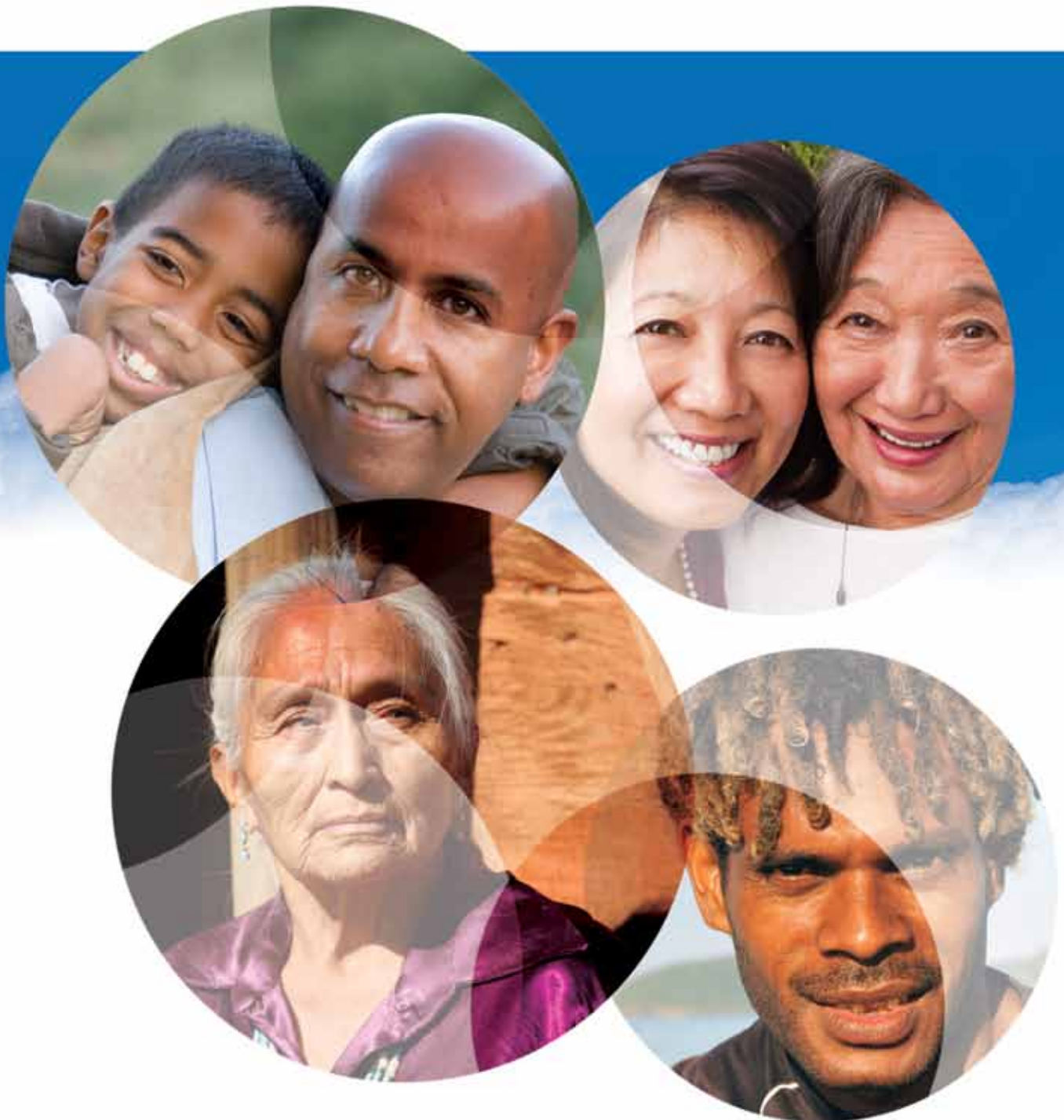


State of Lung Disease in Diverse Communities 2010

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State of Lung Disease in Diverse Communities

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Executive Summary

The overall health of Americans continues to improve in many ways, thanks to advances in medical technology, research, resources devoted to public health and education and new prescription drugs. Life expectancy in the United States continues to increase, as it has for decades. Progress has clearly been made, yet it is accompanied by increased prevalence of chronic conditions and their associated pain and disability.

Even more disturbing is the fact that improvements have not been equally distributed by income, race, ethnicity, education and geography, or have not eliminated existing disparities. Census data reveals that diverse communities experience a host of societal problems at higher rates than Caucasians. For example, 58 percent of the 39.8 million people living in poverty were racial and ethnic minorities in 2008 and, out of the 46.3 million Americans living without health coverage, communities of color made up 54 percent of the uninsured.¹

These socioeconomic differences among racial and ethnic groups in the U.S. will continue to influence future patterns of disease, disability and healthcare. People of these communities are more likely to be uninsured, less likely to have a regular health care provider and, in turn, suffer from poor health. They are also more likely to die prematurely. Access to and utilization of care is further affected by provider biases, poor provider-patient communication, poor health literacy, and other factors, including personal experiences.² African Americans can be especially distrustful of the healthcare system due to experiences with racism, including circumstances in which they were victimized, such as the Tuskegee Syphilis Study,³ while Hispanics and Asian Americans can be limited by lack of available services in their parent language.⁴

The American Lung Association is well aware of the health disparities among racial and ethnic communities and has created the American Lung Association **State of Lung Disease in Diverse Communities: 2010** as a resource to those who have been affected by asthma, lung cancer and other lung diseases. This report provides members of these communities with much needed health information that can be used in the fight against lung disease and risk factors that cause or contribute to lung disease. It provides statistics, background material and ongoing research about important lung health issues such as asthma, smoking, and clean air as they relate to racially and ethnically diverse communities.

Looking at the nation as a whole, the American Lung Association **State of Lung Disease in Diverse Communities 2010** finds:

- Studies have linked air pollution to heart disease, cancer, asthma, other illnesses, and even death. Communities of color are especially vulnerable as both African Americans and Hispanics have been found to be more likely than Caucasians to live in areas with high levels of air toxics and that are disproportionately located near freeways and other areas with heavy traffic.^{5,6,7,8}
- Puerto Ricans have the highest asthma prevalence of any Hispanic subgroup or other race, followed by African Americans. In 2008, Puerto Ricans had an asthma rate of 128.3 per 1,000, compared to 105.5 per 1,000 for African Americans, 87.3 for Cubans and Cuban-Americans, 78.2 per 1,000 for Caucasians, 39.1 for Central or South Americans, 38.1 per 1,000 for Dominicans, 31.4 per 1,000 for Mexicans, and 68.3 for Mexican-Americans.⁹ African Americans are also three times more likely to die from asthma than their Caucasian counterparts.¹⁰
- Caucasians in the United States are more likely to develop and die from COPD than other racial or ethnic groups. However, Hispanics are more likely to go to the emergency room for COPD, suggesting that they are not receiving the routine treatment they need to control their COPD.¹¹ In addition, African Americans without private insurance are significantly less likely to receive a lung transplant than Caucasians.¹²
- Native Americans have the second highest death rate due to cystic fibrosis behind Caucasians.¹³
- African Americans and Hispanics are significantly less likely to receive influenza or pneumonia vaccinations than their Caucasian counterparts.¹⁴ A recent report on healthcare disparities found that one of the three largest disparities facing Asian Americans (compared to Caucasians) was in rates of adults 65 and over who had never received a pneumococcal vaccination.¹⁵ Influenza and pneumonia are the fourth leading cause of death among Asian Americans and Pacific Islanders over the age of 65; this ranking is higher than what is seen among other racial groups.¹⁶
- A recent study of the impact of novel H1N1 influenza on American Indians and Alaska Natives found that these populations had a death rate from this disease that was four times greater than the rate among all others. This markedly higher burden may be due to greater levels of poverty, delays in accessing care, or chronic disease levels among these populations. Among those who died from novel H1N1 influenza, American Indians and Alaska Natives were much more likely to have had asthma or diabetes compared to other groups.¹⁷
- African Americans are more likely to develop and die of lung cancer than Caucasians, despite lower smoking rates. This difference is most pronounced among men, as African American men are 37 percent more likely to develop and 22.5 percent more likely to die

from lung cancer than Caucasian men.¹⁸ Lung cancer incidence rates among Native American tribes greatly vary from each other, with Northern Plains tribes having rates that are 7 times greater than those seen among Southwest tribes (104.3 per 100,000 versus 14.9 per 100,000, respectively). In addition, American Indians and Alaska Natives were 39.6 percent more likely to be diagnosed with lung cancer before the age of 65 compared to Whites.¹⁹

- African American adolescents are more than two times more likely than Caucasian adolescents to have obstructive sleep apnea.²⁰ Strong evidence suggests that obesity may increase the risk of obstructed breathing during sleep.²¹ Lack of awareness by the public and healthcare professionals have resulted in the vast majority of people with the illness remaining undiagnosed and, therefore, untreated.
- Hispanics are more likely than any other racial or ethnic group to be employed in high-risk occupations where they are overexposed to occupational respiratory hazards that are associated with lung disease. Hispanics account for 28.2 percent of building cleaners, 59.3 percent of agricultural graders and sorters, 29.9 percent of brick and stonemasons, and 57.7 percent of cement workers.²²
- American Indians and Alaska Natives had the highest incidence rate of respiratory distress syndrome (RDS; 5.3 per 1,000) of all racial and ethnic groups in the United States.²³ African American infants (35.3 per 100,000) were more than twice as likely to die from RDS compared to Caucasian infants (13.9 per 100,000) and the general U.S. population (17.0 per 100,000).²⁴
- Respiratory syncytial virus (RSV) accounts for 14.4 percent of all American Indian and Alaska Native infant hospitalizations.²⁵ Hospital rates for RSV in American Indians and Alaska Natives are three times higher than that for the general population.
- African Americans are three times more likely to have, and 17 times more likely to die, from sarcoidosis than Caucasian.^{26,27} The cause of the disease is still a mystery, but researchers have several theories, including genetic predisposition to increased susceptibility and progression of the disorder. African Americans with sarcoidosis are 3 times more likely than Caucasians to have a first-degree or second-degree relative with the disease.²⁸
- American Indians and Alaska Natives have the highest sudden infant death syndrome (SIDS) rates of all racial and ethnic groups. The SIDS death rate is twice as high among American Indians and Alaska Natives as well as African Americans compared to that among Caucasians (123.5 per 100,000 and 109.4 per 100,000 versus 54.5 per 100,000, respectively).²⁹ The cause of SIDS remains unknown, but research has found that infant prone sleeping and maternal smoking during pregnancy double the risk of an infant dying from it.³⁰
- American Indians and Alaska Natives have the highest rates of smoking among all racial and ethnic groups.³¹ American Indians and

Alaska Natives youth had the greatest cigarette smoking prevalence (23.1%), followed by Caucasians (14.9%), Hispanics (9.3%), African Americans (6.5%), and Asian Americans (4.3%).³² In addition, recent studies indicate there is widespread prevalence of smoking in LGBT (Lesbian, Gay, Bisexual and Transgender) communities, which puts them at an increased risk for lung cancer, COPD, coronary heart disease, and other smoking-related diseases.³³

- Asian Americans had the highest TB incidence rate (25.6 per 100,000) followed by Native Hawaiians and Pacific Islanders (15.9 per 100,000) in 2008. Asian Americans had 23.3 times the incidence rate of Caucasians, while Native Hawaiians and Pacific Islanders had a rate over 14 times greater than Caucasians (1.1 per 100,000). In 2008, Asian Americans (26%) surpassed African Americans (25%) as the second largest racial or ethnic group in the number of TB cases in the U.S. Asian Americans represented less than 3 percent of TB cases in U.S.-born persons, but 43 percent of TB cases in foreign-born persons. Four out of the top five countries of origin of birth for foreign-born TB cases were in Asia: Philippines, Vietnam, India and China.³⁴

Introduction

The Many Faces of Lung Disease—Reaching out to Communities in Need

The American Lung Association is fighting lung disease on many fronts. As part of our fight, we continue to focus diligently on who needs our help the most. Some groups are especially hard hit by the suffering caused by asthma, lung cancer, tuberculosis and other forms of lung disease. Certain populations are at increased risk because of exposure to elevated levels of outdoor or indoor air contaminants, or because of higher than average smoking rates. Others are at higher risk because they do not have equal access to health education or quality medical services. Or may live in substandard housing. And some minority groups may be at increased risk of certain lung diseases simply because of genetic predisposition to these conditions.

These are frightening facts, but facts that need to be disseminated in order to raise awareness, with the ultimate goal of reversing negative trends that are affecting diverse communities. The American Lung Association State of Lung Disease in Diverse Communities: 2010 report is intended to inform local communities and organizations about these health disparities in an effort to assist them in influencing local policy and public health practice.

The American Lung Association is dedicated to being the premiere organization engaged in lung health research, education and advocacy. We fund innovative research that has the promise of impacting lung health to find cures and new and improved treatments that will benefit those living with lung disease. Our Awards and Grants program is unique in that it supports researchers at a critical juncture in their careers to help ensure that there will be an adequate supply of investigators dedicated to lung disease. Our Asthma Clinical Research Center, the nation's largest not-for-profit network of clinical research centers dedicated to asthma treatment research, attracts some of the best asthma investigators worldwide to conduct large clinical trials that

have a direct impact on patient care and asthma treatment.

Our health education programs make a difference in people's lives. We provide people with the skills they need to manage or treat lung disease. Our programs educate people about making positive behavior changes, from teaching children with asthma to recognize the symptoms of an asthma attack, to educating COPD patients about ways they can improve their daily lives. For example, the American Lung Association's adult asthma program, *Breathe Well, Live Well*, helps participants increase their asthma knowledge as well as learn asthma self-management. Freedom From Smoking (FFS) and Not-On-Tobacco (N-O-T) are American Lung Association programs that have been proven to provide adult and teenage smokers with the tools they need to successfully quit smoking. The American Lung Association collaborates with volunteers and community organizations nationwide. Our programs are taught by local residents who help us in serving diverse communities.

Policy change provides some of the fastest, most far-reaching and highest impact interventions in the fight against lung disease. Those individuals disproportionately affected by lung disease often reap great benefits from policy changes. The American Lung Association's efforts include advocacy for tobacco control policies, aggressive efforts to clean up air pollution, support of research and public health programs, and work in coalitions with other organizations with similar goals. Our vision of a world free of lung disease and its suffering drives each of us in the American Lung Association, both volunteers and staff. We are united across the country in a common cause and committed to reducing the pain and suffering caused by lung disease.

Methodology

This report contains data on lung diseases gathered through various surveys, reports, and research, analyzed by the Epidemiology and Statistics Unit of the American Lung Association. Prevalence data are derived from the National Health Interview Survey (NHIS), the Behavioral Risk Factor Surveillance System (BRFSS) and other surveys such as the Youth Risk Behavior Survey and Youth Tobacco Survey. Mortality data comes from the Centers for Disease Control and Prevention's (CDC) Wonder web site and the National Center for Health Statistics. Additional data sources include the National Cancer Institute's Surveillance, Epidemiology and End Results (SEER) program for data on lung cancer incidence and survival, and the National Hospital Discharge Survey and the National Hospital Ambulatory Medical Care Survey for data on hospital discharges, emergency department visits, outpatient visits and doctor visits. Unpublished data were specially requested from the agencies involved. Research articles and the CDC's Morbidity and Mortality Weekly Reports provided data on other lung diseases not included in the aforementioned surveys. The U.S. Census Bureau provided population estimates used in calculating the percentage of each racial or ethnic group living in the United States. A complete list of references is available at the end of each chapter.

Please note that data on lung diseases by specific group are often not available at the local level, as these surveys are most often designed to be representative of the national U.S. population. Additionally, these surveys are frequently not able to adequately sample specific racial or ethnic populations with smaller overall numbers. Therefore, reliable estimates cannot always be established.

Helpful Terminology and Definitions

The terminology used by the U.S. Public Health Service and most other federal agencies reflects the categories employed by the U.S. Census Bureau. These designations can be unclear or overlap. The Census Bureau makes use of the following racial and ethnic categories: White or Caucasian, Black or African American, Asian, Native Hawaiian or Other Pacific Islander, American Indian or Alaska Native, Hispanic or Latino, and multi-racial. In this report, we use these same categories while focusing on lung disease disparities among racial and ethnic groups for which data exists. This report only contains information on lung diseases that have race-specific and/or ethnicity-specific data available. It is important to note that other lung diseases do impact minority communities, but if no specific data existed, the disease was not included in this report. Caucasian and African American refer to non-Hispanic populations when such data were available.

In 2008, there were approximately 304 million people living in the United States: 73.9 million children under 18 years, 191.3 million working-age adults (18 to 64 years) and 38.8 million persons aged 65 years and older. Caucasians account for 75 percent of the U.S. population and are defined as any of the original peoples of Europe, the Middle East or North Africa who have immigrated to the U.S. since the 1600s.³⁵

There were over 37.6 million African Americans living in the U.S. as of 2008, representing approximately 12.4 percent of the U.S. population.³⁶ Close to a third of the African American population was under age 18.³⁷ The African American population is as diverse as other ethnic and racial groups, and includes people from Africa, the West Indies and other parts of the Caribbean.

Close to 47 million persons in the U.S. are of Hispanic origin, representing 15.4 percent of the U.S. population and making them the nation's largest ethnic or racial minority. Over 66 percent of Hispanics in the United States are of Mexican origin, 9 percent are of Puerto Rican origin, 3.5 percent are of Cuban origin, and 22 percent are of other Hispanic origins.³⁸ Hispanics are the fastest growing minority group in the U.S. Since 1970, when Hispanic origin was first included in the census, the percent of the U.S. population that is Hispanic has tripled. It is estimated that by 2050, Hispanics will represent almost a quarter of the U.S. population.³⁹ While similarities exist among Hispanic groups, particularly in language (Spanish) and religion (Catholic), the Hispanic population is a mosaic of cultures and its various subgroups reflect profound differences in race, nationality, customs, heritage, lifestyles and socioeconomic status that may impact their overall health status.

As such, caution should be taken in making broad generalizations about the Hispanic population.

