

Ambient Air Quality in Texas: Meeting the Healthy People 2000 Objective

The public health costs of air pollution are high. Air pollution has been associated with a wide range of respiratory diseases including chronic bronchitis, emphysema, lung cancer, and asthma. Other health consequences include eye irritation, immunosuppression, and premature lung tissue aging.³ The annual health costs of exposure to the most serious air pollutants have been estimated to range from \$40 to \$50 billion.⁴ Air pollution is a direct threat to human health since most exposure occurs through pulmonary, ocular, and dermal contact. Airborne pollution deposited in surface waters, including reservoirs, also poses an indirect threat to human health.⁵

Healthy People 2000 (HP2000) is a comprehensive set of national objectives for health promotion and disease prevention.² Objective 22.1 of HP2000 provides a set of nationally comparable health status indicators that can be used by various levels of government (ie, local, state, and national) for health evaluation and planning. In 1990, following a consensus building process involving local, state, and national groups, the Centers for Disease Control and Prevention (CDC) introduced 18 Health Status Indicators.¹ Some of the Health Status Indicators directly measure health status, and some measure factors that put individuals at increased risk of disease or premature death. Because air quality can affect health status, it is addressed in one of the HP2000 objectives and in one of the 18 Health Status Indicators. This report describes how air quality is measured in terms of the Health Status Indicators and how well Texas is meeting the air quality HP2000 objective.

The Clean Air Act was first enacted in 1955 and forms the legislative basis of federal air pollution control regulations. Amendments to the Clean Air Act were passed in 1963, 1965, 1970, 1977, and 1990. Drafted in response to the 1970 and 1990 amendments, the National Ambient Air Quality Standards (NAAQS) define and set regulatory limits for 6 "criteria pollutants" which are considered serious airborne threats to human health. These 6 criteria pollutants are ozone, particulate matter (PM-10), carbon monoxide, sulphur dioxide, nitrogen dioxide, and lead.^{6,7} Exceedance of standards associated with the criteria pollut-

ants is used to monitor progress for HP2000 Objective 11.5, which monitors ambient air quality. The health effects and sources of these pollutants are described in the following paragraphs and listed in Table 1.

Stratospheric, or high-altitude, ozone is beneficial because it absorbs some of the harmful ultraviolet (UV) solar energy. In any reference to air pollution, however, ozone refers to low-altitude (tropospheric) ozone, which is harmful to human health. Ozone is not directly emitted by any of the sources listed in Table 1, but is formed by photochemical processes involving volatile organic compounds (such as hydrocarbons) and nitrogen oxides, which are produced by the sources listed. Because sunlight and temperature stimulate ozone formation, ozone pollution is a seasonal problem with peak concentrations occurring in the warmer times of the year. Since the major contributors of ozone-producing compounds are mobile sources such as motor vehicles, ozone is a more widely distributed environmental health problem than the other criteria pollutants. The mobility and seasonality of this pollutant also pose substantial challenges in monitoring and addressing its risks.⁸

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Table 1. Criteria air pollutants, health risks and sources

Pollutants	Health risks	Contributing sources
Ozone ¹ (O ₃)	Asthma, reduced respiratory function, eye irritation	Cars, refineries, dry cleaners
Particulate matter (PM-10)	Bronchitis, cancer, lung damage	Dust, pesticides
Carbon monoxide (CO)	Blood oxygen carrying capacity reduction, cardiovascular and nervous system impairments	Cars, power plants, wood stoves
Sulphur dioxide (SO ₂)	Respiratory tract impairment, destruction of lung tissue	Power plants, paper mills
Lead (Pb)	Retardation and brain damage, esp. children	Cars, nonferrous smelters, battery plants
Nitrogen dioxide (NO ₂)	Lung damage and respiratory illness	Power plants, cars, trucks

Source: Environmental progress and challenges: EPA's update

¹Ozone refers to tropospheric ozone which is hazardous to human health.

