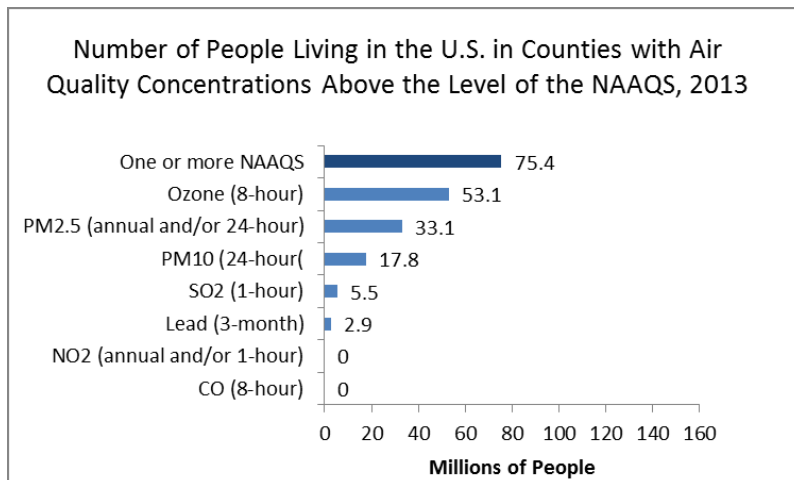


Environmental Health

Environmental factors play a central role in human development, health, and disease. The environment, including infectious agents, is one of the primary factors, along with genetic factors, personal behaviors, and social circumstances that affect human health.^{lx}

Air Quality

Poor air quality continues to be a widespread public health and environmental problem in the United States, and can cause respiratory disease development such as asthma, lung cancer, chronic obstructive pulmonary disease, as well as long term damage to cardiovascular systems.^{lxi} Air pollution also reduces visibility, damages crops and buildings, and deposits pollutants on the soil and in bodies of water where they affect the chemistry of the water and the organisms living there. The Environmental Protection Agency (EPA) regulates nationwide air quality for six pollutants: ground-level ozone, particulate matter, lead (Pb), nitrogen oxides, carbon monoxide, and sulfur dioxide. Of the six air pollutants, Hamilton County is only required to monitor ozone and particulate pollution.



Air Quality in the United States

Although there have been significant air quality improvements nationwide, the EPA reports that approximately 75 million people in the U.S. live in counties that exceeded the national ambient air quality standards (NAAQS) in 2013, with ozone as the primary pollutant.^{lxii}

Figure 55 Source: EPA. Multiple years of data are generally used to determine if an area attains the NAAQS. The chart above is for one year only.

Air Quality in Hamilton County

The Hamilton County Air Pollution Control Bureau (APCB) administers local air pollution control laws that are intended to achieve and maintain levels of air quality as well as protect human health and safety. The APCB maintains seven monitoring sites throughout the county, and reports on the daily air quality using the Air Quality Index, which is a scale designed by the EPA to standardize the method for reporting air quality nationwide.

In Hamilton County, the daily air quality level is determined by either the ozone or the particulate concentration; whichever is higher on that day. The Air Quality Index measures the amount of pollutants in the outdoor air from a score of 0 to 500: good (0-50), moderate (51-100), unhealthy for sensitive people (101-150), unhealthy (151-200), very unhealthy (201-300), and hazardous (301-500).^{lxiii} During

2013 and 2014, the APCB observed no days where the AQI was in the unhealthy range. During each the three previous years, the number of days with AQI in the category “unhealthy for sensitive people” ranged from 5 to 7 days, and this was attributed to ozone levels. In 2010, there was 1 day where the AQI was in the category “unhealthy,” due to particulate matter.

Table 31. Number of Unhealthy Days

	Unhealthy for Sensitive Groups Number of Days		Unhealthy Number of Days	
	Ozone 8-Hour Average	Particulate 24-Hour PM _{2.5}	Ozone 8-Hour Average	Particulate 24-Hour PM _{2.5}
2010	7	0	0	*1
2011	5	0	0	0
2012	5	0	0	0
2013	0	0	0	0
2014	0	0	0	0

*High data due to construction project next to monitoring site
 Source: Chattanooga-Hamilton County Air Pollution Control Bureau

Outdoor air quality has improved dramatically since the Department of Health, Education and Welfare named Chattanooga as the most polluted city in the nation in 1969. The following charts from the Chattanooga/Hamilton County Air Pollution Control Bureau (APCB) at local monitors show a steady decrease in both ozone and particle pollution. Note that Hamilton County has met particulate pollution standards since 2005-2007 and is in compliance with the new standard of 12 µg/m³ set in 2013. It has been in compliance with the ozone standard of 75 parts per billion (ppb) since 2007-2009. In December 2014, the EPA proposed a more stringent standard to a range of 65 to 70 ppb, which Hamilton County has already met.^{lxiv} The EPA is to finalize the rule by October 1, 2015.