According to U.S. Census Bureau data for 2008, over 13.4 million Asian Americans live in the U.S., making up 4.3 percent of the total population. Asian American refers to persons whose familial roots originate from many countries, ethnic groups and cultures of the Asian continent, including the Indian subcontinent and Southeast Asian populations. Over 23.1 percent of the Asian American population is Chinese, 18.6 percent Asian Indian, 18.3 percent Filipino, 11.4 percent Vietnamese, 10 percent Korean and 6.7 percent Japanese. Asian Americans of other national ancestry comprise an additional 14.4 percent.⁴⁰ Over 46 percent of Asian Americans reside in the West.⁴¹

Native Hawaiians and other Pacific Islanders include people of Polynesian, Micronesian and Melanesian ancestry. Though usually grouped with Asian Americans for data collection, Native Hawaiians and Pacific Islanders were assigned a distinct category in the 2000 U.S. Census and made up 0.1 percent of the country's total population in 2008. This small subgroup includes more than 25 distinct groups with variations in historical background, language and cultural traditions. Native Hawaiians are the largest group (34.4%), followed by Samoans (16.8%) and Guamanian/Chamorros (14.3%). Other Pacific Islanders comprise an additional 34.5 percent.⁴² Nearly 80 percent of Native Hawaiians and Pacific Islanders live in the West, with a majority living in California and Hawaii.⁴³

Native Americans and Alaska Natives are descendents of the various indigenous peoples of the United States. This category includes persons living on reservations and in sovereign communities, as well as those who identify themselves as Native American, American Indian, Eskimo, Aleut or Inuit. In 2008, American Indians and Alaska Natives account for less than 1 percent (0.8%) of the U.S. population with 2.4 million American Indians and Alaska Natives currently living in the U.S.⁴⁴ Over 75 percent of Native Americans and Alaska Natives resided in the South or West region of the U.S.⁴⁵

The following definitions will assist in the reading and understanding of the data points made in this report:

Mortality represents deaths. Rates are per 100,000 population.

Morbidity is the term used to refer to illness.

Prevalence is the number of existing cases of a particular condition, disease, or other occurrence (e.g., persons smoking) at a given time.

Incidence is the number of new cases occurring during a particular period of time (e.g., 100 cases of TB from 1998 to 2002).

Prevalence or Incidence Rate represents the cases in a particular population quantity (e.g., 10 cases per hundred thousand). Prevalence rates are per 1,000 population while incidence rates are per 100 or per 100,000 population.

Age-adjusted figure is a figure that is statistically adjusted to remove the distorting effect of age when comparing populations with different age structures. Most death rates are age-adjusted to the 2000 U.S. standard population.

Odds is the proportion having or getting a disease at one point or during a time period divided by the proportion who do not have the disease at that time. Expressed as a ratio (OR), such as 2:1 odds.

Note: All statistics in this document apply to the United States unless otherwise noted and are for the most recent available year.

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Air Quality

Air pollution poses a serious threat to our nation's health. Whether indoors or out, unhealthy air is a concern for everyone, but especially those who are higher risk. Unfortunately, the threat posed by air pollution is born disproportionately by certain groups. Large sources of dangerous pollutants are frequently located near the neighborhoods and communities where people of color and people with low incomes live. Others face toxic pollutants on the job or at home. In addition, many individuals also suffer from excessive disease burdens, such as asthma, heart conditions, or diabetes, which place them at even greater risk.

Outdoor Air Pollution

Outdoor air quality is a major public health concern. Unfortunately, millions of Americans live in areas where outdoor pollution puts their health and even their lives at risk. Studies have tied air pollution to adverse health effects such as heart disease, cancer, asthma, respiratory illnesses, and even death.

Most at risk from these pollutants are children and teens, older adults, people with lung diseases, such as asthma and chronic obstructive pulmonary disease, as well as healthy adults who work or exercise outdoors. People with cardiovascular disease and diabetes are also at higher risk from some of these pollutants.

The six most widespread pollutants are ozone, particulate matter, nitrogen dioxide, sulfur dioxide, carbon monoxide and lead, but many other toxic air pollutants, such as mercury, affect communities across the nation. Most of these pollutants result from the burning of fossil fuels, but many have other sources.

Ozone (O₃) is an invisible gas made of three oxygen atoms. Ozone forms when two groups of gases have a chemical reaction in the air triggered by sunlight and heat. The two groups of gases—volatile organic compounds and nitrogen oxides—come from many sources, especially burning fossil fuels.¹

Ozone irritates and inflames the respiratory system at levels frequently found across the nation during the summer months. Breathing ozone may lead to shortness of breath, chest pain; inflammation of the lung lining, wheezing and coughing, increased risk of asthma attacks, and need for medical treatment or hospitalization.² Ozone may also cause premature death.^{3,4,5} Children who grow up

in areas of high ozone pollution may never develop their full lung capacity as adults. This can put them at greater risk of lung disease throughout their lives.⁶

Particulate Matter (PM) is a combination of fine solids and aerosols that are suspended in the air. Particles come from different sources. PM can be solids, like dust, ash, or soot. PM can also be liquid aerosols, or solids suspended in liquid mixtures. Combustion sources ranging from diesel trucks and buses to coal-fired power plants are the major source of PM_{2.5} pollution.⁷

There are different sizes of particles. The ones of most concern are small enough to lodge deep in the lungs where they can do serious damage. They are measured in microns. The largest of concern are 10 microns in diameter (PM₁₀). The group of most concern is 2.5 microns in diameter or smaller (PM_{2.5}). Some of these are small enough to pass from the lung into the bloodstream, just like oxygen molecules.

High levels of particle pollution have been found to cause or are likely to cause many serious health effects, including: death from respiratory and cardiovascular causes, higher risk of heart attacks and strokes, increased hospital admissions and emergency room visits for cardiovascular and respiratory diseases, and increased severity of asthma attacks in children. Breathing high levels over a long time may decrease the development of the function of the lungs as children grow and may cause lung cancer.⁸

Nitrogen Dioxide (NO₂) is a gaseous air pollutant composed of nitrogen and oxygen. NO₂ forms when fossil fuels such as coal, oil, gasoline or diesel are burned at high temperatures. NO₂ also contributes to the formation of particle pollution and ozone. NO₂ converts in the atmosphere to nitrate aerosols, a prime component of fine particle pollution. Fine particles are associated with serious health effects ranging from respiratory problems to premature death. Nitrogen oxides also are a building block of ozone smog, a major respiratory irritant that also increases the risk of premature death.

Nitrogen dioxide causes a range of harmful effects on the lungs, including: increased inflammation of the airways; worsened cough and wheezing; reduced lung function; increased asthma attacks; greater likelihood of emergency department and hospital admissions; and increased susceptibility to respiratory infection, such as influenza.⁹

Sulfur Dioxide (SO₂) is a gaseous air pollutant composed of sulfur and oxygen. SO₂ forms when sulfur-containing fuel is burned, such as coal, oil, or diesel. Sulfur dioxide also converts in the atmosphere to sulfates, a prime component of fine particle pollution in the eastern U.S. Sulfur dioxide causes a range of harmful effects: wheezing, shortness of breath, chest tightness and other problems, especially during exercise or physical activity, and reduced lungs function. Short exposures to peak levels of SO₂ in the air can make it difficult for people with asthma to breathe when they are active outdoors. SO₂ also increases the risk of hospital admissions or emergency

room visits, especially among children, older adults and people with asthma.¹⁰

Carbon Monoxide (CO) is a colorless, odorless, poisonous gas produced by the incomplete burning of carbon in fuels. Transportation sources are responsible for 77 percent of nationwide CO emissions, with highway motor vehicles accounting for the largest portion.¹¹ Carbon monoxide can harm the body by reducing oxygen delivery to the body's organs and tissues. At low levels, CO can create headaches, nausea, dizziness, confusion and fatigue, while at higher levels it lead to unconsciousness, coma, or even death.¹²

Lead pollution in the atmosphere primarily comes from industrial sources, including iron and steel foundries, coal and fuel oil combustion, as well as wood burning. Although no longer used in gasoline, lead remains in the soil near roadways. A major source of lead in the air currently occurs when wind, traffic, or construction lifts the soil-bound particles and road dust back up and into the air.¹³ Reducing lead emissions is important because exposure to it can lead to neurological problems in children and cardiovascular problems in adults. Even low exposures may cause behavioral problems, learning deficits, or lowered IQ among infants and young children.^{14,15}

Many other hazardous or toxic air pollutants exist in addition to these six major air pollutants. Two important ones include benzene and mercury, which are known to cause cancer and damage to the nervous system, respectively. These pollutants may not be as widespread, but can still be found in dangerously high concentrations. They are especially common in industrial areas, near roadways, and in coal-fired power plants.

Indoor Air Pollution

Indoor air pollution can pose a serious health threat. EPA studies indicate that the levels of many air pollutants may be two to five times higher in indoor air than outdoor air. In some cases, indoor air pollutants may even be 100 times higher than outdoors. High levels of indoor pollutants are of particular concern, because people may spend as much as 90 percent of their time indoors.¹⁶ The health effects of indoor air pollution can be even more devastating for people with respiratory disorders.

Secondhand Smoke (SHS) is a mixture of the smoke given off by the burning end of a cigarette, pipe or cigar, and the smoke exhaled from the lungs of smokers. Secondhand smoke is involuntarily inhaled by nonsmokers and can cause or exacerbate a wide range of adverse health effects, including cancer, respiratory infections, sudden infant death syndrome, and asthma.¹⁷ Secondhand smoke is estimated to cause almost 50,000 deaths annually.¹⁸ Additionally, studies have estimated that secondhand smoke may significantly worsen symptoms of asthma for 400,000 to 1,000,000 children each year.¹⁹

Smokefree air laws provide a critical tool to protect the quality of indoor air in public places, including workplaces. Smokefree air laws are easily implemented. They are well accepted by the public, reduce nonsmoker exposure to secondhand smoke, and contribute to an overall reduction in cigarette consumption. Currently, smokefree air laws are in place in communities throughout the country.²⁰ However, only 26 states and the District of Columbia have adequate laws in place.

Radon is a colorless, odorless, radioactive gas that seeps from uranium as it breaks down naturally. Radon becomes trapped in buildings from the uranium in the soil and rocks on which homes are built. Radon is the leading cause of lung cancer in nonsmokers and the second leading cause of lung cancer overall.²¹ Smoking greatly increases the risk of lung cancer from radon exposure. The EPA estimates that radon causes between 7,000 and 30,000 lung cancer deaths per year in the United States.²²

Combustion Products (aside from tobacco smoke) include carbon monoxide, nitrogen dioxide, and particulate matter, which have health effects described above. Sources of combustion products include stoves, furnaces, fireplaces, heaters, and dryers. Carbon monoxide, which is both colorless and odorless, can be particularly dangerous. Fatal and near-fatal carbon monoxide poisonings occur most often during the winter months because of misused or malfunctioning heating devices. CO poisoning is a leading cause of unintentional poisoning deaths in the United States, accounting for approximately 450 deaths each year.²³ To avoid health problems, it is essential that smoke exhaust be vented outside anytime anything is burned. Nitrogen dioxide can be found in high concentrations indoors.

Bacteria and Viruses can travel through the air, causing diseases and worsening allergies or asthma. When someone sneezes or coughs, tiny water or mucous droplets filled with viruses or bacteria scatter. Inhaling these viruses or bacteria can spread coughs, colds, influenza and tuberculosis and other infectious agents. Crowded conditions with poor air circulation can promote this spread. Some bacteria and viruses thrive and circulate through poorly maintained building ventilation systems, as with Legionnaires' disease. Damp, humid air can increase the survival rate of viruses indoors. In addition, some individuals with allergies react to endotoxins, substances that come from the broken-down cells of dead bacteria. These microscopic particles have been associated with coughing, wheezing and worsening asthma. Even so, some studies have linked them to *protecting* against some health threats.^{24,25}

Dust Mites are microscopic, insect-like pests that generate some of the most common indoor allergens that can trigger allergic reactions and asthma in many people. Hundreds of thousands of dust mites can live in the bedding, mattresses, upholstered furniture, carpets or curtains in a home. They feed on the human skin cells found in dust. The harmful allergen comes from their fecal pellets and body fragments. Dust mites are nearly everywhere; roughly four out of five homes in the United

States have detectable levels of dust mite allergen in at least one bed.²⁶ Mites are one of the major indoor triggers for people with allergies and asthma. Dust mite exposure can even cause asthma.²⁷ Chronic, ongoing exposure to dust mites at home can dramatically impact the health of people with asthma and those who are allergic or particularly sensitive to mites. People with asthma who are sensitive to mites face an increased risk of flare-ups or an asthma attack.²⁸

Dampness and Mold inside a building are associated with coughing, wheezing, and asthma exacerbations. Dampness, which includes condensation, ponding or humidity, promotes the growth of biological pollutants, like mold, bacteria, viruses, dust mites, and cockroaches. Molds are naturally occurring fungi that reproduce through tiny particles called spores. Spores are microscopic in size and easily float through the air. Many species of mold exist and vary by climate, season, geographic location, and other factors.²⁹

High humidity can also contribute to the degradation of building materials. Many products found in a typical home, like furniture, carpeting, and construction materials contain volatile organic compounds (VOCs), like formaldehyde. Higher humidity causes these chemicals to be released into the air more quickly, where they can then get into the lungs.³⁰

A 2007 analysis estimated that dampness and mold contribute to approximately 21 percent of asthma cases in the United States. The researchers estimated the cost of that exposure at \$3.5 billion annually.³¹

Cockroaches are insects that produce allergens that can aggravate asthma and cause allergic reactions in people who are sensitive to those substances. The allergens produced by cockroaches concentrate in their fecal matter and in fragments of their body parts.³²

Cockroach allergens do not remain airborne for long because they behave like dust mite allergens and stick to heavier particles that quickly settle. Activities like vacuuming may stir up allergens that have settled in dust or fabrics. Most commonly, cockroach allergens are inhaled in dust or allergens that have collected in pillows, bedding or other dust-trapping fabrics.³³ Not only do cockroach allergens trigger asthma and allergies, researchers are exploring evidence that early exposure to cockroach allergen may actually cause asthma to develop in preschool aged children.³⁴ Inhaling particles from cockroaches can cause coughing and wheezing in babies less than 12 months of age.³⁵

Cockroaches need not be present for there to be cockroach allergen in homes. Tests have found that one in five homes with no history of cockroach infestation had a significant level of cockroach allergens in dust and fabrics.³⁶

Pet Allergens includes a number of irritants, such as **Pet Dander**, which is flecks of skin shed by cats, dogs, rodents, birds and other animals with fur or feathers. Proteins found in saliva, urine and feces

from cats, dogs and other pets can also cause allergic reactions in some people. The most common allergies are caused by the *Fel d I* protein from cats and the *Can f I* and *Can f II* proteins from dogs. Dried saliva containing allergens may flake off from an animal's fur and become airborne, where it is inhaled by the allergic person. Dust from dried feces can become airborne in the same way.³⁷

Cats are kept as pets in 33 percent of homes in the United States and dogs are found in 39 percent.³⁸ However, roughly twice as many people report allergies to cats when compared to dogs. Research also indicates that male cats produce less *Fel d I* allergen than female cats, although the reason is not clear.³⁹

Pet allergens are lightweight and small. They remain suspended in the air for a long time; much longer than allergens from cockroaches or dust mites. Because of their microscopic size and jagged shape, pet allergens easily stick to furniture, bedding, fabrics and many items carried into and out of the home. Animal dander is easily spread through the home and out to public places like schools and hospitals. It can even be found in homes and buildings without pets.⁴⁰

Plants and Pollen are the cause of seasonal allergies for many people. The symptoms range in severity and include itchy, watery eyes, sneezing, and wheezing. Pollen indoors largely comes from outdoor pollen entering through windows, doors and vents. Pollen in a building may settle in dust or on fabrics and be stirred up by activities that disturb dust, such as vacuuming. Despite the potential for exposure to pollen, indoor environments are considered protective for individuals with allergies to pollen.⁴¹

Volatile Organic Compounds (VOCs) is a class of thousands of carbon-containing chemicals that evaporate readily into the air at room temperature. VOCs include substances such as benzene, formaldehyde, chloroform and toluene. Sources include cosmetics, building materials, furnishings, and home and office products, such as paints, paint strippers, cleaning supplies, pesticides, copiers, printers, and craft supplies,⁴² as well as car exhaust from attached garages.^{43,44} Some VOCs have been identified as probable carcinogens (formaldehyde), while others irritate the eyes, nose, and throat and cause headaches. The investigation of formaldehyde in mobile home trailers supplied by the Federal Emergency Management Administration in the wake of Hurricanes Katrina and Rita highlighted the sources and hazards of VOC exposure indoors.⁴⁵

Lead is a metal widely used in the past in paints, pipes and building products, such as caulk. Lead paint chips, dust and lead in soil pose particular danger to children and unborn babies. It can affect physical and mental development and cause acute illness in both children and adults. In older buildings (often found in poor urban areas), lead primarily comes from old, lead-based paint that is still on the walls, though lead can also come from cosmetics, hobby materials and other products.⁴⁶ An estimated 83 percent of privately-owned housing units

and 86 percent of public units built before 1980 contain some lead-based paint.⁴⁷ Chronic exposure to low doses of lead can decrease a child's ability to learn because of brain damage. Occupational exposures to lead can pose health risks for adults, such as increased blood pressure or impaired neurological or renal function. Recent studies have found that lead dust can be tracked in to carpeting in homes and automobile interiors from these workplace exposures, putting children at risk.^{48,49}

Asbestos refers to a group of naturally occurring, fibrous minerals that can cause major respiratory problems and cancer when inhaled. Due to its durability and heat resistance, asbestos was once widely used in shingles, fireproofing, heating systems, and floor and ceiling tiles. When asbestos-containing material is damaged or disintegrates, microscopic fibers are dispersed into the air. Inhaling asbestos increases the risk of lung cancer, especially in smokers. Inhaling asbestos increases the risk of developing lung cancer or mesothelioma, a deadly cancer of the thin lining surrounding the lungs and other organs. The risk depends on levels of exposure, how long ago exposure occurred and whether a person also smokes. Smoking cigarettes in addition to asbestos exposure greatly increases your chances of developing lung cancer. Most asbestos-associated cancers are related to the intensity and duration of the exposure. However, the symptoms of disease do not generally appear for 20 to 30 years. Removal of asbestos is not always recommended because fibers can be released in the removal process. The EPA recommends removal only to prevent significant exposures.^{50,51}

Environmental Injustice

Exposure to indoor or outdoor air pollution can pose a wide range of health risks for many populations. Those most vulnerable include children, the elderly and people with chronic lung disease. For example, people who suffer from asthma may experience periodic attacks of breathing difficulty and lung inflammation, often in response to environmental irritants.

Minority communities in the United States often have higher disease prevalence and death rates compared to predominantly Caucasian communities. They also are more often affected by the consequences of debates over environmental health and government efforts to improve it. For example, asthma is disproportionately more common in low-income and urban communities, especially in inner city African American and Hispanic populations. Therefore, controlling exposures to outdoor and indoor air pollution, which can worsen asthma, is an especially important protective measure for these groups.

