Health Status Indicators for the Year 2000: Projections for Allegheny County, Pennsylvania

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Synopsis

A consensus set of health status indicators was released in July 1991 by the Centers for Disease Control and Prevention for use by public health officials at the Federal, State, and local levels in identifying and monitoring issues of public health importance.

These health status indicators have been projected for the Year 2000 in Allegheny County, PA, with linear regression analyses of historical data. Indications are that mortality rates for black infants, breast cancer mortality, suicide, lung cancer mortality, incidence of acquired immunodeficiency syndrome, and the number of measles cases likely will not meet the year 2000 targets in Allegheny County.

These data will prove useful in monitoring progress towards the year 2000 objectives and provide comparative data for other geographic areas of the United States with similar demographic characteristics.

UNITED STATES HEALTH GOALS and objectives for the year 2000 were unveiled by the Public Health Service in 1990 (*1*). The overall purpose of the goals was threefold— to "increase the span of healthy life for Americans, reduce health disparities among Americans, and achieve access to preventive services for all Americans."

The more than 300 national health promotion and disease prevention objectives encompassed the areas of health promotion, health protection, preventive services, surveillance and data systems, age-related objectives, and special population objectives. Associated with each of the objectives is a target rate for the year 2000. The objectives related to surveillance and data systems were designed to assist the systematic collection, analysis, interpretation, dissemination, and use of health information by developing standard methods of data collection throughout the United States.

Objective 22.1 is to "develop a set of health status indicators appropriate for Federal, State, and local health agencies and establish use of the set in at least 40 States," where no such set existed in 1990 (*1*). According to Dever, a health status indicator is "a single measure that is obtained from a single component (variable) and purports to reflect the health status of an individual or defined group," whereas a health status index is "a composite measure that summarizes data from two or more components (variables) and, like an indicator, purports to reflect the health status of an individual or defined group" (*2*). Health status indices are useful when attempting to describe the overall health of a region, while health status indicators are more useful for program planning and monitoring issues of public health importance because they are disease-specific.

In July 1991, the Centers for Disease Control and Prevention (CDC) released a consensus set of health status indicators for the general assessment of community health status in the United States and priority data needs to augment the indicators (*3*). In developing the indicators, priority was given to selecting indicators for which it was assumed data were widely available and commonly used. Thus, many of the indicators are mortality rates. Omission of one of the year 2000 objectives from the list does not mean that it is not a priority, rather that the committee that developed the consensus set of health status indicators may have felt that there were not adequate data available for the objective at all levels of health care delivery (*4*).

Health status indicators for the year 2000—baseline U.S. figures, targets, and projections for the year 2000 in Allegheny County, PA

Indicator	1987 U.S. baseline	Year 2000 target	Year 2000 projection Allegheny County	95 percent confidence interval
Black infant mortality rate[1]	17.9	11.0	[2]23.0	13.8, 32.1
Death rates[3]:				
Motor vehicle crashes	18.8	16.8	3.9	1.1, 6.6
Breast cancer	22.9	20.6	[2]24.2	19.9, 28.4
Coronary heart disease	135	100	53.3	46.4, 60.3
Homicide	8.5	7.2	0.9	0.0, 2.1
Work-related injury	6	4	NA	
Suicide	11.7	10.5	[2]14.8	13.4, 16.2
Lung cancer	37.9	42	[2]46.4	42.3, 50.6
Incidence:				
AIDS	37,722	268	[2]267	265, 269
Measles	3,058	0	[2]>0	
Syphilis	18.1	10	3.2	1.1, 5.2
Tuberculosis	9.1	3.5	[2]1.6	0.1, 3.1

[1] Per 1,000 live births.
[2] Will likely not meet the year 2000 objective if trends were to continue as in the past 10 years.
[3] Per 100,000 population.

The purpose of our study was to determine whether or not data were available for the indicators of health status as outlined by CDC and whether or not the year 2000 targets would likely be met in Allegheny County, PA, using simple statistical models based on past trends. The results will be used for health policy development and program planning in the county.

Methods

The consensus set of indicators of health status (*3*) are listed in the box. They include measures related to communicable and noncommunicable diseases, violent behavior in the population, and risk factors for diseases. For the purposes of this study, two indicators were not directly addressed. Black infant mortality had already been identified by the Pennsylvania Department of Health as a major problem in Allegheny County, and attempts are being made to address this issue (*5*). We did not attempt to duplicate efforts at assessment and prediction but will present the results of other researchers for this indicator.

Another indicator that was not assessed was the death rate from all causes. As defined by Dever, the death rate from all causes is actually a health status index, not a health status indicator, because it is a compilation of a number of component indicators, such as the other mortality-related health status indicators (*2*). Therefore, it would not be useful for health policy development and program planning. Also, no target is assigned to this "indicator" in "Healthy People 2000." Finally, data on indicators of risk factors are generally not available for Allegheny County, so no attempt was made to present any data on the risk factors either.

