the lifestyles of our ancestors—a lifestyle in which physical activity is readily part of our daily life, a healthy diet is easily available, and one in which nearly one hundred years of tobacco mass manufacturing and marketing is reversed.

Let us envision a future in which a baby born in Maine will not have to struggle with health risks that lead to so much suffering and premature death due to chronic disease. To achieve these goals we need to use the resources available to empower our communities, our schools, and our health care system to create an environment that is supportive of a healthy life. As a result, Maine children of the twenty-first century will have more healthy choices available to them, and will be able to live healthier and, hopefully, happier lives. 🐟



Dora Anne Mills was born in Maine and raised in Farmington. She is a graduate of Bowdoin College, the University of Vermont College of Medicine, Children's Hospital of Los Angeles Pediatric Residency Program and the Harvard School of Public Health. She has practiced medicine in Tanzania, East Africa, Los Angeles, and Farmington, Maine. In 1996, she was appointed as Maine's chief medical officer and director of the Bureau of Health in the Department of Human Services.

REFERENCES

- Calle, E.E., Thun, M.J., Petrelli, J.M., Rodriguez, C., Heath C.W. 1999. "Body-Mass Index and Mortality in a Prospective Cohort of U.S. Adults." *New England Journal of Medicine*, 341: 1097-105.
- Centers for Disease Control and Prevention, U.S. Department of Health and Human Services. "An Ounce of Prevention." September 1999.
- Centers for Disease Control and Prevention, U.S. Department of Health and Human Services. "Chronic Diseases and Their Risk Factors: The Nation's Leading Causes of Death." May, 1998.
- Centers for Disease Control and Prevention, U.S. Department of Health and Human Services. "Unrealized Prevention Opportunities: Reducing the Health and Economic Burden of Chronic Disease." March 1997.
- Centers for Disease Control and Prevention, U.S. Department of Health and Human Services. "Prevalence of Disability and Associated Health Conditions—United States, 1991-1992." *MMWR* 42(40): 730-31 and 737-39.
- Fortmann, S.P., Flora, J.A., Winkleby, M.A., Schooler, C., Taylor, C.B., Farquhar, J.W. 1995. "Community Intervention Trials: Reflections on the Stanford Five-City Project Experience." *American Journal of Epidemiology*, 142: 576-86.
- Kiiskinen, U. 1995. "The Costs of Cardiovascular Disease." In Puska, P., Puomilehto, J., Nissinen, A. & E.Vartiainen (eds) *The North Karelia Project: 20 Year Results and Experiences*. National Public Health Institute, 255-70.
- Kuehnert, P. 1999. Division of Disease Control, Maine Bureau of Health, Maine Department of Human Services, unpublished data.
- Lightwood, J.M., Glantz, S.A. 1997. "Short-Term Economic and Health Benefits of Smoking Cessation—Myocardial Infarction and Stroke." *Circulation*, 96(4): 1089-96.
- Maine Pregnancy Risk Assessment Monitoring System (PRAMS), Maine Bureau of Health, Maine Department of Human Services.
- Maine Behavior Risk Factor Surveillance System (BRFSS), Maine Bureau of Health, Maine Department of Human Services/Maine Board of Health Reports, 1892-1917, Maine Government Archives.
- Maine Youth Risk Behavior Survey (YRBS), Maine Department of Education.
- Manton, K.G., Corder, L., Stallard, E. 1997. "Chronic disability Trends in the Elderly United States Populations: 1982-1994." *Proceedings of the National Academy of Science*, 94: 2593-98.
- McGinnis, J.M., Foege, W.H. 1993. "Actual Causes of Death in the United States." *Journal of the American Medical Association*, 270: 2207-12.
- Mokdad, A.H., Serdula, M.D., Dietz, W.H., Bowman, B.A., Marks, J.S., Koplan, J.P. 1999. "The Spread of the Obesity Epidemic in the United States, 1991-1998." *Journal of the American Medical Association*, 282: 1519-22.
- Office of Vital Statistics, Maine Bureau of Health, Maine Department of Human Services (DHS).
- Pronk, N.P., Goodman, M.J., O'Connor, P.J., Martinson, B.C. 1999. "Relationship Between Modifiable Health Risks and Short-Term Healthcare Charges." *Journal of the American Medical Association*, 282: 2235-39.
- Record, B. 1999. Franklin Memorial Hospital, unpublished data.
- U.S. Department of Health and Human Services. *U.S. Public Health Reports*. September 1998.
- Vartiainen, E., Puska, P., Pekkanen, J., Tuomilehto, J., Jousilahti, P. 1994. "Changes in Risk Factors Explain Changes in Mortality from Ischaemic Heart Disease in Finland." *British Medical Journal*, 309: 23-26.
- Vita, A.J., Terry, R.B., Hubert, H.B., Fries, J.F. 1998. "Aging, Health Risks, and Cumulative Disability." *New England Journal of Medicine*, 338: 1035-41.