Furthermore, minority communities may experience greater exposure to substandard indoor and outdoor air quality. In particular, research indicates that minorities live in greater concentrations both in areas that do not meet federal air quality standards and in areas with above-average numbers of air-polluting facilities.⁵² Both African Americans and Hispanics have been found to be more likely than Caucasians to live in areas with high levels of air toxics.⁵³

Communities of color and low income are also disproportionately located near freeways and other areas with heavy traffic.^{54, 55,56} Proximity to vehicles and the pollutants that they create has been shown to increase exposure to and risk from these emissions, compared to those who are located further from heavily-used roadways.

Racial/ Ethnic Differences

African Americans

African Americans experience multiple negative health effects from indoor and outdoor air pollution. Numerous studies have documented the disproportionate burden of exposure to air toxics and risk that falls on minority and low-income populations.⁵⁷

While pollution from power plants affects all Americans, 68 percent of African Americans live within 30 miles of a coal-fired power plant, compared to only 56 percent of Caucasians.⁵⁸

A recent study found that ozone exposure increased mortality among African Americans at a higher rate than among Caucasians. Mortality rates tended to increase the most when a larger fraction of the population was African American, and when there was higher unemployment, higher public transportation use, and lower prevalence of central air conditioning.⁵⁹

A study in Maryland found that the risk of cancer related to air toxics was greatest in areas with the largest African American population proportions and lowest among those with the smallest African American population proportions. In addition, the estimated cancer risk decreased for every 10 percent increase in the percentage of Caucasians living in an area. Having a low income also increased the risk among African Americans more so than among Caucasians.⁶⁰

Particulate matter levels can be greater indoors than out, and such differences may be particularly pronounced among disadvantaged populations. Among a sample of mostly African American pre-school children (90% African American, aged 2-6 years) from low socioeconomic backgrounds in inner-city Baltimore, bedroom PM concentrations were over twice as high as outdoor PM levels. Smoking, sweeping, and higher outdoor PM concentrations were significantly related to higher indoor PM levels, while open windows significantly predicted lower indoor levels.⁶¹

African Americans report being slightly less likely to be protected from secondhand smoke at home and at work than Caucasians. While 77.7 percent of Caucasians, report that smoking is not allowed at home, only 74.9 percent of African Americans do. Seventy-five (75.0) percent of African Americans report that smoking is not allowed where they work, similar to the 76.3 percent reported by Caucasians.⁶²

● Hispanics

Similar to the experience of African Americans, Hispanics face disproportionate exposure to unhealthy levels of air pollution.

A recent study conducted in and around Houston provided evidence of ethnic and social disparities in exposure to hazardous air pollution. Houston is home to one of the world's largest petrochemical complexes, and a quarter of the nation's refining capacity, making it an ideal region in which to study disparities related to exposure. Researchers found that the risk of cancer in an area increased along with the proportion of the population that was Hispanic and as measures of social disadvantage increased.⁶³

A study in Southern California found that traffic-related air pollution was associated with the onset of asthma in children. Among Hispanics, the risk of developing asthma was twice that for Caucasian children.⁶⁴

Hispanics may face higher risks from exposures to hazardous indoor air pollutants, especially carcinogenic VOCs. A study of nonsmoking residences in Los Angeles, Houston, and Elizabeth, New Jersey, found that indoor sources contributed to the higher cumulative cancer risk seen among Hispanics when compared to Caucasians.⁶⁵ A study of recent Mexican immigrants in Colorado found elevated carbon monoxide and PM_{2.5} levels, linked to the use of gas ranges and high prevalence of smoking indoors.⁶⁶

Hispanics are much less likely to permit smoking in the home than any other ethnic group except Asian Americans-Pacific Islanders, but they are less protected in the workplace than any group except American Indian/Alaska Natives. Hispanics report that 69.1 percent of their workplaces do not allow smoking, compared to the 76.3 percent reported by Caucasians. However, at home, 87.6 percent of Hispanic households do not allow smoking indoors, a much higher percentage than in Caucasian households, where only 77.7 percent report similar protection against secondhand smoke.⁶⁷

● Asian Americans/Pacific Islanders

Indoor air pollution concerns about Asian Americans and Asian immigrants have highlighted the risk from occupational exposures, particularly in nail salons that employ high percentages of Asian women. Chemicals, including solvents and polishes used in these salons, poor ventilation and the high prevalence of women of reproductive age working in them have moved Asian American and Pacific Islander women's groups,⁶⁸ public health organizations, and the EPA⁶⁹ to work to reduce exposure and risk.

Asian Americans/Pacific Islanders have the greatest home and workplace protections against secondhand smoke of any ethnic group. They report that 89.8 percent of their homes do not allow smoking, slightly higher than Hispanics and much higher than nation as a whole (87.6 percent and 79.1 percent respectively). Asian-Americans/Pacific

Islanders report slightly more protection from secondhand smoke at work, with 77.0 percent reporting that they work in a smokefree environment. That is slightly better than the 76.3 percent smokefree workplaces reported by whites and the 75.0 percent reported by African Americans.⁷⁰

● American Indians/Alaska Natives

Under the Clean Air Act, American Indian and Alaska Native tribes have the authority to manage air quality on their reservation. Many participate in voluntary monitoring, while others are engaged in smoke and toxic air pollutants management, diesel retrofit efforts, woodstove replacement initiatives, and indoor air quality programs, including secondhand smoke, mold, and radon.⁷¹

American Indians and Alaska Natives may have higher environmental exposures because they rely on natural resources more so than most populations.⁷² In addition, asthma and diabetes rates are much higher among these populations compared to national averages. Both of these conditions increase the risk posed by air pollution, especially particulate matter.⁷³ Tribal populations are also at increased risk due to their proximity to emissions sources: 82.3 percent of American Indians and Alaska Natives live within 50 miles of major NO_x sources,; and 65.8 percent live within 25 miles of PM₁₀ point sources.⁷⁴

Alaska Natives may have unique air quality concerns compared to other U.S. populations. Some of these include pollution from the burning of solid waste, since it cannot be buried in the frozen ground, and frequent use of gas generators due to the lack of a power grid. Homes made to withstand the harsh climate are often less healthy, and inefficient wood stoves are frequently used to heat them. The lack of roads in remote areas means supplies must be transported in by boat or airplane, which also bring along their harmful exhaust. Roads are also often dirt, which allows soil and metal dusts, including lead dust, to resuspend into the air, where they can be inhaled.⁷⁵

In a recent survey, American Indians and Alaska Natives were the least likely of all racial and ethnic groups to report being having rules in place to protect them from secondhand smoke at work or in their home. Only 69.3 percent did not allow smoking at home, compared to 79.1 percent for the nation overall. Smoking at work was not allowed for only 68.4 percent of this population, significantly less than the nationwide average of 75.3 percent.⁷⁶

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Asthma

Asthma is a chronic lung disease characterized by reversible airway obstruction resulting from inflammation of the lung's airways and a tightening of the muscles around them. Some degree of airway obstruction is often constantly present in those with asthma, but more severe reactions can occur due to exposure to a variety of triggers. Asthma triggers vary depending upon person and environment, but some known triggers include cigarette and other smoke, mold, pollen, dust, animal dander, exercise, cold air, household and industrial products, air pollutants, and infections.

Symptoms

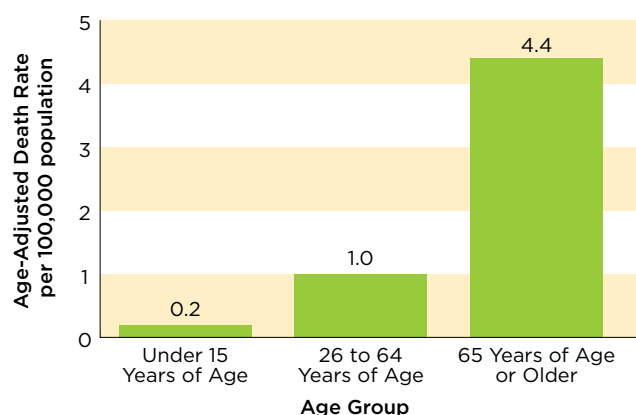
Asthma symptoms include coughing, wheezing and shortness of breath. During an asthma attack, these symptoms worsen and a person feels like they cannot breathe. An asthma attack is often the result of exposure to one or more asthma triggers.

Who It Affects

In 2008, 7.8 percent of the U.S population, or 23.3 million Americans, suffered from asthma, including 7.0 million children.¹ Asthma afflicts people of all ages, races, genders, and socioeconomic statuses. However, it occurs at disproportionately higher rates among some ethnic and racial populations.

Deaths due to asthma are rare, especially among children, but risk of death increases with age (Figure 1). In 2006, 131 children under the age of 15 died from asthma, an age-adjusted rate of .22 per 100,000.² In contrast, adults from 25 to 64 years of age had an age-adjusted death rate of 1.0 per 100,000, and adults over the age of 65 had an age-adjusted death rate of 4.4 per 100,000.³

Figure 1: Age-Adjusted Death Rates due to Asthma by Age, 2006



Source: NCHS 2006

Adequate healthcare is integral to reducing the burden of asthma. Without proper treatment, asthma can become life threatening. The issue of access to healthcare for minority populations has become an area of concern in recent years.

Scientists have proposed varying explanations for the high rates of asthma in some ethnic and racial populations. One theory is that these groups have a genetic predisposition to asthma. A second theory is that environmental influences, such

as poverty, stress, living in inner cities, and decreased access to healthcare contribute to the high prevalence of asthma among these populations. Some researchers believe that both genetic and environmental factors combine and interact to explain the higher asthma rates in some communities. Often, these other factors may be the true cause of a disparity, with race or ethnicity being the factor that is easier to detect between different populations.⁴ Research and interventions based on and comparing the contributions of these theories is ongoing.

One such field has focused on isolating the genetic influences on asthma development. Results indicate that there are different types of asthma that vary according to ancestry. Some asthma variations include allergic sensitization, IgE levels and bronchial hyper-responsiveness. These all present in a unique manner in for each racial and ethnic group, including Caucasians.⁵

Asthma research has grown, but the complexity of the disease continues to challenge progress. One problem is the lack of sufficiently large studies of minority populations. Others include the number of asthma-related environmental factors, the different levels of exposure possible, and the many interactions between these factors and genetic influences.⁶

**Racial/
Ethnic
Differences**

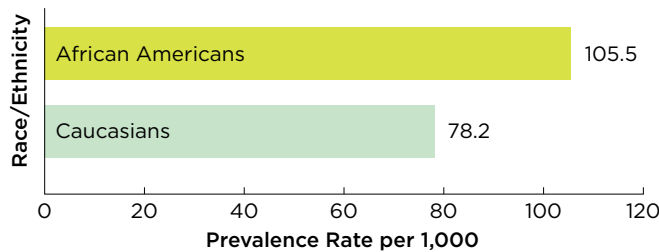
African Americans

African Americans have one of the highest rates of current asthma compared to other racial/ethnic groups (Figure 2). In 2008, 105.5 per 1,000 Africans Americans had asthma, 35 percent higher than the rate of 78.2 per 1,000 among Caucasians.⁷

This disparity in asthma prevalence rates is evident between African Americans and Caucasians at all age levels. A survey of children 6 to 12 years of age from Chicago elementary schools found that African Americans were more than twice (21.2%) as likely to have been diagnosed with asthma compared to Caucasians (9.7%). This relationship remained true even when accounting for a number of factors including school district income levels,

other household members with asthma, type of school, age, gender, and language preferences.⁸

Figure 2: Current Asthma Prevalence Rates by Race/Ethnicity, 2008



Source: NHIS 2008

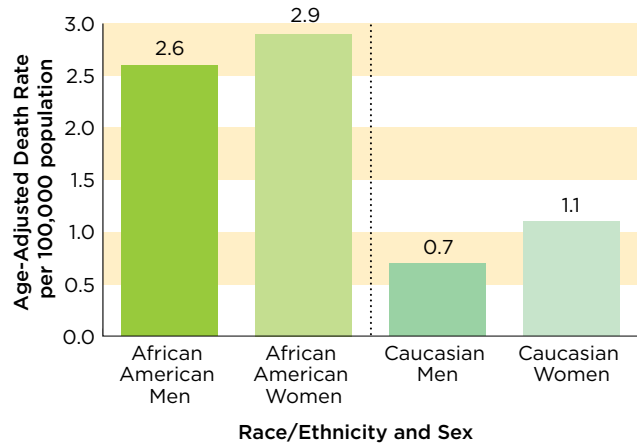
In 2006, the age-adjusted death rate due to asthma was three times higher in the African American population (2.8 per 100,000) than in the Caucasian population

(0.9 per 100,000). African American women had the highest age-adjusted mortality rate due to asthma of any gender and racial/ethnic group with 2.9 per 100,000 (Figure 3).⁹

African Americans also have the highest rate of hospital discharges due to asthma. In 2006, they had a rate of 29.3 per 100,000 population, almost 3 times the rate of 9.8 per 100,000 for Caucasians.¹⁰

Access to healthcare and proper treatment is an important issue facing African Americans with asthma, as wide disparities in care exist between them and Caucasian asthma patients.

Figure 3: Age-Adjusted Death Rates due to Asthma by Race/Ethnicity and Sex, 2006



Source: NCHS 2006

In a sample of people with severe asthma, African Americans were found to have a poorer quality of life, more asthma control problems, and a greater risk of emergency hospital visits compared with Caucasians.¹¹

Additionally, a study found differences between African Americans and Caucasians in regard to factors associated with taking their asthma control medicine. Inhaled corticosteroids (ICS) are the most common treatment for asthma. Adherence to taking ICS is known to be low overall, but it tends to be even lower among African American patients when compared with Caucasian patients. This may be due to differences

in external factors, such as income, insurance coverage, or stress related to the environment, healthcare facilities, or internal factors, such as beliefs, knowledge, or motivation.¹²

The researchers found that internal factors were more important than external factors in determining ICS use, and that both of these factors differed between Caucasians and African Americans. Among African Americans, the only factors that increased the likelihood of using prescribed ICS were greater readiness to take ICS and higher household income. Among Caucasians, increased readiness, perceived necessity, knowledge about ICS, perception of doctors as the source of asthma control, difficulty in affording medication, long clinic waits, and greater ratings of communication with clinician were all predictive of ICS use. This suggests that differing and tailored approaches may be needed for African Americans and Caucasians with asthma to improve treatment adherence and, ultimately, health outcomes.¹³

African American children are less likely to have an asthma management plan compared to Caucasian children. Children who have asthma management plans are less likely to have had an asthma attack in the last year. Requiring all insurers to provide asthma management plans through health care providers might decrease this disparity and the overall burden of asthma.¹⁴

Access to care, use of controller medications, asthma education, and specialist care do not account for all of the gap between races and ethnicities in asthma burden, as African Americans were still more likely to visit the emergency room (hazard ratio = 1.73, CI = 1.07-2.81) or be hospitalized (HR = 2.01, 1.33-3.02) for asthma than Caucasians, even when controlling for all these factors. Future research should investigate

these differences and the role of provider practices or beliefs and patient characteristic, including asthma behaviors, cultural beliefs, genetic risks and gene-environment interactions.¹⁵

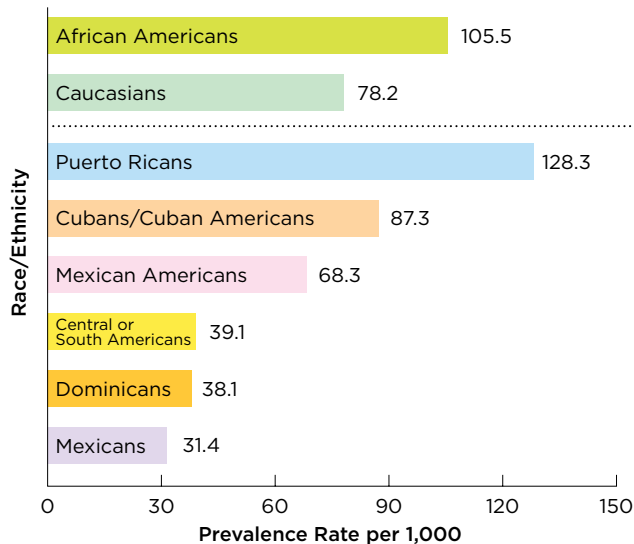
● **Hispanics**

Approximately 2.7 million Hispanic Americans had asthma in 2008, a rate of 58.1 per 1,000 Hispanics. Hispanics had lower asthma prevalence rates than both Caucasians (78.2 per 1,000) and African Americans (105.5 per 1,000).¹⁶

In 2006, the age-adjusted mortality rate due to asthma for Hispanics was 1.0 per 100,000. This was similar to the mortality rate due to asthma for the U.S. at large and for Caucasians (1.2 and 0.9 per 100,000 population, respectively). Age-adjusted death rates in Hispanics were 64% lower than among African Americans.¹⁷ However, research has suggested that Puerto Ricans have higher age-adjusted death rates than all other Hispanic subgroups as well as Caucasians and African Americans.¹⁸

Of all Hispanic subgroups, Puerto Ricans are believed to have the highest rate of asthma (Figure 4). In 2008, Puerto Ricans had an asthma rate of 128.3 per 1,000, compared to 31.4 per 1,000 for Mexicans. Rates per 1,000 population among other Hispanic subgroups were 87.3 for Cubans and Cuban-Americans, 68.3 for Mexican-Americans, 39.1 for Central or South Americans, 38.1 for Dominicans, and 38.1 for Americans, and 38.1 for Dominicans.¹⁹

Figure 4: Current Asthma Prevalence Rates by Race/Ethnicity, 2008



Source: NHIS 2008

In a study comparing Puerto Rican children living in Puerto Rico and in the South Bronx, New York, the authors found a high overall prevalence of asthma at 38.6 percent. Children living in Puerto Rico had higher (statistically significant) asthma prevalence compared with those living in the South Bronx (41.3% compared with 35%, respectively). In addition, children living in Puerto Rico were more likely to develop asthma (OR=1.27) or be

hospitalized for asthma (OR=1.47) at some point in their lives than children living in the South Bronx. These differences support further research into the effects of acculturation, migration, environment, and psychosocial factors on asthma development.²⁰

Another study in New York City also found that Puerto Ricans had the highest rates of asthma, even when controlling for housing conditions and perceptions of neighborhood cohesion. The authors also found that Mexicans had some of the lowest reported rates.²¹ A separate comparison of

Mexican origin and non-Mexican origin boys and girls in New York City Head Start programs found no difference in asthma prevalence between girls of different origin (OR = 1.8, CI = 0.9-3.6). However, Mexican origin boys were less likely to have asthma than non-Mexican origin boys (OR = 5.9, CI = 2.9-12.2).²²

A key factor in controlling asthma among Hispanics is access to quality healthcare. A survey of children with asthma from California, Texas, Illinois and Alabama found that Hispanic children with persistent asthma were less likely to use a controller medication than Caucasian children. The gap in quality of asthma care increased when comparing children of Spanish-speaking versus English-speaking parents.²³ This suggests that efforts need to be made to break down cultural and language barriers within the healthcare field in order to provide quality service to all.