The following data were gathered from the Pennsylvania Department of Health Data Center: number of cases or deaths for each indicator listed in the box, the total population for Allegheny County, and the female population for Allegheny County. Age-adjusted death rates were calculated according to Fleiss (*6*) for motor vehicle deaths, breast cancer deaths, cardiovascular deaths, homicides, suicides, and lung cancer deaths and standardized to the 1940 population, as suggested by the National Center for Health Statistics (*3*), allowing for the comparison of our rates with mortality rates for the entire United States or for other geographic areas. Data were gathered for the most recent years, as far back as 1970 and as recently as 1989, so that long term trends could be analyzed when possible.

Linear regression was used to model the existing data and predict attainment of the year 2000 targets. Linear regression is a useful tool for modeling continuous data and making projections based on existing data. The priority in choosing a regression model was simplicity so that our methods could be duplicated easily in other areas of the United States. Therefore, when transformations of the data were necessary, only log, square root, and squared transformations were considered. However, none of the data to be presented required transformation prior to analysis.

After using the models to predict the status of the indicators in the year 2000, 95 percent confidence limits were calculated for all of the predictions according to the Fleiss method (*6*). For diseases with a decrease from baseline as the year 2000 target, we would not predict with confidence that the target will be met if our projection and associated 95 percent confidence limits did not include the year 2000 target. All analyses were performed with the use of the BMDP (*7*) software package for mainframe computers.

The specific target rates employed in our study were established in the "Healthy People 2000" document for all of the indicators listed in the box except acquired immunodeficiency syndrome (AIDS) and cardiovascular disease. The U.S. AIDS target from "Healthy People 2000" (*1*) was extrap-

olated to Allegheny County to yield a year 2000 target of no more than 268 new cases of AIDS in that year for the region (*8*). (Coronary heart disease, which has an associsted "Healthy People 2000" target, was employed as an indicator instead of cardiovascular disease.)

Results

The results of the predictions for the year 2000 are presented in the table. These data represent incidence and mortality for the residents of Allegheny County. Eleven years (1979–89) of data were used to predict attainment of the year 2000 targets for all health status indicators except AIDS. All years of data available since the identification of AIDS (1981–89) were used to predict the number of new AIDS cases in Allegheny County for the year 2000.

"Healthy People 2000" (*1*) defined the codes to be used for all diseases from the International Classification of Diseases, 9th edition (ICD–9) (*9*). The Commonwealth of Pennsylvania also collects and reports data on vital statistics by employing the ICD–9 coding scheme (*10*). The codes for coronary heart disease used in "Healthy People 2000," however, were not the same as those used by the Commonwealth of Pennsylvania. Prior to 1990, the heart disease designation compiled for Pennsylvania included several codes in addition to those specified in the technical appendix for "Healthy People 2000" (*1*). Therefore, it was necessary to use the individual 4-digit death codes from death certificates to calculate the death rate from coronary heart disease in Pennsylvania for comparability with the year 2000 target of no more than 100 per 100,000 population.

Black infant mortality continues to be a major public health problem, with data from the State health data center (*5*) indicating that Allegheny County will not reach the year 2000 objective. As noted by the data center, Allegheny County has one of the highest black infant mortality rates in the nation.

Not enough data were available for one indicator in the table to make predictions for the year 2000. Work-related injury deaths have only been coded on death certificates in Pennsylvania since 1985. However, the State health data center reported that the average age-adjusted annual death rates for 1988–90 in Allegheny County from work-related injury were 1.3 per 100,000 population, which is already below the year 2000 target of 4.0 (*11*).

Predictions for the other indicators also are displayed in the table. The diseases for which the rates likely will not meet the year 2000 targets based on trends from historical data are footnoted. To date, rates for three of the indicators (homicides, motor vehicle crashes, and syphilis) have always been lower than the year 2000 target and are still declining in Allegheny County. The death rate from suicide has been above the year 2000 target for every year except one and is still on the rise. Prediction of the number of AIDS cases in the year 2000 from regression analyses indicate an expected number of 267 in that year, with an upper confidence limit greater than the year 2000 target

Consensus Set of Health Status Indicators for Assessing Community Health Status and Monitoring Progress Toward the Year 2000 Objectives, United States, July 1991

Indicators of health status outcome

1. Race-ethnicity-specific infant mortality, as measured by the rate (per 1,000 live births) of deaths among infants younger than 1 year of age

Death rates (per 100,000 population) of

2. Motor vehicle crashes
3. Work-related injury
4. Suicide
5. Lung cancer
6. Breast cancer
7. Cardiovascular disease
8. Homicide
9. All causes

Reported incidence (per 100,000 population) of

10. Acquired immunodeficiency syndrome
11. Measles
12. Tuberculosis
13. Primary and secondary syphilis

Indicators of risk factors

14. Incidence of low birth rate, as measured by percentage of total number of live-born infants weighing less than 2,500 grams at birth
15. Births to adolescents (females ages 10–17 years) as a percentage of total live births
16. Prenatal care, as measured by percentage of mothers delivering live infants who did not receive prenatal care during first trimester
17. Childhood poverty, as measured by the proportion of children younger than age 15 years living in families at or below the poverty level
18. Proportion of persons living in counties exceeding U.S. Environmental Protection Agency standards for air quality during previous year

SOURCE: Reference *3*.