Particulate matter refers to dust, dirt, smoke, and other particles suspended in air. From 1971 through 1987 the national air quality standard for particulate matter included particles up to 45 microns in diameter. In 1987 the standard was revised to emphasize particles smaller than 10 microns (PM-10) in diameter. These smaller particles pose a greater health threat than larger particles because they are more easily transported into the lungs.⁸

A primary source of sulphur dioxide pollution is the incineration of coal that has a high sulphur content. This is the type of coal most frequently used in power plants and factories in the midwestern United States; consequently, sulphur dioxide levels are highest in this area of the country. Sulphur dioxide can also have indirect health effects when it forms acid rain that contaminates surface water.⁵

Since the advent of unleaded fuels, lead pollution is most prevalent near smelters and battery plants. Nitrogen dioxide is most often found in urban areas. In ad-

dition to its independent detrimental health effects, nitrogen dioxide plays an important role in the formation of ozone. Carbon monoxide is also most common in urban areas, with automobiles being a major source.⁸

The Ambient Air Quality HP2000 Objective and Health Status Indicator

The HP2000 measure for Objective 11.5 is the percentage of people living in counties which **have not exceeded** any of the specific air quality standards for the 6 criteria pollutants during the previous 12 month time period. The HP2000 target is 85%. The Health Status Indicator (HSI) for air quality is the converse of this objective, and measures the percentage of people living in counties **which have exceeded** any of the US EPA standards for air quality during the previous year.⁹ Since the HSI is used primarily for the purposes of comparing various units of government to one another, there is no target level.¹

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Table 2. Percentage of people nationwide who live in counties that have not exceeded NAAQS* in the previous 12 months (Objective 11.5)

	1988	1989	1990	1991	1992	1993
Any standard	49.7	65.3	69.4	65.3	78.5	76.5
Ozone	53.6	72.6	74.2	72.0	82.1	79.5
Carbon monoxide	87.8	86.2	91.1	92.0	94.3	95.4
Nitrogen dioxide	96.6	96.5	96.5	96.5	100	100
Sulphur dioxide	99.3	99.9	99.4	98.0	100	99.4
Particulates (PM-10)	89.4	88.8	92.3	94.1	89.6	97.5
Lead	99.3	99.4	97.8	94.1	98.1	97.8

Source: U.S. EPA Aerometric Information Reporting System.
 *NAAQS are the National Ambient Air Quality Standards.

Since 1988 there has been progress toward the HP2000 goal, with a general increase in the percentage of people who live in counties where none of the standards were exceeded. From 1988 to 1993 the percentage of residents who lived in counties where none of the criteria pollutants exceeded the EPA standards increased from 49.7% to 76.5% (Table 2). The NAAQS target is 85.0%. Although elevated ozone levels remain the most pervasive pollution problem, the greatest strides toward air quality improvement have been made in the area of ozone remediation. From 1988 to 1993 the percentage of people living in counties which have not exceeded the criteria standard for ozone increased from 53.6% to 79.5%. The HP2000 nitrogen dioxide standard has already been reached; as of 1992, 100% of US residents lived in counties that had not exceeded the nitrogen dioxide standard during the previous 12

months. The percentage of people in counties that have not exceeded standards for carbon monoxide, sulphur dioxide, and particulates (PM-10) have also increased since 1988. In contrast to the gains for the above criteria pollutants, the percentage of people living in counties that had not exceeded the lead standard declined from 99.3% in 1988 to 97.8% in 1993.⁸ Table 3 provides data regarding the percentage of people living in counties that have exceeded NAAQS standards.

Since 1988 there has been progress toward the HP2000 goal

How do states compare with one another?

Table 4 lists the 36 states in which at least one county exceeded any of the criteria standards in 1993. (It should be noted that 41 states had exceeded at least one standard in 1991 and 32 states exceeded at least one standard in 1992.)

Table 3. Percentage of people nationwide who live in counties that have exceeded NAAQS* in the previous 12 months (Health Status Indicator)

	1988	1989	1990	1991	1992	1993
Any standard	50.3	34.7	30.6	34.7	21.5	23.5
Ozone	46.4	27.4	25.8	28.0	17.9	20.5
Carbon monoxide	12.2	13.8	8.9	8.0	5.7	4.6
Nitrogen dioxide	3.4	3.5	3.5	3.5	0	0
Sulphur dioxide	0.7	<0.1	0.6	2.0	0	0.6
Particulates (PM-10)	10.6	11.2	7.7	5.9	10.4	2.5
Lead	0.7	0.6	2.2	5.9	1.9	2.2

Source: U.S. EPA Aerometric Information Reporting System.
 *NAAQS are the National Ambient Air Quality Standards.