Similarly, Hispanic children in Chicago were less likely to have been diagnosed with asthma (36.3%) if their parents filled out the survey in Spanish, compared to those whose parents filled out the survey in English (55.2%). These results may indicate the presence of a language barrier that is leading to an underdiagnosis of asthma among this population. Alternatively, other acculturation issues may be the true risk factors and language preference serves simply as an indicator of them.²⁴

Hispanic children in one large, national survey were also less likely to have an asthma management plan compared to Caucasian children, as were children who had had an asthma attack in the last year. The researchers suggested that requiring all insurers to provide asthma management plans might decrease this disparity and the overall burden of asthma.²⁵

● **Asian Americans and Native Hawaiians/ Pacific Islanders**

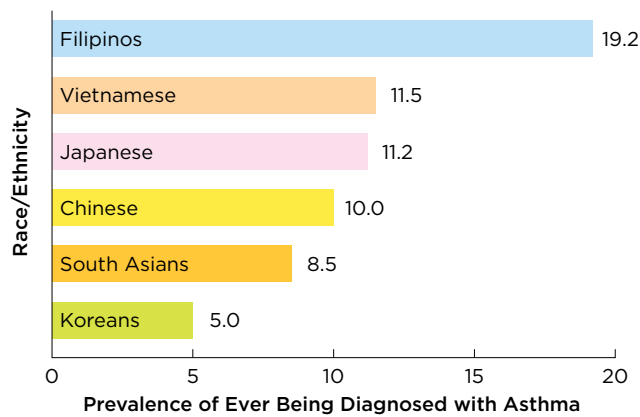
Limited data are available on asthma for Asian Americans and Native Hawaiians/Pacific Islanders. Major national health surveys have begun to collect data for this group. However, small sample sizes mean the estimates are not statistically accurate so they are not published or released as their own category. Often analysts group Asian Americans and Native Hawaiians/Pacific Islanders with American Indians into the category of “Other Races.”

Though data about Asian Americans with asthma are limited, some are available through surveys in states with large Asian American and Native Hawaiian/Pacific Islander populations. California and Hawaii are included among these states and help to provide estimates on asthma among the Asian American and Native Hawaiian/Pacific Islander populations.

The 2007 California Health Interview Survey compared asthma prevalence among Asian American subgroups (Figure 5). They concluded that Filipinos have the highest rate of ever being diagnosed with asthma (19.2%) compared to Koreans (5.0%), Vietnamese (11.5%), Chinese (10.0%), Japanese (11.2%), and South Asians (8.5%).²⁶ The California survey, like the NHIS, did not distinguish recent immigrants from second or later generations.

A study focusing on specific childhood populations found a broad range

Figure 5: Lifetime Asthma Prevalence Rates among Asian Americans, California, 2007



Source: CHIS 2007

Hawaiians/Pacific Islanders in order to fully understand how they are affected by asthma.

of prevalence estimates among different Asian American groups and an increased risk of current asthma among those children born in the U.S. compared to those born outside the U.S. Asian Indian children had the lowest current prevalence at 4.4 percent.²⁷

There is a strong need for additional research focusing upon Asian Americans and Native

● **American Indians/
Alaska Natives**

Due to their small numbers in terms of the U.S. population, available data on asthma among American Indians/Alaska Natives are limited. Major national health surveys have begun to collect data for this group. However, estimates are not considered statistically accurate and are not published or released because of small sample sizes. Analysts often group Asian Americans and Native Hawaiians/Pacific Islanders with Native Americans into the category of “Other Races.”

One recent estimate of asthma prevalence among American Indian/Alaska Native children found a prevalence rate of 13.0 percent, the highest reported in the study of underrepresented populations, including Chinese, Filipino, and Asian Indian.²⁸

Resources

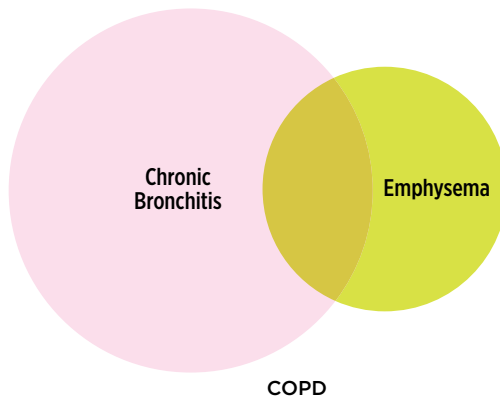
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Chronic Obstructive Pulmonary Disease COPD

Chronic Obstructive Pulmonary Disease (COPD) is a term that refers to two lung diseases, chronic bronchitis and emphysema. The term COPD is used because both diseases are characterized by obstruction to airflow that interferes with normal breathing and the two frequently co-exist. While asthma is not included in COPD, people with asthma may develop COPD over time. In 2008, 12.1 million people in the U.S. 18 years of age or older were estimated to have COPD (Figure 1).¹ However, lung function tests show that up to 24 million people may have the disease, indicating an underdiagnosis of COPD.²

Figure 1: COPD Prevalence by Disease, 2008



Source: NHIS 2008

COPD is the fourth leading cause of death in the U.S., claiming 120,970 lives in 2006, an age-adjusted death rate of 39.9 per 100,000. 2006 was also the sixth consecutive year in which more women (63,006) than men (57,970) died of COPD.³

Chronic Bronchitis

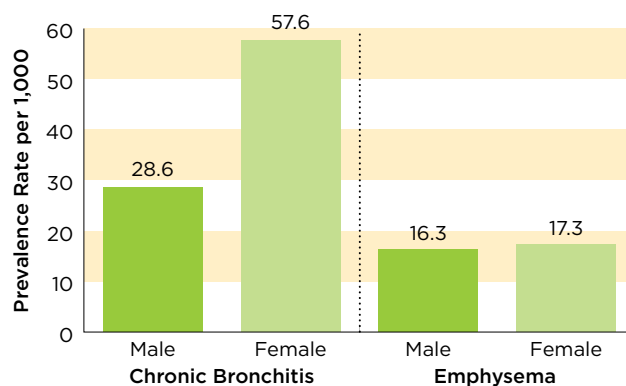
In 2008, 9.8 million Americans (43.6 per 1,000) reported having been diagnosed with chronic bronchitis within the last year. Chronic bronchitis is about twice as common among women (57.6 per 1,000) as men (28.6 per 1,000; Figure 2). It is also more common among those over 65 years of age (56.0 per 1,000) and 45 to 64 years of age (54.9 per 1,000) than among those 18 to 44 years of age (31.6 per 1,000).⁴

Sufferers of chronic bronchitis experience obstructed breathing because the linings of the airways in the lungs are constantly inflamed and become thickened. The airways also become clogged because they are producing more mucus than usual.⁵

Emphysema

In 2008, an estimated 3.8 million Americans (16.8 per 1,000) reported ever having

Figure 2: COPD Prevalence Rates by Disease and Sex, 2008



Source: NHIS 2008

been diagnosed with emphysema. Traditionally, prevalence rates for emphysema have been higher among men than women, although the difference has been growing smaller. For the first time, the rate for women (17.3 per 1,000) is higher than for men (16.3 per 1,000), but only slightly so (Figure 2, above). Emphysema is not common among populations under 45 years of age; about 94 percent of all people ever diagnosed with the disease are over 45.⁶

Emphysema causes the walls between the alveoli (air sacs within the lungs) to lose their ability to stretch and recoil. The air sacs become stiff and weakened and may break, creating irreversible “holes” in the tissues of the lower lungs. These holes between the small air sacs create larger air sacs, in which air can become trapped more easily. The lungs have more difficulty moving air in and out and the exchange of oxygen and carbon dioxide with the blood may be impaired.⁷

Symptoms

Chronic bronchitis and emphysema both cause chronic cough and shortness of breath. Unique symptoms of chronic bronchitis are increased mucus and frequent clearing of the throat, while limited exercise tolerance is a common symptom of emphysema. A healthcare provider will make a diagnosis of COPD based on the results of lung function tests, the patient’s history, a physical examination and other tests.⁸

Causes and Risk Factors

Smoking is the primary cause of COPD. Approximately 80 to 90 percent of COPD deaths are caused by smoking. Female smokers are nearly 13 times as likely to die from COPD as women who have never smoked. Male smokers are nearly 12 times as likely to die from COPD as men who have never smoked.⁹

Other environmental and genetic factors can also increase a person’s likelihood of getting COPD. Some environmental risk factors include exposure to air pollution, second-hand smoke and occupational dusts and chemicals, heredity, a history of childhood respiratory infections and socioeconomic status.¹⁰

A rare type of emphysema that accounts for 5 percent or less of all cases is caused by too little alpha-1 antitrypsin (AAT), a protein mainly produced in the liver. AAT is a “lung protector,” and in its absence, emphysema is almost inevitable. Sometimes called Alpha-1, this type of emphysema results from inheriting a faulty alpha-1 gene from each parent.¹¹

Treatment

Lung damage from COPD is irreversible, and the quality of life for a person suffering from COPD diminishes as the disease progresses. The most important step in preventing COPD and slowing its progression is to stop smoking. In addition, there are treatments available that can improve a patient’s quality of life, such as medication, vaccination, pulmonary rehabilitation, oxygen therapy, and surgery. These therapies

are used to help the patient relieve symptoms, reduce the frequency and severity of exacerbations, and improve overall health and ability to exercise.¹²

Costs

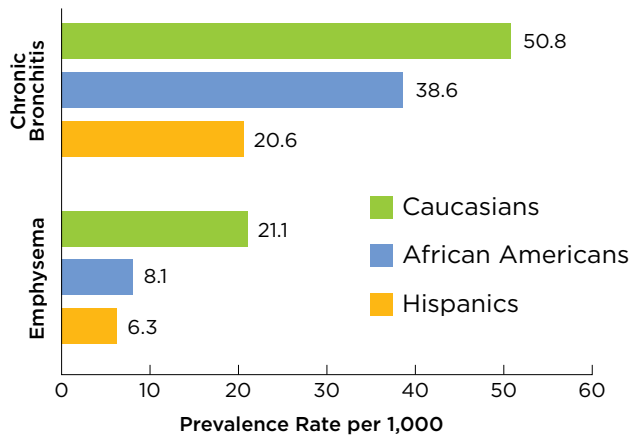
COPD is a costly condition due to the large number of people who have it and how much it impairs their everyday functioning. It is estimated that the total economic cost of COPD will be \$49.9 billion in 2010. This includes \$29.5 billion in direct health care expenditures and \$20.4 billion in indirect costs.¹³

**Racial/
Ethnic
Differences**

African Americans

COPD does not disproportionately affect African Americans compared to Caucasians. In 2008, approximately 1.0 million African Americans were diagnosed with chronic bronchitis. Their prevalence rate of 38.6 per 1,000 was significantly lower than the rate of 50.8 per 1,000 among Caucasians. That same year, approximately 213,000 African Americans had emphysema, a prevalence rate of 8.1 per 1,000. Again, the rate among Caucasians was significantly higher at 21.1 per 1,000 (Figure 3).¹⁴

Figure 3: COPD Prevalence Rates by Disease and Race and Ethnicity, 2008



Source: NHIS 2008

COPD claimed over 6,700 African American lives in 2006. Age-adjusted death rates due to COPD tend to be higher among Caucasians and men. African American men (37.7 per 100,000) were twice as likely as African American women (18.9 per 100,000) to die from COPD in 2006. The rate for Caucasian women (39.1 per 100,000) was close to the same as that of African American men, while Caucasian men had the highest rate at 50.5 per 100,000 (Figure 4).¹⁵

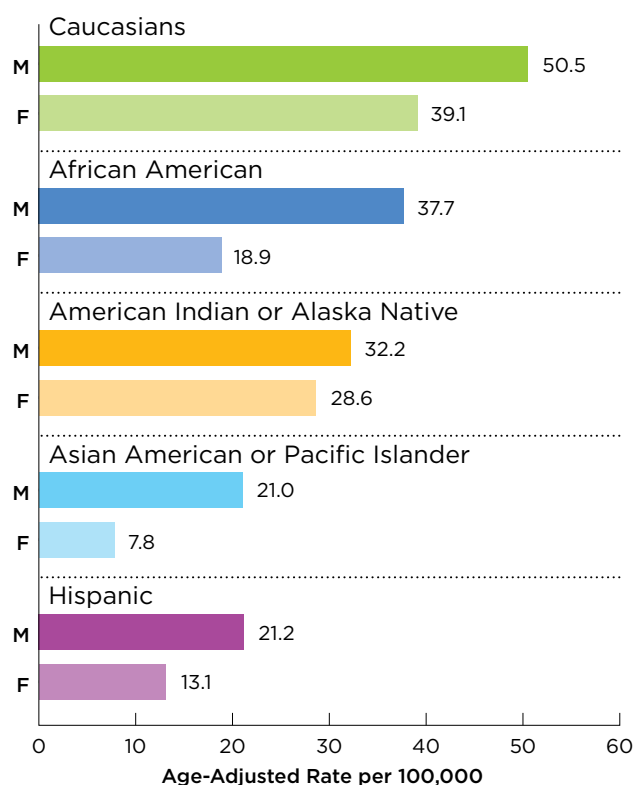
Access to quality healthcare can be the difference between life and death for COPD patients waiting for a lung transplant.

A review of all African American and Caucasian lung transplant patients between 1995 and 2005 found that African Americans and Caucasians with private insurance had similar and favorable chances of receiving a lung transplant. However, among those who did not have private insurance, African Americans were significantly less likely to receive a lung transplant than Caucasians (61 versus 68%; adjusted hazard ratio = 0.83, CI = 0.70-0.98). African Americans were also more likely than Caucasians to die while on the transplant list, or to be removed from it.¹⁶

● **Hispanics/Latinos**

Hispanics have much lower prevalence rates for both chronic bronchitis and emphysema compared to Caucasians. In 2008, over 630,000 Hispanics were diagnosed with chronic bronchitis. The prevalence rate in this group, 20.6 per 1,000, was significantly lower compared to Caucasians and African Americans. A similar pattern was seen for emphysema prevalence, although the rate among Hispanics (6.3 per 1,000) was only significantly different compared to Caucasians (Figure 3, above). Almost 194,000 Hispanics reported having emphysema in 2008.¹⁷

Figure 4: Age-Adjusted Death Rates for COPD by Race and Ethnicity and Sex, 2006



Source: NCHS 2006

Similar to prevalence, Hispanics have some of the lowest emphysema death rates compared to other racial and ethnic groups. In 2006, 3,053 Hispanics died of COPD. The age-adjusted death rate among Hispanic men (21.2 per 100,000) was about 60 percent higher than the rate among Hispanic women (13.1 per 100,000; Figure 4, above).¹⁸

Access to quality healthcare remains a huge obstacle for Hispanics who suffer from COPD. A study of COPD patients found that Hispanics visited

the emergency room at twice the rate of Caucasian patients (incidence rate ratio = 1.97, CI = 1.16-3.33). This suggests that even though fewer Hispanics suffer from COPD, low access to healthcare may prevent them from receiving the routine treatment they need to control their COPD.¹⁹

More research on COPD among Hispanics is needed in order to identify any important differences that may exist between Hispanic subgroups and other populations in areas such as risk factors, testing guidelines, and barriers to disease management. One such barrier that is of importance among Hispanics is language, as certain clinical words such as dyspnea and wheeze (both symptoms of COPD) do not translate well from English to Spanish. Additionally, studies that focus on Hispanics usually combine all people of Hispanic heritage into one group. This

hides any important differences between Hispanic subpopulations, who may be unique in terms of their genetic profile, exposure to risk factors, and healthcare access. Future research on COPD among Hispanics should focus on and carefully define these subgroups in order to decrease the burden of this disease among the population in the U.S. and elsewhere.²⁰

● **Asian Americans and Native Hawaiians/ Pacific Islanders**

Limited data are available on COPD for Asian Americans and Native Hawaiians/Pacific Islanders. Major national health surveys have begun to collect data for this group. However, small sample sizes mean the estimates are not statistically accurate, so they are not published or released as their own category. Often analysts group Asian Americans and Native Hawaiians/Pacific Islanders with American Indians into the category of “Other Races.”

Death rates among Asian Americans and Native Hawaiians/Pacific Islanders are the lowest compared to other racial and ethnic groups, although the difference in rates between men and women is the largest. In 2006, there were 1,190 deaths due to COPD among these populations. The age-adjusted death rate among Asian American and Native Hawaiian/Pacific Islander men (21.0 per 100,000) was 2.4 times higher than the rate among women (8.8 per 100,000; Figure 4, above).²¹

A study of patients with COPD in California found that Asian Americans were less likely than Caucasians to be hospitalized for the disease (RR = 0.5, CI = 0.3-0.7). Those with Chinese (RR = 0.3, CI = 0.2-0.7) and Japanese (RR = 0.4, CI = 0.1-1.0) ancestry were even less likely to be hospitalized. Although there was no clear reason for these differences, the researchers believed they may have been due to genetics.²²

● **Native Americans/ Alaska Natives**

Due to their small numbers in terms of the U.S. population, limited data are available on COPD among Native Americans/Alaska Natives. Major national health surveys have begun to collect data for this group. However, estimates are not considered statistically accurate and are not published or released because of small sample sizes. Analysts often group Asian Americans and Native Hawaiians/Pacific Islanders with Native Americans into the category of “Other Races.”