'Not only does this knowledge allow for comparison of rates across different areas of the United States, but it also allows for the prioritization of needs in any given geographic location.'

of 268. Therefore, we cannot predict with any confidence attainment of the year 2000 target for AIDS cases. Deaths from breast cancer have never been below the year 2000 target and do not appear to be declining. If the incidence and death rates from both tuberculosis and coronary heart disease would continue to decline in Allegheny County as they have in the past, the year 2000 targets for these two indicators will be met. Finally, because the target for measles in the year 2000 is eradication, it cannot be said with any degree of confidence that Allegheny County will attain that target, even though there have been relatively few cases reported in the last 10 years.

Discussion

The development of health status indicators that define the measurement of disease is a good first step in the improvement of surveillance and data systems by CDC. In times of increasing financial burden, researchers and program planners need to know the relation of their community, county, or State to the indicators outlined by CDC. Not only does this knowledge allow for comparison of rates across different areas of the United States, but it also allows for the prioritization of needs in any given geographic location. For this task to be accomplished, however, data must be available in the form required, and knowledgeable personnel must be available to model past trends and predict future ones. To this end, health officials must be willing to assist planners on the Federal, State, and local levels to implement the consensus set of health status indicators for the year 2000. The information gained from them will also aid in the development of the next set of national health promotion and disease prevention objectives. Beyond that, without adequate baseline information at all levels of health care delivery, it is impossible to assess the effectiveness of any intervention aimed at decreasing the impact of a particular disease on the health of the nation.

Our study was an assessment of the status of the consensus indicators in Allegheny County for purposes of description and program planning locally but may also serve as a model for other local areas wishing to obtain data and assess trends related to the consensus set of health status indicators. One of our first discoveries was the inadequacy of data on deaths from work-related injury and indicators of risk factors. Persons involved with health care at all levels of delivery could collaborate for more efficient use of resources to collect such data. It would be useful not only for program planning but also for strategic health care planning at the institution level and for health care providers.

Regression analyses were not performed to estimate the incidence of measles in Allegheny County. An understanding of the transmission of this disease is necessary to realize that prediction of future trends based on past incidence is not appropriate because it is communicable and its incidence in any given year is not directly dependent on incidence in the previous year (*12*). The appearance of even one new measles case in a given year presents the possibility that measles will not be eradicated by the year 2000; therefore we would have to assume that the number of measles cases in the year 2000 will be greater than zero in Allegheny County.

Assuming no major changes in risk factors, health care, or current intervention activities, death rates from motor vehicle accidents, homicides, and coronary heart disease should meet the year 2000 target in Allegheny County with no further intervention. Death rates from motor vehicle accidents have been steadily declining, presumably because more people are wearing seat belts to comply with the State law and fewer people are driving motor vehicles while under the influence of alcohol. Mortality from coronary heart disease has been declining steadily since the mid-1960s (*13*), with part of the decline being attributed to better medical care and reduction of risk factors in the population (*14*).

Although it appears from 20-year trends that the yearly incidence of tuberculosis (TB) should meet the year 2000 target, other factors must be considered. For example, immunocompromised people, such as AIDS patients, are more susceptible to TB (*12*). Therefore, if the yearly incidence of AIDS continues to rise, it would be logical to assume that the incidence of TB might also increase. Also, the new antibiotic-resistant strains of TB appearing recently could alter the incidence and prevalence of TB in the county and the rest of the United States.

Other issues to consider when evaluating the

predictions displayed in the table are the components of those rates and variables that might affect their future trends. It is possible that certain subgroups of the population, such as lower socioeconomic status cohorts, may not attain the targets as specified in "Healthy People 2000." Therefore, when planning interventions and prioritizing health care needs for specific subgroups, these analyses should be repeated using only the numerator and denominator data for that subgroup. Also, predictions are limited because they are based solely on historical data and they are only accurate if no major environmental or demographic changes occur in the population.

This description of the health status indicators in Allegheny County should be very useful to health policy developers and health planners interested in the year 2000 goals and objectives. Indicators that appear to need intervention to meet the year 2000 targets based on data from the entire population of Allegheny County include measles, suicide, AIDS, female breast cancer, and possibly tuberculosis. Perhaps these data could provide the rationale for health care providers to seek funding to intervene on known risk factors for these diseases in the county.

In conclusion, the development and implementation of the CDC consensus set of health status indicators (*3*) will require the cooperation of Federal, State, and local health officials. If this is a priority of health officials, then they must respond with technical and financial support for the assessment of these indicators at all levels of health care delivery. The promotion of adequate surveillance and data systems as outlined in Objective 22.1 (*1*) is essential to providing information about attainment of all of the year 2000 targets (*1*).

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