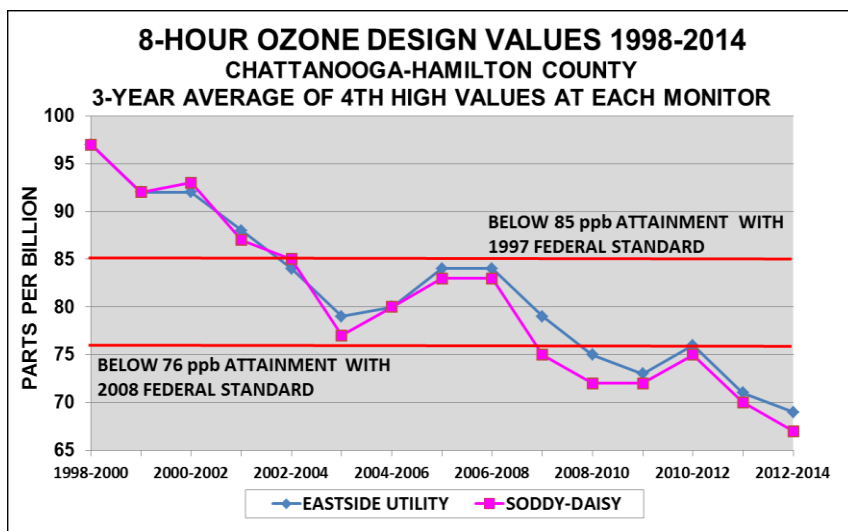


Figure 56 Source: Chattanooga-Hamilton County Air Pollution Control Bureau

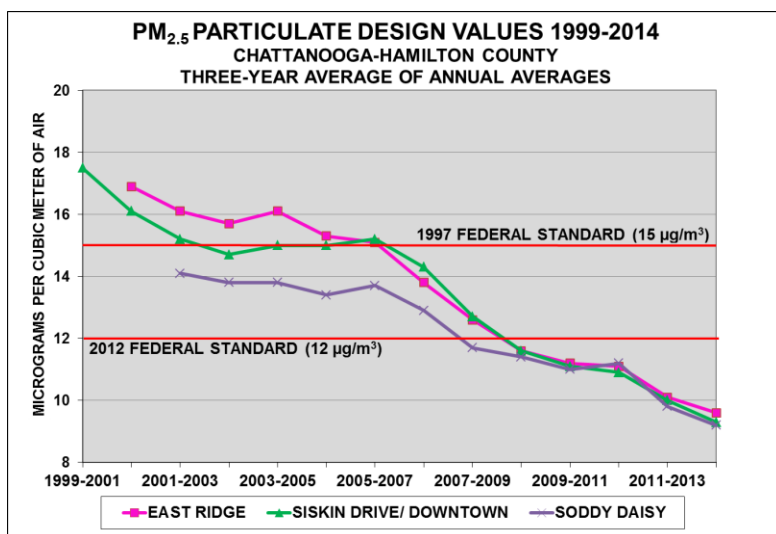


Figure 57 Source: Chattanooga-Hamilton County Air Pollution Control Bureau

Radon

According to the Environmental Protection Agency (EPA), radon is the number one cause of lung cancer among non-smokers in the nation. Radon is a naturally occurring, invisible, and odorless radioactive gas. Radon disperses in outdoor air, but can reach harmful levels when trapped in buildings such as homes. All buildings are susceptible to high levels of radon, regardless of building materials, or when the building was constructed. The EPA estimates that radon in indoor air causes 20,000 lung cancer deaths each year in the United States.

Hamilton County is categorized in “Zone 2” by the EPA, which is a moderate risk for radon exposure. The Tennessee Department of Environment and Conservation (TDEC) operates a statewide indoor Radon Program as part of the Office of Sustainable Practices. TDEC reported radon lab result testing data from 1986 to March 2009, the most recently available data. A total of 33,360 radon tests were completed in Tennessee, with 973 tests in Hamilton County. The average pCi/L was 2.4, with the maximum reading at 30.7. The average for the state of Tennessee was 4.7. The EPA standard is 4 pCi/L.

Water Quality

Approximately 319 million residents in the U.S. receive their tap water from a public water system, which is monitored and regulated by the Environmental Protection Agency (EPA). An estimated 15% of Americans get their water from private ground water wells that are not subject to EPA regulations.

The Oral Health Services program of the Tennessee Department of Health, in collaboration with the Tennessee Department of Environment and Conservation, continues active statewide community water fluoridation program. As of July 2014, 282 public water systems in Tennessee distributed fluoridated water to 5.1 million residents. In 2014, the Tennessee Department of Health estimated that 88% of residents who drink water from public water systems in Tennessee are receiving fluoridated water, compared with nearly 75% nationally, exceeding the *Healthy People 2020* objective of 79.6%.^{lxv}

In Hamilton County, the following public water systems provide fluoridated water: Eastside Utility District, Grindstone Estates Mobile Home Park, Hixson Utility District, Mowbray Mountain Utility District, Northwest Utility District – Sale Creek, Northwest Utility Water District-Soddy Daisy, Savannah Valley Utility District, Signal Mountain Water System, Tennessee-American Water Company, Union Fork-Bakewell Utility District, and Walden’s Ridge Utility District.