Death rates for COPD among Native American/Alaska Native men are the second lowest compared to other racial and ethnic groups, even though smoking rates (the primary risk factor for COPD) are highest among this population. COPD death rates are second only to Caucasian women among Native American/Alaska Native women. In 2006, the age-adjusted death rates among men in these populations was 32.2 per 100,000, only 12.6 percent higher than the rate of 28.6 per 100,000 among women (Figure 4, above).²³

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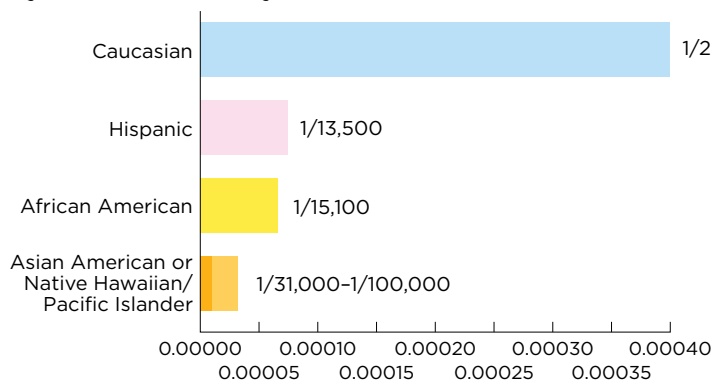
Cystic Fibrosis (CF)

Cystic Fibrosis (CF) is a lifelong, hereditary disease that causes thick, sticky mucus to form in the lungs, pancreas, and other organs. In the lungs, this mucus blocks the airways, causing lung damage, making it hard to breathe, and leading to serious lung infections. In the pancreas, it clogs the pathways leading to the digestive system, interfering with proper digestion.¹ In 90 percent of cystic fibrosis cases, the airways are affected.²

Who Has It

CF is the second most common life-shortening, inherited disorder occurring in childhood in the United States, after sickle cell anemia.³ Approximately 30,000 Americans have CF, and there are an estimated 1,000 new cases diagnosed each year.⁴ The overall birth prevalence of CF in the United States is 1 in 3,700 (Figure 1).⁵ It occurs equally in male and female babies and affects nearly every race.⁶ However, cystic fibrosis

Figure 1: Estimated Cystic Fibrosis Prevalence Rates by Race and Ethnicity



Source: CDC. Cystic Fibrosis Clinical Validity, September 10, 2007

occurs most commonly among Caucasians of Northern European descent; an estimated 1 in 2,500 Caucasian births are affected.⁷

More than 10 million Americans are unknowing, symptomless carriers of the defective cystic fibrosis gene. In order to develop CF, an individual must inherit a defective gene from each parent. Each time two carriers of the defective gene conceive, there is a 25 percent chance that the child will have CF. There is a 50 percent

chance that the child will be a carrier of the gene, and 25 percent chance that the child will not have the gene at all. The odds remain the same with each child. The severity and symptoms of the disease vary considerably due to different mutations of the gene.⁸

Deaths

Between 1999 and 2006, 3,708 people in the U.S. died from cystic fibrosis. Most of these deaths were among Caucasians (3,355). The age-adjusted death rate among Caucasians (0.22 per 100,000) is much higher than that among other racial and ethnic groups (Figure 2).⁹

Survival

In the 1950s, few people with CF lived to go to elementary school. In 1985, the median survival age was about 25 years. In 2007, the predicted

survival age was 37.4 years. Thanks to dedicated researchers and earlier diagnosis, the age of survival for patients with CF continues to increase.¹⁰

Symptoms and Diagnosis

As a genetic disease, CF begins at conception, though symptoms may not appear at first. Diagnosis is sometimes delayed for decades because of mildness of the symptoms or failure to recognize them. Typical symptoms include:^{11,12,13}

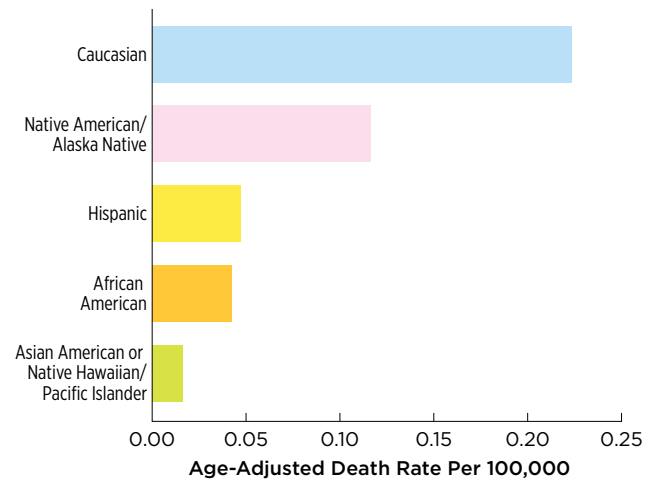
- salty-tasting skin (which parents often notice when they kiss their child)
- wheezing or shortness of breath
- persistent cough and excessive mucus
- frequent lung infections, such as pneumonia and bronchitis
- frequent sinus infections (sinusitis)
- growths in the nose (nasal polyps)
- poor weight gain and growth
- foul-smelling, greasy stools
- swollen belly, accompanied by abdominal gas and discomfort
- broadening of the fingertips and toes

Early identification of CF through newborn screening programs has led to improved survival, better lung function and growth with less intensive therapy, and reduced cost of therapy. So far, 37 states have adopted newborn screening programs.¹⁴ The sweat test remains the standard diagnostic test for cystic fibrosis. It measures the amount of salt in a child's sweat, with a high salt level indicating that a person has cystic fibrosis. Genetic testing is available for cystic fibrosis, but it does not detect all of the mutations that can cause the disease.¹⁵

Treatment

Though a cure for cystic fibrosis has yet to be developed, patients have a variety of options to treat their symptoms. Common treatments for those with CF include airway clearance techniques and medications to clear mucus from the lungs, prevention and management of infections, and proper nutrition.¹⁶

Figure 2: Cystic Fibrosis Age-Adjusted Death Rates by Race and Ethnicity, 1999-2006



Source: NCHS 2005

Racial/ Ethnic Differences

African Americans

Cystic fibrosis is much more common among Caucasians than among African Americans. It is estimated that 1 in 15,100 African Americans are diagnosed with cystic fibrosis, compared to 1 in 2,500 Caucasians (Figure 1, above).¹⁷ In 2007, of the 24,511 patients in the Cystic Fibrosis Foundation's Patient Registry,

only 4.2 percent were African American;¹⁸ about 12 percent of the U.S. population is African American.¹⁹

Between 1999 and 2006, there were 131 deaths due to cystic fibrosis among African Americans. The age-adjusted death rate of 0.04 per 100,000 for this population was lower than most other racial and ethnic groups (Figure 2, above).²⁰

The Delta F508 genetic mutation, the most common CF gene mutation, has been found in approximately 44 percent of African American individuals with clinically diagnosed cystic fibrosis. In comparison, it has been found in over 72 percent of Caucasians with CF.²¹

● Hispanics/Latinos

Cystic fibrosis occurs in about 1 in 13,500 Hispanics, compared to 1 in 2,500 Caucasians (Figure 1, above).²² Only 6.8 percent of people in the Cystic Fibrosis Foundation's 2007 Patient Registry were Hispanic,²³ even though Hispanics represent 15.4 percent of the total population.²⁴

There were 178 Hispanic deaths due to cystic fibrosis between 1999 and 2006, and age-adjusted rate of 0.05 per 100,000. This rate falls towards the lower end of rates for all racial and ethnic groups (Figure 2, above).²⁵

The Delta F508 genetic mutation, the most common CF gene mutation, has been found in 54 percent of Hispanic individuals with clinically diagnosed cystic fibrosis, compared to over 72 percent among Caucasians with CF.²⁶

● Asian Americans and Native Hawaiians/Pacific Islanders

There are limited data available on cystic fibrosis for Asian Americans and Hawaiians/Pacific Islanders. One national study found that 1 in 31,000 to more than 1 in 100,000 Asian American births are affected by cystic fibrosis. This is a lower birth prevalence than Caucasians (1 in 2,500), African Americans (1 in 15,100), and Hispanics (1 in 13,500; Figure 1, above). Research in Asian countries find much lower rates and it is likely that most Asian American cases result from having one Asian and one Caucasian parent.²⁷

There were only 16 deaths among Asian Americans and Pacific Islanders due to cystic fibrosis between 1999 and 2006. The age-adjusted death rate for this group is unreliable due to so few deaths, but was around 0.01 to 0.02 per 100,000 for this period, making it the lowest among all racial and ethnic groups (Figure 2, above).²⁸

● American Indians/Alaska Natives

Due to their small numbers in terms of the U.S. population, available data on cystic fibrosis among American Indians/Alaska Natives are limited. Small sample sizes mean that estimates are not considered statistically accurate and are not published or released. However, research indicates that CF may be common among American Indians and Alaska Natives, especially the Pueblo and Zuni.²⁹

Between 1999 and 2006, there were only 26 deaths due to cystic fibrosis among Native Americans and Alaska Natives. However, the age-adjusted rate for this population was second only to Caucasians at 0.12 per 100,000 (Figure 2, above).³⁰

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Influenza and Pneumonia

Influenza and Pneumonia are a leading cause of death in the U.S. The sad part of these diseases is that they can easily be prevented by a vaccination, yet continue to cause disease and death for thousands each year. As highlighted by the emergence of novel H1N1 and the severity of the last flu season, continued vigilance and resources are necessary to lessen the burden caused by these diseases.

Influenza

Influenza is a highly contagious viral infection that is one of the most severe illnesses of the winter season. Depending on the severity of the virus, 15 to 61 million Americans contract influenza each year.¹ Many confuse the flu with the common cold, but in actuality, the flu is much more serious. In the United States, the flu is responsible for 226,000 hospitalizations and an average of 36,000 deaths annually.²

Novel H1N1

A new influenza subtype is novel H1N1, or “swine flu,” first identified in April 2009. Similarities between this influenza A virus and influenza viruses previously identified in swine were initially identified, although it is actually a mix of four different strains, including swine, avian, and human influenza.³ Novel H1N1 has been widespread during the 2009–2010 flu season and continues to infect people. While the risks from influenza viruses can be similar, there are often important differences between them too. Most of the information in this section is about normal seasonal influenza as scientists are still learning about novel H1N1.

How Flu Spreads and Who Is At Risk

Influenza is spread easily from person to person. An infected person needs only to cough, sneeze, or even talk in order to expel the virus into the air. Anyone can get influenza, especially when it is widespread in a community. People who are not healthy or well to begin with are particularly susceptible to the complications that can follow. This includes those with chronic lung disease, such as asthma, COPD (which includes emphysema and chronic bronchitis), bronchiectasis, or cystic fibrosis. Pregnant women, while also at risk from seasonal influenza, appear to be even more at risk from novel H1N1, along with younger adults. For anyone at high-risk, influenza is a very serious illness.⁴

Flu Symptoms

Symptoms of influenza include fever, chills, body aches, headache, sore throat, cough, and a runny or stuffy nose. The influenza sufferer may also experience nausea, vomiting, or diarrhea, although these symptoms are more common among children.

Prevention With Vaccines

Seasonal influenza can be prevented with a high degree of success when a person receives the seasonal influenza vaccine. Health officials recommend influenza immunization for approximately 250 million Americans, including all children 6 months through 18 years of age.

Two vaccine options are available in the United States. The first is the flu shot. The viruses in the flu shot are inactivated so that someone receiving the vaccination cannot get influenza from it. Instead, protection develops in the form of substances called antibodies. The amount of antibodies in the body is greatest 1 or 2 months after vaccination and then gradually declines. The influenza shot is covered by Medicare and many other health plans. All persons 50 years of age and older or in other high-risk groups, such as those with asthma, should receive the flu shot annually. An American Lung Association study proved that the flu shot is safe for people with asthma.⁵

The second option for vaccination against the flu is FluMist, the only nasal spray approved for influenza vaccination. The nasal spray is made from a live but weakened virus. FluMist is only approved by the FDA for healthy people ages 2 to 49. It has not been proven safe for high-risk populations, such as those with asthma, who should receive the inactivated flu shot.⁶

The strains of influenza virus usually change each year, so people should be vaccinated each fall with the new vaccine. October 15th through November 15th is the best time to get vaccinated. However, it is never “too late” to get a flu shot since it only takes about 2 weeks until it starts offering protection and because the flu season can last through March. The 2009–2010 flu season has included two separate flu shots or sprays; one for seasonal flu and one for novel H1N1. Both are being distributed at record levels, although increased interest in vaccination has made it difficult at times during the season for everyone to find available shots when desired.

Prevention With Antivirals

Another tool in the fight against influenza are antiviral drugs. Two drugs are currently available for use in preventing or reducing the severity of symptoms associated with influenza infection: oseltamivir (Tamiflu) and zanamivir (Relenza). Oseltamivir comes in pill or liquid form, and zanamivir as a powder. When started shortly after symptoms first appear, antivirals can help decrease the severity of symptoms, shorten the duration of disease by one or two days, as well as prevent serious complications related to the flu.⁷

Vaccination Goals

Healthy People 2010 targets for influenza vaccination are 60 percent for persons with high-risk conditions aged 18-64 and 90 percent for those aged 65 years or older. No racial/ethnic group, at any age group, has met these standards. Methods for increasing vaccination levels include standing vaccination orders (compared to needing a specific order from

a healthcare provider for each patient) and reminder and recall systems in place to pursue vaccination of recommended groups.⁸

One study estimated that 1,880 minority deaths could be prevented each year if these immunization gaps were eliminated. If the Healthy People 2010 goal of 90 percent vaccination coverage were achieved, 3,750 minority and 11,840 Caucasian deaths could be prevented annually. A total of 33,000 years of minority life could be gained if influenza vaccination rates were equal from age 65 on.⁹

Pneumonia

Pneumonia is a serious infection of the lungs. The air sacs in the lungs become inflamed and fill with pus and other liquid, making it difficult for oxygen to reach the blood through them. If there is too little oxygen in the blood, then the body's cells cannot work properly. Pneumonia can cause oxygen deprivation and the spread of infection through the body, which may lead to death.¹⁰

Who Has It

No ongoing surveillance of pneumonia cases exists, so hospital discharges are the best indicator available for estimating the burden of this disease. In 2006, there were an estimated 589,000 hospital discharges in males (40.2 per 10,000) and 643,000 discharges in females (42.4 per 10,000) attributable to pneumonia. The highest pneumonia discharge rate that year was seen in those Americans 65 years of age and older, at 189.0 per 10,000.¹¹

Cause

Pneumonia does not have one single cause. Over 30 different agents can cause pneumonia, but the common ones are bacteria, viruses, mycoplasmas, other infectious agents such as fungi including pneumocystis, and various chemicals. Approximately half of pneumonia cases are believed to be caused by viruses and tend to result in less severe illness than bacteria-caused pneumonia. Most pneumonia in young children results from viral infection, including respiratory syncytial virus (RSV). The symptoms of viral pneumonia are similar to influenza symptoms and include fever, dry cough, headache, muscle pain, weakness, and increasing breathlessness.

High Risk Groups

People considered at high risk for pneumonia include the elderly (over 65 years of age), young children whose immune systems are not yet fully developed, and those with underlying health problems, such as chronic obstructive pulmonary disease (COPD), diabetes, and cardiovascular disease. Patients with diseases that impair the immune system, such as AIDS, those undergoing cancer therapy or organ transplantation, or patients with other chronic illnesses are particularly vulnerable.¹²

Prevention and Treatment

One of the best ways to prevent pneumonia is to vaccinate against it. In addition, an annual flu shot can provide protection due to the close

relationship between influenza and pneumonia. The pneumococcal polysaccharide vaccine (PPV) is recommended for anyone over 65 years of age, those with serious long-term health problems, anyone with lowered infection resistance, all Alaskan Natives and certain Native American populations.

The pneumococcal conjugate vaccine (PCV) is also recommended for children less than 2 years of age and children between 2 and 5 years of age who have serious long-term health problems, lowered infection resistance, are Alaskan Native, Native American, African American, or attends a group day care center.¹³

Treatment for pneumonia caused by bacteria, and sometimes mycoplasma, usually involves antibiotics. All types of pneumonia usually require supportive treatment, including a proper diet, and may include oxygen to increase oxygen in the blood when needed.¹⁴ For some patients, medication to ease chest pain and to provide relief from violent coughing may also be necessary.

Influenza and Pneumonia

Influenza is often complicated by pneumonia, especially in the elderly. Because the two are linked so strongly, they are often grouped together for data reporting.

Deaths

Until 1936, pneumonia was the number one cause of death in the U.S. Since then, the use of antibiotics and vaccines has reduced its impact significantly. In 2006, pneumonia and influenza combined ranked as the nation's eighth leading cause of death with 56,326. Pneumonia consistently accounts for the overwhelming majority of deaths between the two, as 55,477 people died of pneumonia in 2006.¹⁵

During the 2007–2008 influenza season, deaths associated with influenza and pneumonia peaked at 9.1 percent of all deaths per week. The proportion of deaths associated with influenza and pneumonia were above the epidemic threshold for 13 consecutive weeks beginning in January 2008.¹⁶

Costs

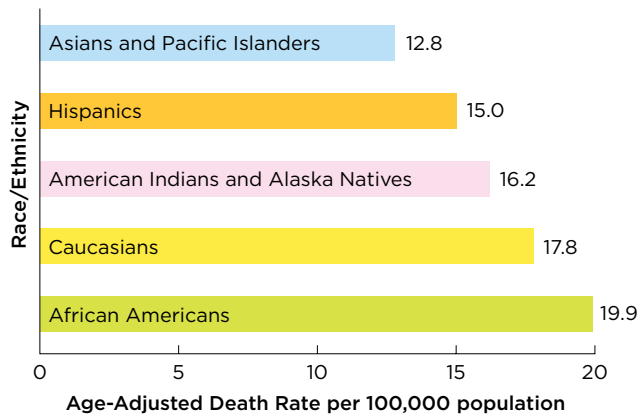
Influenza and pneumonia pose a great cost to the American economy. In 2005 influenza and pneumonia represented a cost of \$40.2 billion to the U.S. economy, \$6.0 billion in indirect costs and \$34.2 billion in direct costs.¹⁷

Racial/ Ethnic Differences

African Americans

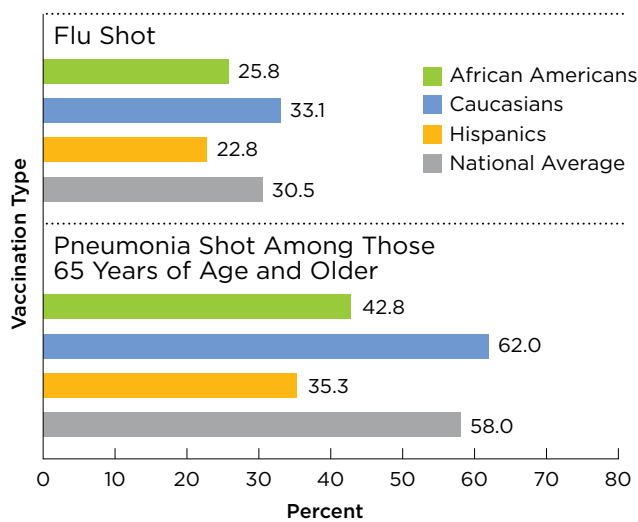
It is hard to know how many people of each race or national origin have pneumonia because no national reporting or monitoring system exists to capture diagnoses of the disease. The best available method for tracking differences

Figure 1: Age-Adjusted Death Rates due to Influenza and Pneumonia by Race & Ethnicity, 2006