Among states that exceeded standards in 1993, the percentage of people living in counties that did not exceed any standard ranged from 99.7% in Oregon and Michigan to 3.1% in Connecticut (Column 1). The second column in Table 4 shows the percentage of people living in

counties that exceeded criteria standards (the Health Status Indicators); these values are the converse of the values in Column 1 and ranged from 0.3% in Oregon and Michigan to 96.9% in Connecticut. For the 14 states that are not included in the table, none of the NAAQS were exceeded in 1993.

Table 4. Profile of states that exceed NAAQS*, 1993

State	% People in counties not exceeding NAAQS**	% People in counties exceeding any NAAQS***
Alabama	97.5	2.5
Alaska	39.9	60.1
Arizona	42.1	57.9
California	28.4	71.6
Colorado	86.0	14.0
Connecticut	3.1	96.9
Delaware	33.7	66.3
Georgia	79.6	20.4
Illinois	97.6	2.4
Indiana	84.0	16.0
Kentucky	82.0	18.0
Louisiana	89.6	10.4
Maine	83.9	16.1
Maryland	55.7	44.3
Massachusetts	54.9	45.1
Michigan	99.7	0.3
Missouri	77.0	23.0
Montana	94.1	5.9
Nebraska	73.6	26.4
Nevada	38.3	61.7
New Hampshire	69.7	30.3
New Jersey	72.0	28.0
New Mexico	91.1	8.9
New York	91.2	8.8
North Carolina	91.7	8.3
Ohio	87.0	13.0
Oregon	99.7	0.3
Pennsylvania	64.3	35.7
South Carolina	88.0	12.0
Tennessee	78.0	22.0
Texas	65.0	35.0
Utah	75.5	24.5
Virginia	83.1	16.9
Washington	92.6	7.4
West Virginia	98.0	2.0
Wisconsin	97.4	2.6
US	76.5	23.5

Source: US EPA, Aerometric Information Reporting System.

* NAAQS are the National Ambient Air Quality Standards.

** Healthy People 2000 objective 11.5

*** Health Status Indicator

The ozone standard was most frequently exceeded in the 36 states in which any of the criteria standards were exceeded in 1993. Standards for PM-10 were the next most frequently exceeded, followed by lead and carbon monoxide. However, in California and several other populous states, the standards for multiple pollutants were exceeded in several counties.

How do minorities fare?

Nationally, 23.5% of the population lived in counties which exceeded at least one criteria standard. Among the racial and ethnic groups, 42% of Hispanics and 37% of Asians and Pacific Islanders lived in counties that exceeded at least one standard. Much of this disparity is attributable to the high concentrations of both Hispanics and Asians and Pacific Islanders living in California and several other states which had higher percentages of all residents exposed to poor air quality. Specifically, 61.2% of all Hispanics live in California, Texas, Arizona, and New Jersey--all states where numerous counties exceeded criteria standards. These same 4 states contain 48% of the US Asian and Pacific Islander population. Conversely, only about 18% of American Indians and Alaskan Natives live in counties where air standards were exceeded, a situation that is partly attributable to the large proportion of this group who live in rural areas. Some of these disparities are undoubtedly attributable to the greater concentration of some minority groups in urban areas where air pollution standards are most likely to be exceeded.⁹

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Table 5. Percentage of Texans who Live in Counties that have not Exceeded National Ambient Air Quality Standards from 1988-1995 (HP2000 Objective)

	1988	1989	1990	1991	1992	1993	1994	1995
Any Standard	56.6	56.1	52.8	68.8	67.4	65.1	70.2	52.9
Ozone	56.6	57.6	54.3	68.8	67.4	65.1	70.2	52.9
Carbon Monoxide	96.6	96.6	96.6	96.6	96.6	96.6	96.6	100
Particulate (PM-10)	96.6	96.6	96.6	96.6	96.6	100	96.6	96.6
Sulfur Dioxide	100	98.6	100	100	100	100	100	100
Nitrogen Dioxide	100	100	100	100	100	100	100	100
Lead	100	98.5	98.5	100	100	100	100	100

Data based on 1990 census county population estimates.
 Source: Texas Natural Resource Conservation Commission

How is Texas measuring up?