Lead

Lead poisoning can affect nearly every system in the body. Because lead poisoning often occurs with no obvious symptoms, it frequently goes unrecognized. Lead poisoning can cause behavior and learning problems, lower IQ, hyperactivity, slowed growth, hearing problems, and anemia. In rare cases, ingestion of lead can cause seizures, coma, and even death. Approximately half a million U.S. Children aged 1-5 years have blood lead levels greater than 5 micrograms per deciliter of blood ($\geq \mu 5 /dL$), the level at which the Centers for Disease Control recommends public health actions be initiated. The *Healthy People 2020* objective is to eliminate elevated blood lead levels in children in 2020.

Lead can accumulate in the body, where it is stored in bones along with calcium. During pregnancy, lead is released from bones and is used to help form the bones of the fetus, particularly if a woman does not have enough dietary calcium. Lead can also cross the placental barrier and can result in reduced fetal growth and premature birth. Among adults, lead exposure can lead to hypertension, decreased kidney function, and reproductive problems among men and women.

The Health Department conducts required reporting of confirmed elevated lead blood levels in children ages 6 months to 6 years to the Tennessee Department of Health. In addition, the Health Department provides case management for children identified with elevated lead blood levels, including educational and nutritional counseling. Prior October 2012, children were identified as having a blood lead “level of concern” if the test result was 10 or more micrograms per deciliter of lead in blood ($\geq \mu 10 /dL$). With the new value, more children have been identified as having lead exposure. In Hamilton County there were 14 reported cases of children with elevated lead blood levels in 2013 and 12 in 2014, up from between four and six cases in the previous three years.

Table 32. Reported Children in Hamilton County with Elevated Lead Blood Levels[†]

	2010 $\geq \mu 10 /dL$	2011 $\geq 10 \mu /dL$	2012 $\geq 10 \mu /dL$	2013 [†] $\geq 5 \mu /dL$	2014 $\geq 5 \mu /dL$
Cases	5 cases	4 cases	6 cases	14 cases	12 cases
% of State Cases	4.2%	3.8%	5.9%	3.1%	3.0%

[†]In 2013, the threshold for reporting elevated blood levels decreased from $\geq \mu 10 /dL$ to $\geq \mu 5 /dL$.
Source: Tennessee Department of Health, Tennessee Childhood Lead Poisoning Prevention Program

In 2011, a resident of Chattanooga’s Southside Neighborhood presented to a local hospital with symptoms of lead poisoning. The Tennessee Department of Health requested that the Tennessee Department of Environment and Conservation (TDEC) conduct an investigation to determine the source of lead exposure. The EPA and TDEC conducted soil testing and found elevated lead soil levels at 84

residences, which were subsequently remediated. The actual source of lead was never determined, but is suspected to be associated with historic foundry operations.^{lxvi}

Rabies

Rabies is caused by a virus that affects the nervous system of humans and other mammals, and is primarily transmitted through the bite of a rabid animal. The usual mode of rabies transmission is by the introduction of saliva containing rabies virus into a bite wound. Rabies infects the central nervous system, causing encephalopathy and ultimately death. Over the past century, rabies in the U.S. has changed dramatically, from the majority of cases being reported in domestic animals, to now where more than 90% of cases are reported in wildlife. The majority of rabies cases occur in raccoons, skunks, bats, and foxes. The number of rabies-related human deaths has declined from more than 100 cases annually 100 years ago to one or two per year.

Although human rabies deaths are rare, the estimated public health costs associated with disease, detection, prevention, and control exceed \$300 million annually. These costs include the vaccination of companion animals, animal control programs, maintenance of rabies laboratories, and medical costs, such as those for rabies post exposure prophylaxis (PEP).^{lxvii} The tables below summarize animal encounter investigations and animal rabies vaccinations in Hamilton County.

Table 33. Animal Encounter Investigations by the Chattanooga-Hamilton County Health Department Rabies Control Program

	2011	2012	2013	2014	
Dog Exposures	752	685	643	687	No animals in Hamilton County have tested positive for rabies since 2012, when the Health Department reported one bat with a positive rabies test.
Cat Exposures	209	159	176	178	
Wildlife Exposures	93	86	96	60	
Other Domestic	3	2	2	2	
Total Investigations	1057	932	917	927	
-- Positive Rabies	4 bats	1 bat	0	0	
Source: Chattanooga-Hamilton County Health Department					

Table 34. Reported Animal Rabies Vaccinations in Hamilton County

	2011	2012	2013	2014	
Dog Vaccinations	47,003	48,572	48,960	50,894	In 2014, there were 71,585 reported animal rabies vaccinations in Hamilton County, which was 6,015 more than in 2011 (a 9.2% increase).
Cat Vaccinations	18,342	20,434	20,535	20,558	
Other Domestic	225	186	103	133	
Total Vaccinations	65,570	69,192	69,598	71,585	
Source: Chattanooga-Hamilton County Health Department					