Source: NCHS 2006

Figure 2: Flu and Pneumonia Vaccination Rates by Race and Ethnicity, 2008



Source: NHIS 2008

between races or ethnicities for influenza and pneumonia is through the number of deaths due to these diseases. African Americans have a much higher rate of death from influenza and pneumonia than do Caucasians. In 2006, the age-adjusted death rate due to influenza and pneumonia was 19.9 per 100,000 among African Americans, 12 percent higher than the rate of 17.8 per 100,000 among Caucasians (Figure 1).¹⁸

In addition, African Americans are less likely to get vaccinated for influenza and pneumonia. In 2008, 25.8 percent of African Americans reported receiving a flu shot, a rate significantly lower than the nationwide average of 30.5 percent or the rate of 33.1 percent among Caucasians (Figure 2). A similarly significant gap occurred for pneumonia vaccinations, with only 42.8 percent of African Americans over 65 years of age receiving one, compared to 58 percent among all those over 65, and 62 percent among Caucasians over 65.¹⁹ This despite the pneumonia shot being covered by Medicare and available to all seniors.²⁰

Results from focus groups of African American patients who did not want to be immunized revealed they shared some misunderstandings about the flu common among the broader population, but the

beliefs were more widespread. They believed that the vaccine could give people the flu. They also felt that it could be prevented by taking traditional anti-cold and “stay healthy” precautions, such as hand washing, taking vitamins, eating right, and getting enough sleep. Others expressed a strong distrust of the government, physicians and drug companies, and demonstrated a firm belief that they could control their own health status and outcomes.²¹

One study compared opinions of older African Americans and health care providers about the influenza vaccine. Researchers found that providers were aware of older African Americans’ fear of the vaccine giving them the flu and distrust of the vaccine and healthcare system. However, the providers were not aware of concerns about allergic reactions and interactions with other medications. Addressing these beliefs and lack of trust and offering further information to African American patients may help to decrease the gap in vaccination rates between African Americans and the rest of the U.S.²²

● Hispanics

Lack of surveillance and reporting limits the available knowledge about the incidence of pneumonia and influenza among Hispanic populations, as with other ethnic and racial groups. Here as well, the best information comes from mortality rates, where Hispanics fared much better compared to other groups. Hispanics had one of the lowest age-adjusted mortality rates due to influenza and pneumonia among all racial/ethnic groups in 2006 at 15.0 per 100,000 population (Figure 1, above). Hispanics were almost 16 percent less likely to die from influenza or pneumonia than Caucasians.²³ However, in 2006, influenza/pneumonia ranked as the ninth leading cause of death in Hispanics overall and the seventh leading cause of death in the over 65 Hispanic population.²⁴

In 2008, 22.8 percent of Hispanics reported receiving a flu shot, a rate significantly lower than the nationwide average of 30.5 percent or the rate of 33.1 percent among Caucasians (Figure 2, above). A similarly significant gap occurred for pneumonia vaccinations, with only 35.3 percent of Hispanics over 65 years of age receiving one, compared to 58 percent among all those over 65, and 62 percent among Caucasians over 65.²⁵ This is despite the pneumonia shot being covered by Medicare and available to all seniors.²⁶

● Asian Americans and Native Hawaiians/ Pacific Islanders

Lack of surveillance and reporting limits the available knowledge about the incidence of pneumonia and influenza among all ethnic and racial groups, but lack of data particularly limits knowledge about Asian Americans and Native Hawaiians/Pacific Islanders.

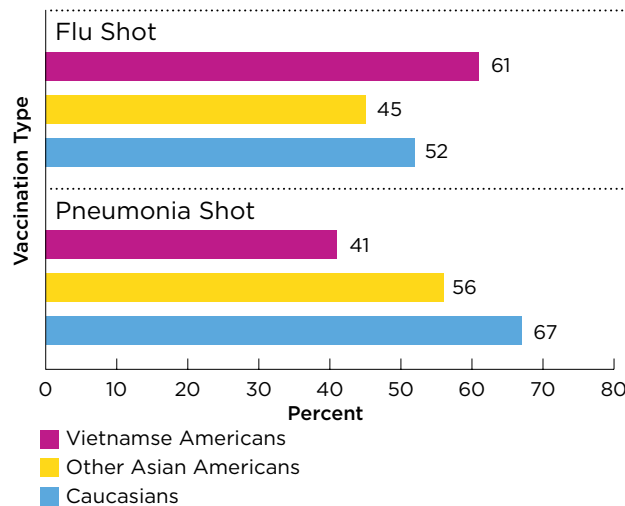
However, the little information available shows that Asian Americans and Native Hawaiians/Pacific Islanders bear a smaller burden from these diseases compared to other racial and ethnic groups. In 2006, there were 1,327 deaths due to influenza and pneumonia among Asians and Pacific Islanders, the lowest age-adjusted death rate of any racial or ethnic group at 12.8 per 100,000. Despite that, influenza and pneumonia ranked as the sixth leading cause of death overall and the fourth leading cause of death in those over the age of 65 among Asian Americans and Native Hawaiian/Pacific Islanders (Figure 1, above). These rankings are higher than what is seen among other groups.²⁷

Limited data are available on influenza and pneumonia vaccination rates for Asian Americans and Native Hawaiians/Pacific Islanders. Major national health surveys have begun to collect data on this group, but because of small sample sizes, estimates are not considered statistically accurate and are not published or released. Often analysts group Asian Americans and Native Hawaiians/Pacific Islanders with American Indians into the category of “Other Races.”

One survey with estimates for Asians found that influenza vaccinations for the 2006-07 season among those at high-risk and recommended for

vaccination were close to the national average for those 18-49 and 50-64 years of age. The rate for Asians 65 years of age and older was above the national average and significantly higher than during the 2005-06 season.²⁸

Figure 3: Flu and Pneumonia Vaccination Rates by Race and Ethnicity



Source: Daniels NA, Gildengoren G, Nguyen TT, Liao Y, Luong TN, McPhee SJ. Influenza and Pneumococcal Vaccination Rates among Vietnamese, Asian, and Non-Hispanic White Americans. *Journal of Immigrant and Minority Health*. October 2008.

A recent study compared vaccination rates of Caucasians, and Vietnamese Americans, and other Asian Americans (Figure 3). Vietnamese Americans had a higher rate of influenza vaccination (61%) than other Asian Americans (45%) and Caucasians (52%). Vietnamese Americans however, had a lower rate of pneumococcal vaccination (41%) than other Asian Americans (56%) and Caucasians (67%). This study indicates that health behaviors and outcomes can differ widely among Asian subgroups. Analyses of preventive care measures in Asian Americans should focus on subgroups to ensure accuracy and quality of assessments.²⁹

A recent report on healthcare disparities found that one of the three largest disparities facing Asian Americans (compared to Caucasians) was in rates of adults 65 and over who had never received a pneumococcal vaccination. In addition, this disparity grew worse since the previous report.³⁰

American Indians/ Alaska Natives

Data is the most limited among American Indians and Alaska Natives due to the small populations from which national surveys have to sample. However, some data are available concerning mortality among these populations. In 2006, there were 261 deaths among American Indians and Alaska Natives due to, influenza and pneumonia. The age-adjusted death rate for these diseases (16.2 per 100,000) among these groups were lower than the rate among Caucasians (17.8 per 100,000) (Figure 1, above). Pneumonia and influenza ranked as the tenth leading cause of death overall and the seventh leading cause of death in those over the age of 65 in 2006 among American Indians and Alaska Natives.³¹

A recent study of the impact of novel H1N1 on American Indians and Alaska Natives found that these populations had a death rate from this disease that was four times greater than the rate among all others. This markedly higher burden may be due to greater levels of poverty, delays in accessing care, or chronic disease levels among these populations. Among those who died from novel H1N1, American Indians and Alaska Natives were much more likely to have had asthma or diabetes compared to other groups.³²

During the 2006-07 influenza season, influenza vaccination among American Indians/Alaska Natives with high-risk conditions was above the national average for those 18-49 and 50-64 years, at 43.9 percent and 43.6 percent respectively. However, it was lower than the national average for those over 65 years at 63.1 percent.³³

A 2008 study found no disparities in influenza vaccination coverage, although pneumococcal vaccination coverage was lower among American Indian/Alaska Natives than Caucasians. This difference was attributed to sociodemographic risk factors. Regional variation indicated a need to monitor coverage and target interventions to reduce disparities within geographically and culturally diverse subpopulations of American Indians/Alaska Natives.³⁴

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Lung Cancer

Lung cancer is the uncontrolled growth of abnormal cells in one or both of the lungs. While normal cells reproduce and develop into healthy lung tissue, these abnormal cells reproduce faster and never grow into normal lung tissue. Lumps of cancer cells (tumors) then form and grow. Besides interfering with how the lung functions, cancer cells can spread from the tumor into the bloodstream or lymphatic system where they can spread to other organs.

Causes

Cigarette smoking is by far the most important cause of lung cancer, and the risk from smoking increases with the number of cigarettes smoked and the length of time spent smoking.¹ Other recognized causes include radon,² secondhand smoke,³ and some occupational chemicals and air pollutants like benzene,⁴ formaldehyde,⁵ and diesel air pollution.⁶ Asbestos, a product used in insulation and manufacturing for years, is also an important cause of lung cancer.⁷ It has been estimated that active smoking is responsible for close to 90 percent of lung cancer cases; radon causes 10 percent, occupational exposures to carcinogens account for approximately 9 to 15 percent and outdoor air pollution 1 to 2 percent. Because of the interactions between exposures, the combined attributable risk for lung cancer exceeds 100 percent.⁸

Symptoms

Symptoms include a persistent cough, shortness of breath, wheezing, coughing up blood, chest pain and recurring pneumonia or bronchitis.⁹ However, as earlier stages often seem to be symptomless, most lung cancers are diagnosed in advanced stages. Unfortunately, efforts to detect lung cancer early have not led to a reduction in lung cancer deaths. Many techniques have limited effectiveness in detecting cases.¹⁰ The choice of treatment and prognosis depend upon the specific type of tumor.¹¹

Types

There are two major types of lung cancer: non-small cell lung cancer (NSCLC) and small cell lung cancer (SCLC). Non-small cell lung cancer is much more common and accounts for 85 percent of all lung cancer cases.¹² It usually spreads to different parts of the body more slowly than small cell lung cancer. There are three main types of NSCLC, which are named for the type of cells in which the cancer develops: squamous cell carcinoma, adenocarcinoma, and large cell carcinoma. Only 17.3 percent of the people who develop non-small cell lung cancer survive for 5 years.¹³

Small cell lung cancer, also called “oat cell cancer,” accounts for 14

percent of all lung cancers.¹⁴ This type of lung cancer grows more quickly and is more likely to spread to other organs in the body. It often starts in the bronchi and towards the center of the lungs. Small cell lung cancer is mainly attributable to smoking. Only 6.2 percent of the people who develop small cell lung cancer survive for 5 years.¹⁵ Sometimes lung cancer may have characteristics of both types; this is known as mixed small cell/large cell carcinoma.

Incidence

In 2006, approximately 365,000 Americans suffered from lung cancer. The national incidence rate for lung cancer was 63.1 per 100,000 population. The incidence rate for men was 77.7 per 100,000 and 52.5 per 100,000 for women. Lung cancer incidence rates among men have decreased by 29 percent since 1980, while among women they have increased by sixty percent (Figure 1).¹⁶

Deaths

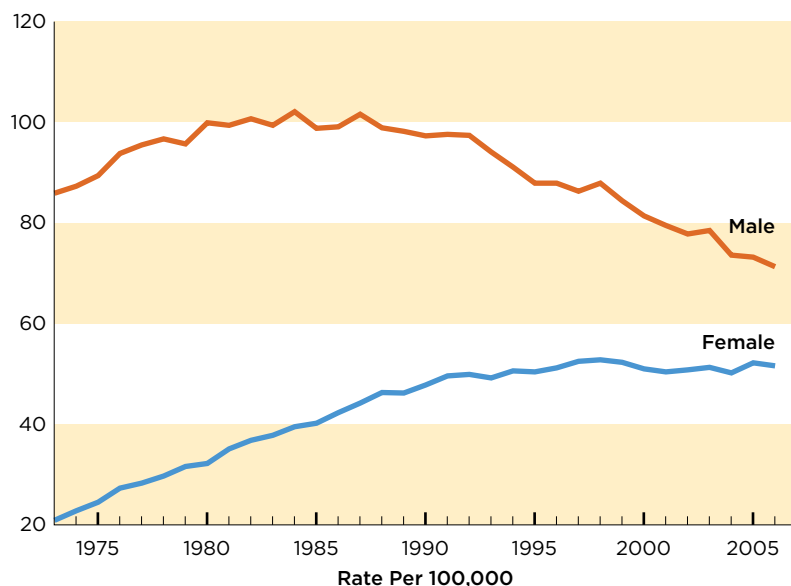
Lung cancer is the number one cancer killer in the nation. It has been the leading cause of cancer death among men since the early 1950s, and in 1987 it surpassed breast cancer to become the leading cause of cancer deaths among women as well. In 2006, lung cancer had an age-adjusted death rate of 51.5 per 100,000 population in the U.S. and accounted for 31 and 26 percent of all male and female cancer deaths, respectively.¹⁷

Smoking-Related

The U.S. Surgeon General estimates that 90 percent of lung cancer deaths in men and 80 percent in women are caused by smoking. Men and women who smoke are 23 and 13 times, respectively, more likely to develop lung cancer.¹⁸ Nonsmokers have a 20 to 30 percent greater chance of developing lung cancer if they are exposed to secondhand smoke at home or work.¹⁹ Exposure to secondhand smoke causes approximately 3,400 lung cancer deaths among nonsmokers each year.²⁰

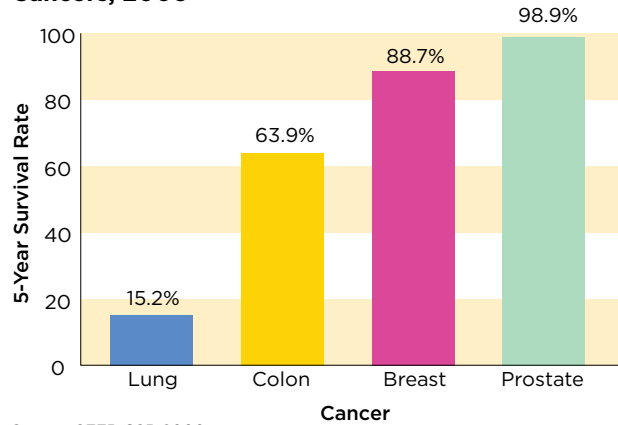
Lung cancer death rates mimic smoking rates, but with a long lag period between the two. The smoking epidemic among men was reflected in steady increase in the male lung cancer death rate through 1990, after which it began to decline. The lung cancer death rate among women, who took up regular cigarette smoking later than men, has begun to plateau after increasing for many decades.^{21,22}

Figure 1: Lung Cancer Age-Adjusted Incidence Rates by Sex, 1973-2006



Source: SEER CSR 1975-2006

Figure 2: Five-Year Survival Rates for Selected Cancers, 2006



Source: SEER CSR 2006

Survival Rates

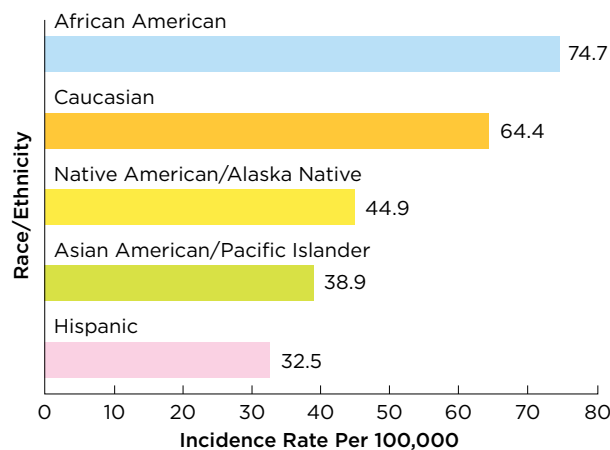
Survival rates for lung cancer tend to be much lower than those of most other common cancers. The 5-year survival rate for all patients in whom lung cancer is diagnosed is 15.2 percent, compared to 63.9 percent for colon cancer, 88.7 percent for breast cancer, and 98.9 percent for prostate cancer (Figure 2).²³ However, lung cancer survival rates tend to increase when the disease is caught in an early stage. Unfortunately, most lung cancers are not identified until later stages. This is one important reason why it is so critical that research on identifying lung cancer early be expanded.