From 1988 to 1994 the percentage of Texans who live in counties where none of the standards were exceeded has increased (Table 5). Although there have been some fluctuations in the data, there is overall progress toward the year 2000 goal. However, in 1995 the percentage of people living in counties which did not exceed any of the standards was 52.9%, down from 70.2% recorded the previous year. The percentage of people living in counties not exceeding the individual standards ranged from 52.9% for ozone to 100% for lead. The increased percentage of people living in counties that exceeded the ozone standard in 1995 can probably be attributed to the warmer than normal weather that year.

Table 6 shows the percentage of Texans living in counties that have exceeded the criteria standards from 1988 to 1995 (Health Status Indicator). From 1988 to 1994 the percentage of people living in counties which exceeded any of the standards decreased. However, in 1995 the percentage of people living in counties which exceeded any of the standards was 47.1%, up from 29.8% recorded the previous year. The ozone standard was the most frequently exceeded criteria standard. Forty-seven percent of Texans lived in counties which exceeded the ozone standard compared with 3.6% for PM-10.

In summary, although there has been nationwide progress toward meeting the Healthy People 2000 target of 85% of

Table 6. Percentage of Texans Living in Counties that have Exceeded National Ambient Air Quality Standards from 1988-1995 (Health Status Indicator)

	1988	1989	1990	1991	1992	1993	1994	1995
Any Standard	43.4	43.9	47.2	31.2	32.6	34.9	29.8	47.1
Ozone	43.4	42.4	45.7	31.2	32.6	34.9	29.8	47.1
Carbon Monoxide	3.4	3.4	3.4	3.4	3.4	3.4	3.4	0
Particulate (PM-10)	3.4	3.4	3.4	3.4	3.4	0	3.4	3.4
Sulfur Dioxide	0	1.4	0	0	0	0	0	0
Nitrogen Dioxide	0	0	0	0	0	0	0	0
Lead	0	1.5	1.5	0	0	0	0	0

Data based on 1990 census county population estimates.
 Source: Texas Natural Resource Conservation Commission

people living in counties where none of the air quality standards were exceeded, many minority groups live in counties that exceeded at least one air quality standard. To reduce this disparity, further efforts are needed to improve air quality in highly populated urban areas.



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Adapted from: Seitz F and Plepys C. Monitoring Air Quality in Healthy People 2000. Healthy People 2000 Statistical Notes: From the CDC National Center for Health Statistics 1995; No. 9 Sept.

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HIV/AIDS in Texas: 1995 Behavioral Risk Factor Surveillance System Results

Background

More than 500,000 cases of acquired immunodeficiency syndrome (AIDS) were diagnosed nationwide from the beginning of the epidemic through 1995. Data obtained through 1993 suggest that an estimated 650,000 to 900,000 Americans are currently infected with human immunodeficiency virus (HIV), the virus that causes AIDS. Close to 320,000 people are known to have died of HIV infection in the US by the end of 1995. The World Health Organization estimates that nearly 20 million people (including 1.5 million children) are infected with HIV worldwide, and approximately 4.5 million of these cases have already progressed to AIDS.

Estimates suggest that 50,000 to 70,000 Texas residents are infected with HIV. Nationally, Texas continues to rank

fourth in the number of AIDS cases reported annually. Through the end of 1995, 35,562 AIDS cases had been reported in Texas. The 4,674 reported in 1995 accounted for an annual rate of 25.1 cases per 100,000 population. HIV infection is the leading cause of death in Texas for men and women aged 25 to 44 years.