African Americans

African Americans have higher lung cancer incidence rates than any other ethnic or racial group, including Caucasians (64.4 per 100,000). In 2006, African Americans had an age-adjusted lung cancer incidence rate of 74.7 per 100,000 (Figure 3). The incidence rate for African Americans males was 104.3 per 100,000, compared with an incidence rate of 54.7 per 100,000 for African American females.²⁴

Figure 3: Lung Cancer Incidence Rates by Race and Ethnicity, 2006



Source: SEER CSR 2006

Recently, a model was developed to predict lung cancer risk specific to African-Americans. Most previous models have been developed based on Caucasian populations. The new model found that certain factors, such as wood and asbestos dust exposure, were important predictors of lung cancer risk in African Americans, but not in Caucasians. Another important risk factor was that African Americans with COPD (Chronic Obstructive Pulmonary Disease) were 6.4 times more likely to develop lung cancer than African Americans without COPD.²⁵

In one workplace study, African American coke oven workers' odds of dying from lung cancer have been found to be 1.38 times those of their white colleagues, although no such difference has been found among white-collar workers. This suggests that factors besides exposure contribute to the difference in lung cancer rates, such as healthcare coverage or access or community beliefs concerning the disease.²⁶

A recent analysis of pooled data from 13 large cohort studies provided compelling evidence of the differences in lung cancer risk between African Americans and Caucasians who never smoked. African American women aged 40 to 84 years had incidence rates that were 56 percent higher than among Caucasian women. Death rates were about 33 percent higher for both African American men and women, compared to Americans with European backgrounds. The authors concluded that this increased risk might account for some portion of the difference in lung cancer rates between African Americans and persons of European descent who do smoke.²⁷

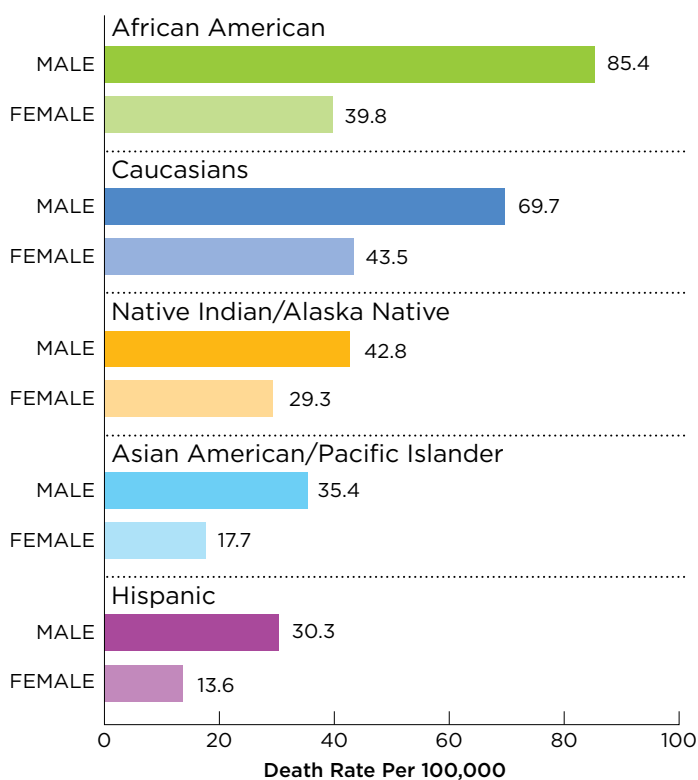
African Americans are more likely to die from lung cancer than Caucasians, though African American men bear the brunt of the difference. In 2006, African Americans had an age-adjusted lung cancer death rate of 57.9 per 100,000, about 6 percent greater than the rate of 54.7 per 100,000 among Caucasians. However, the age-adjusted death rate among African American men (85.4 per 100,000) is 22.5 percent higher than the rate among Caucasian men (69.7 per 100,000 ; Figure 4). Age-adjusted lung cancer death rates are actually higher for Caucasian (43.5 per 100,000) compared to African American women (39.8 per 100,000).²⁸

Lung cancer survival rates also tend to be lower among African Americans. For 1999-2005, the lung cancer five-year survival rate for African Americans was 12.4 percent, over a fifth lower than the rate of 15.9 percent for Caucasians. The rate for African American men was a mere 10.8 percent, while it was somewhat higher for African American women at 14.5 percent. These rates are both lower than their counterparts among Caucasians.²⁹

One study found that African American patients with SCLC tended to have other conditions associated with lower survival rates, such as significant weight loss, less ability to carry on ordinary daily activities, and being a Medicaid recipient. However, African Americans had outcomes similar to those of other patients if they were given equivalent therapy.³⁰ These results show promise that the lung cancer burden born by African Americans may successfully be diminished if they receive appropriate treatment.

Survival rate differences may also depend on other factors. One study adjusted for smoking, staging, treatment, and socioeconomic status in

Figure 4: Lung Cancer Age-Adjusted Death Rates by Sex and Race and Ethnicity, 2006



Source: NCHS 2006

its analysis of factors that affected survival. When these things were taken in to account, the difference in survival rates was eliminated. This study implies that the disparity in five-year survival rate is most likely due to African Americans having lower per-capita income, greater likelihood of smoking, greater delay in getting treatment, and being less likely to agree to neoadjuvant therapy (chemotherapy before surgery with the goal of shrinking the tumor) compared to Caucasians.³¹

Researchers looking at African Americans in South Carolina in 2008 found that they were 29.5 percent less likely to undergo surgical resection for localized NSCLC compared to Caucasians. African Americans in this study were more likely than Caucasians to be younger, male, not married, less educated, poor, uninsured or covered by Medicaid, and to reside in a rural community. Even after controlling for sociodemographics, co-occurring diseases, and tumor factors, their odds of undergoing surgery were less than half that of Caucasians. Earlier studies had explored this disparity, but this research showed that the problem persists.³²

Access to quality healthcare has become integral for patients in their fight against lung cancer. Unfortunately, many studies have found disparities in the quality of care received by African American and Caucasian lung cancer patients. For example, an analysis of Medicare-eligible patients with NSCLC found many discrepancies in treatment. African Americans were less likely to undergo staging, receive surgery once staged, or receive a recommendation for surgery even when there were no clear indications against it. Survival was similar for African American and Caucasians after surgical resection, although African Americans were 70 percent more likely to decline surgery.³³

● Hispanics/Latinos

Hispanics tend to have some of the lowest lung cancer incidence and death rate of any racial or ethnic group, including Caucasians. The age-adjusted incidence rate among Hispanics was 32.5 per 100,000 in 2006 (Figure 3, above). This rate is approximately half that for Caucasians. The low incidence rate of lung cancer among Hispanics has traditionally been linked to the low rate of cigarette smoking among this population. Between the years of 1997 and 2006, lung cancer incidence rates among Hispanics decreased by 2.3 percent and 1.8 percent per year for men and women, respectively.³⁴

A study compared lung cancer incidence rates between first generation Hispanics and Caucasians in Florida and Hispanics in their home countries. Among Mexicans, Puerto Ricans, and Cubans, and others of Hispanic origin, rates were highest among Caucasians, then Hispanics in Florida, and lowest for those in each Hispanic groups' home country. It is typical for immigrant populations to take on the disease profile of the country to move to, although the reasons for this vary and are not always understood. In this case, differences in smoking behavior may explain some of the increase for Florida Hispanics, compared to Hispanics in their native countries.³⁵

The age-adjusted mortality rate due to lung cancer is almost two-thirds lower among Hispanics than among Caucasians and African Americans. Approximately 20.7 per 100,000 Hispanic deaths can be attributed to lung cancer, compared with 54.7 per 100,000 Caucasians, and 57.9 per 100,000 African Americans. The rate among Hispanic women is 55 percent lower than that among Hispanic men, at 13.6 and 30.3 per 100,000, respectively (Figure 4, above).³⁶

Hispanics who are affected by lung cancer may have more trouble obtaining treatment than Caucasians. Inconsistencies have been observed in the treatment of Hispanic and Caucasian lung cancer patients. Hispanics had worse odds (OR = 0.44) of obtaining lung resection at high-volume hospitals compared to Caucasians in a 2007 survey.³⁷ Hispanics also had higher odds of dying in the hospital, but this finding was not statistically significant after controlling for hospital volume. These findings suggest that Hispanics are more likely to die in the hospital following lung resection surgery because they go to hospitals that have lower procedure volumes than Caucasians. The survey found that the differences in treatment were not due to health insurance, segregation or number of surgical hospitals in the county.³⁸

● Asian Americans and Native Hawaiians/ Pacific Islanders

Asian Americans/Pacific Islanders had the second lowest incidence rate of lung cancer after Hispanics (32.5 per 100,000). The age-adjusted incidence rate for lung cancer in the Asian American/Pacific Islander population in 2006 was 38.9 per 100,000 (Figure 3, above). The age-adjusted incidence rate for women was lower, at 28.1 per 100,000, while the age-adjusted incidence rate for men was 1.9 times greater at 53.4 per 100,000.³⁹

In 2006, the age-adjusted death rate for lung cancer among the Asian American/Pacific Islander population was 25.2 per 100,000. This rate is much lower than those seen among Caucasian and African American populations. The rate among Asian American/Pacific Islander women, 17.7 per 100,000, is almost exactly half that among men, 35.4 per 100,000 (Figure 4, above).⁴⁰

● American Indians/ Alaska Natives

Native Americans had the third highest incidence rate of lung cancer after African Americans (74.7 per 100,000) and Caucasians (64.4 per 100,000).⁴¹ The age-adjusted incidence rate of lung cancer in the American Indian/Alaska Native population in 2006 was 44.9 per 100,000 (Figure 3, above). The age-adjusted incidence rate for women is slightly lower, at 39.8 per 100,000, while the age-adjusted incidence rate for men is 51.6 per 100,000.

A review of Indian Health Service (IHS) records found a wide range of incidence rates among IHS regions: 14.9 per 100,000 in the Southwest,

87.1 per 100,000 in the Southern Plains, 93.2 per 100,000 in Alaska, and 104.3 per 100,000 in the Northern Plains. The rate in the region with the highest incidence, the Northern Plains, was 7 times greater than the rate in the region with the lowest incidence, the Southwest. In addition, lung cancer cases among American Indians/Alaska Natives were diagnosed before 65 years of age 39.6 percent more often (41.6%) than among Caucasians (29.8%).⁴²

The age-adjusted mortality rate due to lung cancer is slightly more than a third lower among American Indians/Alaska Natives than among Caucasians and African Americans. Approximately 35.2 per 100,000 American Indian/Alaska Native deaths can be attributed to lung cancer, compared with 54.7 per 100,000 Caucasians, and 57.9 per 100,000 African Americans. The rate among men, 42.8 per 100,000, is 46.1 percent higher than the rate of 29.3 per 100,000 among women (Figure 4, above).⁴³

More research needs to be done to determine cancer prevalence, risk factors, and effects upon Native American/Alaska Native populations. One way in which researchers could gather more reliable and useful data about Native Americans/Alaska Natives is to link cancer registry data with Indian Health Service records. This should decrease health disparities in this population through better planning, implementation and evaluation of cancer control efforts.⁴⁴

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Occupational Lung Disease

Occupational lung diseases are a group of illnesses that are caused by either repeated, extended exposure or a single, severe exposure to irritating or toxic substances that leads to acute or chronic respiratory ailments. Private industry employers reported 14,800 such cases in 2008, while state and local government reported an additional 7,800 cases. The rate of occupational lung conditions was highest for education and health service workers in private industry and local government workers at 3.8 and 5.9 per 10,000 full time workers, respectively (Figure 1).¹

There are two broad categories of occupational lung diseases:

- Diseases that are not occupation-specific, but are aggravated at work, such as occupational asthma; and
- Diseases related to a specific occupation, such as asbestosis, coal worker’s pneumoconiosis (black lung), berylliosis (brown lung), and farmer’s lung.

Table 1: Occupational Respiratory Illness Rates for Selected Industry Sectors, 2008

Industry Sector	Incidence Rate per 10,000 workers
Overall	2.1
State and Local Governments	5.2
Local Governments	5.9
State Governments	3.7
Private Industry	1.6
Education and Health Services	3.8

Source: BLS 2009

Common occupational lung diseases include mesothelioma, occupational asthma, silicosis, asbestosis, and sick building syndrome. Adult-onset asthma can be triggered by occupational exposures. COPD (chronic obstructive pulmonary disease) and even lung cancer, though primarily caused by smoking, can also result from workplace exposures.^{2,3}

Certain occupations are associated with an increased risk of developing occupational lung diseases. They include construction and industry workers who are exposed to

asbestos, farmers who are exposed to a variety of dust and mineral particles, miners who are exposed to coal and minerals. Firefighters are also exposed to dust, combustion particles, gases, fumes, and other noxious materials while on the job.⁴

The estimated yearly cost of occupational injuries and illnesses is between \$128 and \$150 billion dollars.⁵ Although occupational lung diseases are often incurable, they are always preventable. Improving

ventilation, wearing protective equipment, changing work procedures, and educating workers are key factors for prevention.

Occupation-Specific Lung Diseases

Occupational Asthma

Occupational asthma is the most common form of occupational lung disease. Occupational asthma (also known as work-related asthma) is asthma that is caused or made worse by exposures in the workplace. Estimates suggest that 15 to 23 percent of new asthma cases in adults are work related.⁶

Four states (California, New Jersey, Massachusetts, and Michigan) tracked cases of occupational asthma over a seven-year period. During this time, the occupations with the highest percentage of asthma cases were operators, fabricators, and laborers (32.9%); managerial and professional specialty (20.2%), and technical, sales, and administrative support jobs (19.2%). The four most common agents associated with occupational asthma were miscellaneous chemicals (19.7%), cleaning materials (11.6%), mineral and inorganic dust (11.1%), and indoor air pollutants (9.9%).⁷

Mesothelioma

Malignant mesothelioma is a fatal type of cancer caused by exposure to asbestos. Millions of construction and general industry workers have been exposed to asbestos while on the job. Occupations associated with significantly higher mesothelioma deaths include plumbers, pipefitters, and steamfitters; mechanical engineers; electricians; and elementary school teachers.⁸

Throughout much of the twentieth century, many different construction and manufacturing applications involved the use of asbestos. In the U.S., asbestos use peaked in 1973 and but had declined by 99.8 percent in 2007.⁹

Because mesothelioma usually does not show up until 20 to 40 years after exposure, most of the deaths from the disease are the result of exposures that occurred decades ago. This long lag time means that mesothelioma deaths are expected to peak around 2010, despite the much lower current use of asbestos. From 1999 to 2005, 18,068 malignant mesothelioma deaths were reported in the U.S. Men (81%) and Caucasians (95%) accounted for the majority of these cases.¹⁰

Silicosis

Silicosis is a disabling, dust-related disease and is one of the oldest occupational lung diseases in the world. Silicosis is caused by exposure to and inhalation of airborne crystalline silica. Silica (SiO_2) is the name of a group of minerals that are found in mines, foundries, blasting operations, stone, clay, and glass manufacturing. Dust particles from silica can penetrate the respiratory system and land on alveoli (airsacs). This causes scar tissue to develop in the lungs and impair the exchange of oxygen and carbon dioxide in the blood.¹¹

More than one million workers are exposed to silica each year.¹² Though symptoms of silicosis rarely develop in less than five years, progression of the disease can lead to extreme shortness of breath, loss of appetite, chest pains, and respiratory failure, which can cause death. Silicosis also makes a person more susceptible to infectious diseases of the lungs, such as tuberculosis.¹³

The silicosis death rate is generally low, but still too high considering that every one of these deaths could have been prevented. Because of the low number of overall deaths due to silicosis, multiple years of data are combined to provide a more accurate estimate of the burden of this disease. Between 1996 and 2005, the age-adjusted death rate due to silicosis was 0.8 per million population. Rates were much higher among men. Two occupations are most commonly listed in association with silicosis deaths; mining machine operators (15.7%) and non-construction laborers (9.5%).¹⁴

Asbestosis

Asbestosis is a progressive disease that results from breathing in microscopic fibers of asbestos. These small fibers build up over time and can cause scarring, or fibrosis, in the lungs. This scarring causes the lungs to stiffen and makes it hard to breathe or get enough oxygen into the blood.¹⁵ Asbestosis may not show up until 10 to 40 years after exposure to asbestos fibers.¹⁶

Approximately 1.3 million construction and industry employees are currently exposed to asbestos on the job. From 1970 to 2000, the asbestosis age-adjusted death rate in the U.S. increased from 0.6 per million population over 15 years of age) 6.9 per million population over 15 years of age. The age-adjusted death rate in 2004 was slightly lower at 6.03 per million.¹⁷

Sick Building Syndrome

Sick building syndrome (SBS) results when a large number of people in a building experience symptoms that do not fit the pattern of any particular illness, subside when not in the building, and are difficult to trace to a specific source.¹⁸

This condition is often temporary, but some buildings have long-term problems. Causes of sick building syndrome include inadequate ventilation, chemical contaminants from indoor sources (such as adhesives, pesticide, cleaning agents etc.), chemical contaminants from outdoor sources (such as vehicle exhaust and plumbing vents), and biological contaminants (such as bacteria, mold, and pollen).¹⁹

Certain racial and ethnic groups are traditionally employed in lower-wage sectors of the workforce where they are overexposed to occupational respiratory hazards. They are more likely to be employed in industries such as agriculture, mining (coal, silica), textiles, demolition, manufacturing (asbestos), and service maintenance (cleaning supplies)—all of which have been associated with lung disease.

Racial/ Ethnic Differences

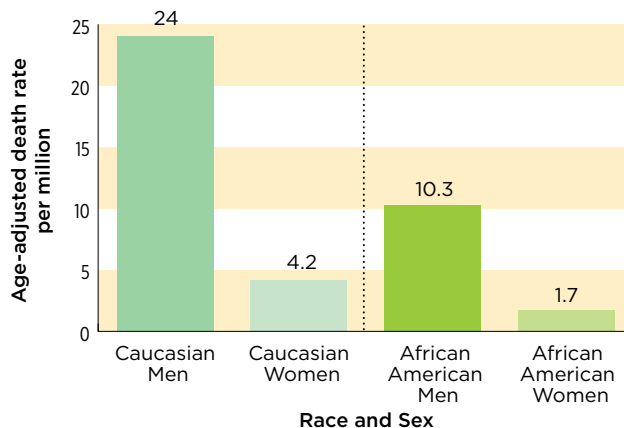
African Americans

Occupational lung diseases can affect African Americans and Caucasians differently. For example, African Americans are known to have higher mortality rates due to silicosis than Caucasians, but have a lower rate of malignant mesothelioma.

The age-adjusted death rate for silicosis was 1.8 times higher among African American men (3.35 per million) than among Caucasian men (1.82 per million) for the combined years of 1996 through 2005. This trend was consistent throughout this period.²⁰

However, African Americans have had a consistently lower age-

Figure 2: Age-Adjusted Death Rates Due to Mesothelioma by Race and Sex, 1999-2005



Source: NIOSH WoRLD Report, 2008

adjusted death rate due to malignant mesothelioma than Caucasians. Between 1999 and 2005, the death rate due to mesothelioma was 24.0 per million among Caucasian men, compared to 10.3 per million among African American men. The age-adjusted rates for Caucasian (4.2) and African American (1.7) showed a similar pattern (Figure 2).²¹

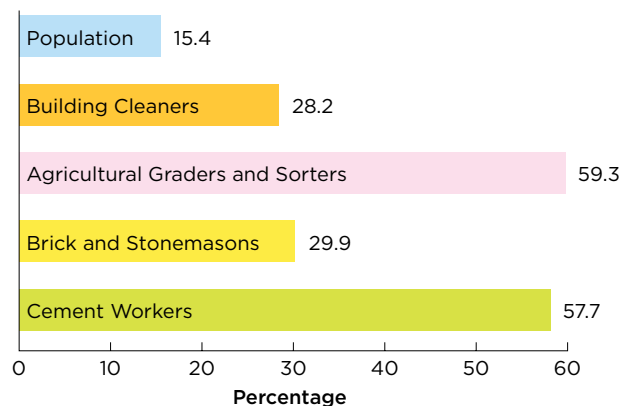
Hispanics

Data on occupational respiratory illness among Hispanics is limited, partially because this population has only recently begun to be independently identified in data collection. However, Hispanics are disproportionately at risk due to their high employment in certain occupations. Currently, Hispanics represent 15.4 percent of the total population,²² but account for 28.2 percent of building cleaners, 59.3 percent of agricultural graders and sorters, 29.9 percent of brick and stonemasons, and 57.7 percent of cement workers (Figure 3).²³

Asian Americans and Native Hawaiians/ Pacific Islanders

Data on occupational illness among the Asian American/Pacific Islander

Figure 3: Percentage of the Population and Selected Occupations that is Hispanic, 2008



Source: Census Bureau and BLS, 2008

populations are limited. Occupational lung diseases may not be as serious a problem for these populations as they are less likely to be employed in occupations with a high risk for these conditions. However, anyone is potentially at risk for occupational lung diseases if preventative measures are not taken.