Shifts in the AIDS Epidemic

Although exposure to HIV from engaging in male-to-male sex continues to account for the largest proportion of AIDS cases, infection due to injection drug use or to heterosexual contact with a partner at risk is increasing rapidly. Exposure through heterosexual activity has steadily increased from less than 1% of cases reported annually in the mid-1980s to 8% of cases reported in 1995. Of the

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total number of 1995 Texas cases attributed to heterosexual exposure, 61% were among women. During the first seven years of the AIDS epidemic (1981 through 1987), 78% of AIDS patients were white, 11% were African American, and 10% were Hispanic. From 1988 through 1995, the percentage of white AIDS cases has dropped to 57% while those for African Americans and for Hispanics have increased to 25% and 17%, respectively.³

AIDS Among Youth

AIDS is the sixth leading cause of death among Texans aged 13 to 24 years. Due to the long period of time between HIV infection and the development of AIDS, most AIDS cases diagnosed in patients 20 to 24 years of age probably developed from HIV infections contracted when these individuals were teenagers. The number of AIDS cases diagnosed among teens has increased more than fivefold in recent years (315 cases during the period 1981 through 1987 to 1,700 cases during 1988 through 1995). More than half of Texas students in grades 9 through 12 reported having had sexual intercourse, with 19% reporting having had at least 4 sexual partners. While 77% of sexually active teens used some method of contraception, only 55% used condoms during their last sexual encounter.

Behavioral Risk Factor Surveillance System

The Texas Department of Health (TDH) Behavioral Risk Factor Surveillance System (BRFSS) conducts a monthly telephone survey of randomly selected adult Texas residents, aged 18 and older, who answer questions about their health habits. Respondents aged 18 to 64 years answer 16 questions on AIDS topics such as education for youth, risk perception, HIV testing, and sexual practices. In 1995, 1,700 Texans participated in the BRFSS survey, with 1,430 eligible to respond to the questions pertaining to HIV/AIDS.

Highlights of the 1995 BRFSS Results

- ◆ **Most people in Texas perceive their risk of HIV infection to be low or nonexistent:** no risk, 63%; low, 26%; medium, 5%; high, 3%
- ◆ **Nearly half of all Texas residents (49%) report being tested for HIV at some time:** 58% of those aged 25-44 years said they had been tested for HIV compared with 51% of people 18-24 years and 30% of ages 45-64.
- ◆ **Only 31% of people receiving their HIV test results recall discussing them with a health care professional.** Nearly 80% of reported AIDS cases are aged 25-44, yet only 28% of them received counseling.
- ◆ **The majority of Texans believe AIDS education should begin no later than 6th grade:** by the 6th grade, 73%; by the 3rd grade, 30%.

Note: reported behavior may differ from actual practices.

Conclusions

To be effective, AIDS prevention strategies must target **high risk behaviors** such as unprotected sex and injecting drug use rather than “high risk populations.” The overwhelming public perception that HIV presents little or no risk to most people in Texas emphasizes the importance of continuing to study behavior trends and remind people that their risk of exposure to HIV is determined by their behavior, not by the color of their skin, their age or their sexual preference.

Teens and young adults are at increased risk for HIV exposure because of their tendency to have multiple partners, to have unprotected sex, and to use alcohol and drugs. The TDH Texas Risk Factor Report recommends several ways to help young people make healthier choices:

- ◆ Include HIV/AIDS education and prevention information in health education programs for grades K-12.
- ◆ Encourage parental involvement.
- ◆ Provide youth with easier access to prompt testing, medical care, and effective HIV counseling.

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To serve their clients most effectively, health care professionals must stay informed of rapidly changing AIDS information. The BRFSS information on HIV/AIDS serves to inform the public health community as to the knowledge and opinions of the general population so that policy and programs may be effectively evaluated and improved.

Summarized from Tomich E, Condon K. HIV/AIDS in Texas 1995 Survey Data. Texas Risk Factor Report: Behavioral Risk Factor Surveillance System. 1996;3(1).

For further information contact the TDH BRFSS Program at (512) 458-7200 or the TDH HIV/STD Epidemiology Division at (512) 490-2545.

New Subscription Guidelines Coming Soon!

As mentioned in the last issue of DPN, subscription procedures for 1997 will include some major changes, such as fees for selected services. Another change is in the DPN subscription period, which now begins January 1 (instead of June 1). Because notification of this change is so close to the new renewal date, the 1997 deadline is extended to March 31, 1997. Subscribers will receive the revised renewal form and instructions, including guidelines for fee-exemption eligibility, this month by separate mail.

Reminder:

The electronic version of DPN will continue to be available free of charge to everyone on the *World Wide Web* at <http://www.tdh.state.tx.us/phpep/dpnhome.htm>