● American Indians/ Alaska Natives

In Colorado and New Mexico, a high percentage of Native Americans have historically been employed in uranium mines. This employment trend has been associated with high rates of lung cancer among Native Americans in these states, due to exposure to radon byproducts. Radon results from radioactive decay of radium, which is in turn a decay product of uranium. A study that looked at Navajo uranium miners from 1969 to 1993 found that they were 28 times more likely to develop lung cancer than Navajos not exposed to uranium.²⁴

Another study concluded that Native Americans working in uranium mines also have a higher risk for getting certain occupational lung diseases, in addition to lung cancer, than any racial or ethnic groups. To confound the problem, they are also less likely to receive compensation for mining-related diseases.²⁵

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Obstructive Sleep Apnea or Sleep-Disordered Breathing

Sleep-disordered breathing is a group of disorders characterized by breathing difficulties while sleeping. Obstructive sleep apnea (OSA) is the most common of these disorders. Obstructive sleep apnea is a repeated narrowing of the throat during sleep that either partially or completely blocks the airways. This blockage can cause a person to have breathing problems, or even to stop breathing for 10 to 20 seconds or longer, many times a night. Symptoms of OSA can include loud snoring, choking or gasping during sleep, unrestful sleep, and sleepiness throughout the day.¹

It is estimated that more than 12 million American adults have obstructive sleep apnea. Obstructive sleep apnea is more common in men, with 1 out of 25 middle-aged men suffering from OSA, compared to 1 out of 50 middle-aged women. OSA becomes more common as people age, with prevalence increasing to at least 1 out of 10 people among those over the age of 65. African Americans, Hispanics, and Pacific Islanders are more likely to develop sleep apnea than Caucasians.²

Other risk factors for OSA include being overweight (more than half of people with OSA are overweight),³ a narrow airway, high blood pressure, a thick neck, smoking, use of alcohol, sedatives, or tranquilizers, or a family history of the disease.⁴

Sleep apnea is a serious public health problem because of the large number of individuals who lose sleep due to it, and their subsequent sleepiness, lack of alertness, impaired mental functioning, delayed reaction times and difficulty maintaining concentration.⁵

A diagnosis of OSA is based on medical and family histories, a physical examination, sometimes a sleep study, and, frequently, referral to a sleep specialist. A sleep study involves having sleep monitored overnight. One monitoring method is a polysomnogram, or PSG. This test records brain activity, eye and muscle activity, breathing and heart rate, movement of air in and out of the lungs, and oxygen levels in the blood. These measurements are painless and allow a specialist to make a diagnosis and form a treatment plan.⁶

Treatments for OSA include behavioral changes, mouthpieces, breathing devices and surgery. Changing a few behaviors may be enough for those with mild sleep apnea, such as avoiding alcohol and other sedatives or losing weight. Other changes include sleeping on the side instead of the back, using nose sprays or allergy medicines to keep nasal passages open, and stopping smoking. A mouthpiece may also be recommended to adjust the lower jaw and tongue and help keep the airways open.⁷

The most common treatment for moderate to severe OSA is continuous positive airway pressure (CPAP). Nasal CPAP prevents the airways from closing by delivering air through a mask at a pressure slightly higher than normal. CPAP is very effective but can cause side effects, including headaches, dry or stuffy nose, or irritated skin on the face. Surgery may be helpful for some people with OAS. There are different types of surgical approaches depending on what is believed to be causing the airway blockage.⁸

If left untreated, obstructive sleep apnea can cause high blood pressure and other heart diseases, depression, irritability, learning and memory difficulties, weight gain, impotence and headaches. Moreover, untreated OSA may be responsible for injuries on the job and deadly car collisions.^{9,10} One study found that more than 800,000 drivers were involved in vehicle crashes related to sleep apnea in 2000, at a cost of nearly \$16 billion and 1,400 lives.¹¹

Racial/ Ethnic Differences

African Americans

African Americans tend to be at increased risk of sleep apnea compared to Caucasians. According to a study that looked at risk factors for sleep-disordered breathing, African-American children, especially those living in a neighborhood of poor socioeconomic status, were more likely than children of other races to develop obstructive sleep apnea.¹² One study found shared and unshared genetic factors that may affect the risk of both obesity and sleep apnea in African Americans.¹³ Increased risk of OSA among African Americans is independent of obesity or respiratory conditions as risk factors.¹⁴

A survey of OSA symptoms among Caribbean-born black men and women found high rates of snoring (45%), excessive daytime sleepiness (33%), and difficulty maintaining sleep (34%). Caribbean-born black men and women had higher snoring rates than all other racial/ethnic groups in the United States, including African Americans. Daytime sleepiness was also higher among Caribbean-born blacks (19%) than among Caucasians. Almost half of the study population had fallen asleep while watching television (47%), and 14 percent had done so while driving. Participants who also reported a history of heart disease were eleven times more likely to have at least one symptom of OSA.¹⁵

A large study of adolescents found that 6 percent had been diagnosed with sleep-disordered-breathing. Those adolescents were twice as likely to have excessive daytime sleepiness, poorer grade point average and attention-deficit/hyperactivity disorder as their peers. Sleep-disordered breathing was also twice as likely among African-Americans as Caucasians.¹⁶ A separate study of obese children (BMI >85th percentile for age) found that African American children were over twice as likely as matched controls to have sleep-disordered breathing.¹⁷

● Hispanics

Data on Hispanics are limited, but OSA may be more common among this population compared to Caucasians. However, this may be due to differences in obesity between the populations.¹⁸

● Asian Americans and Native Hawaiians/ Pacific Islanders

Data are not available for Asian Americans. However, studies from Hong Kong, Korea, and India suggest that prevalence rates among these populations may be similar to those among Caucasians.¹⁹

Pacific Islanders may be at risk for more severe OSA than Caucasians, although this may be due to differences in obesity between the populations.²⁰

● American Indians/ Alaska Natives

Data are not available for American Indians/Alaska Natives.

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Respiratory Distress Syndrome (RDS)

Respiratory distress syndrome (RDS) is a life-threatening lung disorder that occurs in premature infants whose lungs have not fully developed. RDS is caused by a lack of pulmonary surfactant, a liquid that coats the inside of the lung. This liquid keeps the air sacs in mature lungs from collapsing and allows them to inflate with air more easily. In a few cases, RDS can be caused by genetic problems with lung development.

The incidence of RDS correlates with the amount of time a child stays in the womb.¹ Most cases are seen in babies born before 28 weeks and it is rare in infants born full-term (at 40 weeks). In 2005, 16,268 infants suffered from RDS, an incidence rate of 3.9 per 1,000.² The RDS incidence rate was 3.9 per 1,000 for Caucasians, 4.7 per 1,000 for African Americans, 1.8 per 1,000 for Hispanics, 5.3 per 1,000 for American Indians/Alaska Natives, and 2.4 per 1,000 for Asian Americans/Pacific Islanders.³

Symptoms usually appear shortly after birth and become more severe over time. The symptoms of RDS include bluish color of the skin and mucus membranes, brief stopping in breathing, grunting, nasal flaring, decreased urine output, swollen arms and legs, rapid and shallow breathing.⁴ Prematurity is the most important risk factor for developing RDS. Other risk factors include a sibling with RDS, diabetes in the mother, Cesarean delivery, delivery complications that lead to acidosis in the newborn at birth, multiple pregnancy, and rapid labor.⁵ RDS infants may develop several complications, including infection of the bloodstream (sepsis) and other problems related to premature birth, such as bleeding into the brain. These and other complications can cause convulsions (shock-like states), and in some cases even death.

Prompt treatment is necessary for infants suffering from RDS. Mechanical ventilation and surfactant therapy have become the standard of care in management of RDS.⁶ Another effective treatment is the use of nasal continuous positive airway pressure (nCPAP). nCPAP delivers highly pressurized air through the nose and helps to keep the airways open. It may even prevent the need for a breathing machine for many babies.⁷

In 1979, RDS was the second-ranking cause of death in infants but due to the progress made in prenatal care, it has dropped to the eighth place in 2007. In 2007, 735 deaths, or 17.0 per 100,000 live births were due to RDS.⁸

Racial/ Ethnic Differences

African Americans

In 2005, African American infants had a RDS incidence rate of 4.7 per 1,000 compared with 3.9 per 1,000 for Caucasian.

African Americans had the second highest incidence rate of all racial/ethnic groups after American Indians/Alaska Natives.⁹

In 2007, African American infants (35.3 per 100,000) were more than twice as likely to die from RDS compared to Caucasian infants (13.9 per 100,000) and the general U.S. population (17.0 per 100,000).¹⁰ It is possible that this difference is due to the higher rate of premature births among African American women. According to the 2007 birth data, 13.8 percent of African American women, as opposed to 7.2 percent of Caucasian women, delivered low-birthweight babies (under 2,500 grams).¹¹ In 2007, RDS was the eighth leading cause of deaths among African American infants under 1 year of age.¹²

Hispanics

In 2005, 1,779 Hispanic infants suffered from respiratory distress syndrome. The incidence rate among Hispanics was 1.8 per 1,000 and was lower than all other racial/ethnic groups and the national incidence rate (3.9 per 1,000).¹³

In 2007, 124 Hispanic infants died from RDS, an infant mortality rate of 11.7 per 100,000. Hispanic mortality rates for respiratory distress syndrome were lower than that of Whites (13.9 per 100,000) and the general population (17.0 per 100,000). RDS was ranked the tenth leading cause of death for Hispanic infants under 1 year of age.¹⁴

As with asthma, RDS mortality rates vary among Hispanic subgroups. In 2001 (latest year data reported), Puerto Rican infants were twice as likely to die from RDS (43.4 per 100,000) as Mexican (21.1 per 100,000), and Central and South American infants (17.3 per 100,000).¹⁵

Asian Americans/ Pacific Islanders

In 2005, 561 Asian Americans/Pacific Islanders were affected by respiratory distress syndrome. Asian Americans had the second lowest incidence rate, after Hispanics, compared with all other racial/ethnic groups in the United States (2.4 per 1,000 and 1.8 per 1,000, respectively).¹⁶

Reliable incidence and mortality figures for RDS are not available for Asian Americans/Pacific Islanders

American Indians/ Alaska Natives

In 2005, 236 American Indians/Alaska Natives were affected by respiratory distress syndrome. American Indians/Alaska Natives had the highest incidence rate of RDS (5.3 per 1,000) of all other racial/

ethnic groups in the United States. The national incidence rate of RDS (3.8 per 1,000) was much lower than for American Indians/Alaska Natives.¹⁷

Reliable incidence and mortality figures for RDS are not available for American Indians/Alaska Natives.

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Respiratory Syncytial Virus (RSV)

Respiratory Syncytial Virus (RSV) is a very contagious infection of the lungs and breathing passages and is the most common cause of bronchiolitis, an inflammation of the small airways, and pneumonia in children less than 1 year of age. Almost all children in the United States will become infected with RSV by their second birthday.¹

While RSV is most common in infants and young children, it can cause respiratory illness throughout life, especially among those with compromised respiratory, cardiac, or immune systems and the elderly.² Elderly populations are often overlooked when discussing RSV, even though they experience approximately 170,000 hospitalizations and 10,000 deaths related to the disease annually.³

How it spreads

RSV is spread through close contact with an infected person. Infection can occur when droplets from a cough or sneeze come into contact with the eyes, mouth, or nose, or when someone touches an infected surface or object and then their eyes, mouth, or nose. The virus is often brought in to the home by school-aged children who may have symptoms similar to a cold due to the RSV infection. The virus can spread quickly and usually ends up infecting about half of household members.⁴

RSV outbreaks follow a seasonal pattern. In temperate climates, such as most of the U.S., the RSV season generally occurs during the fall, winter, and early spring months.⁵ By contrast, because of its subtropical climate, Florida experiences year-round outbreaks of RSV. From 2000 to 2004, more than 23,000 children under the age of 2 (86% of whom were under the age of 1 year) were hospitalized throughout the state for RSV-related illnesses.⁶ It is estimated that 75,000 to 125,000 children under the age of one are hospitalized due to RSV each year throughout the U.S.⁷

Symptoms and treatment

Symptoms of RSV include coughing, sneezing, runny nose, fever, and decreased appetite. In very young infants, irritability, decreased activity, and breathing difficulties may be the only apparent symptoms of infection. Most people with a healthy immune system and will be able to fight off the virus with relative ease, but a small percentage of cases will become serious. Treatment for infants infected with RSV generally does not warrant hospitalization, and in most cases, recovery will

occur in 1 to 2 weeks. Children with severe disease may require oxygen therapy and occasionally mechanical ventilation. If hospitalization is required, the duration will rarely exceed a few days.⁸

Prevention

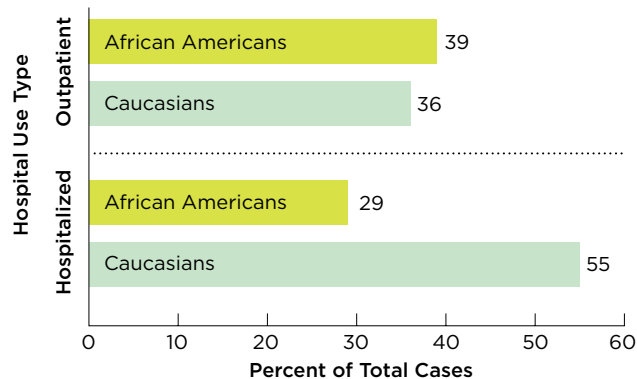
A vaccine for RSV does not yet exist, but infants and children at risk for severe RSV infection can receive monthly doses of palivizumab (an anti-RSV monoclonal antibody) during RSV season. High-risk children include those born prematurely, with lung or heart problems, or compromised immune systems. For children with mild disease, no treatment is necessary other than treatment of symptoms (e.g. acetaminophen). Parents should always consult their healthcare provider in order to determine the best methods of prevention and treatment. Other methods of preventing RSV infection include not sharing utensils or cups, avoiding kissing others, covering coughs and sneezes, and washing hands frequently and correctly.⁹

Racial/ Ethnic Differences

African Americans

Children of all races can contract RSV. However, one study found that African American children tended to have less serious RSV infections than Caucasian children. The results were surprising because African Americans are more likely to suffer from asthma than Caucasians and RSV infection is linked to childhood asthma. The researchers believed they would find that African American children would be at increased risk for serious RSV infection, although they found just the opposite. This may be due to a quicker use of healthcare when the disease first appears, or a genetic advantage.¹⁰

Figure 1: Hospital Use among Children 5 Years of Age and Under Who Tested Positive for RSV by Race/Ethnicity and Type



Source: Hall CB, et al. The Burden of Respiratory Syncytial Virus Infection in Young Children. *New England Journal of Medicine*. February 5, 2009; 360(6):588-98.

A different study reported on hospitalization for children under 5 years of age who tested positive for RSV. Caucasians accounted for 55 percent of children with RSV who were hospitalized and African Americans 29 percent, although both groups accounted for a similar percentage of outpatients (36 and 39%, respectively; Figure

1). These results suggest differences between Caucasians and African Americans children with RSV either in the severity of the disease or

in the treatment offered. They potentially support the above study in that African American children with RSV were more likely to receive outpatient care compared to Caucasian children with RSV, which is often a less intense form of medical care than hospitalization.¹¹

● **Hispanics**

Little data are available concerning RSV infection among Hispanic populations. However, one study in Colorado found that areas with longer RSV seasons tended to be more crowded, urban, have larger families, a greater percent of children under 5 years of age, and a proportionately larger Hispanic population. The researchers concluded that these independent factors could be used to better predict areas and populations that are at increased risk from RSV infection and develop interventions specifically aimed at them.¹²

● **Asian Americans and Native Hawaiians/ Pacific Islanders**

Little data are available concerning RSV infection among Asian American and Native Hawaiian/Pacific Islander populations. One study of Native Hawaiian and other Pacific Islander children in Hawaii found much higher hospitalization rates among these populations for bronchiolitis and RSV, compared to national averages or other racial/ethnic groups living in Hawaii.¹³

● **American Indians/ Alaska Natives**

American Indians and Alaska Natives have been documented to have high rates of RSV hospitalization. According to a recent study, American Indian and Alaska Native infants were 26 percent more likely to be hospitalized for RSV than the general U.S. population. Hospitalization rates for American Indians/Alaska Natives infants living in the Southwest and Alaska were much higher than the overall rate for infants in the U.S. (70.9 and 48.2 per 1,000, respectively). RSV accounted for 14.4 percent of all American Indians/Alaska Native infant hospitalizations.¹⁴

Another study found that hospitalization for severe RSV infection in Alaska Native children was associated with a significant increase in wheezing and lower respiratory infections during the first 4 years of life. The association decreased with age and was no longer significant by 5 years of age. However, hospitalization for RSV infection was associated with increased chronic bronchitis and respiratory symptoms including cough at 5-8 years of age.¹⁵

According to a recent study among Yukon Kuskokwim Delta infants in Southwest Alaska, rates of RSV hospitalization in premature infants have decreased between 1994 and 2004, suggesting that the preventative use of palivizumab among this high-risk population is having a beneficial effect. Despite these improvements, RSV hospitalizations were still greater among premature than term infants

and three times higher than the rate for U.S. infants.¹⁶

Among Navajo and White Mountain Apache American Indians, increased levels of antibodies against RSV in mothers were related to a 30 percent lower risk of RSV hospitalization in infants (OR = 0.69, $p = 0.003$). However, there was no relationship between these antibody levels and the severity of the RSV infection in those infants hospitalized for the disease. While RSV antibody levels in mothers do not affect disease severity, they do offer protection to infants in these populations through 6 months of age against hospitalization in the first place.¹⁷

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Sarcoidosis

Sarcoidosis is a disease that causes inflammation of the body's tissues. It affects multiple systems and is characterized by the formation of granulomas (small lumps) that can be either inside the body or on the body's exterior. Sarcoidosis predominantly affects the lung and the lymphatic system, but virtually any organ can be involved.

In sarcoidosis, immune system cells that cause inflammation overreact and cluster together to form tiny lumps called granulomas. If too many of these granulomas form in one organ, it may not be able to work correctly. For example, if the granulomas damage healthy tissue in the lungs, scarring and stiffness may occur and limit how much air the lungs can hold. This condition is known as pulmonary fibrosis. The problems caused by sarcoidosis differ depending on which organ is affected.^{1,2}

Who Has It

It is found throughout the world, among almost all races and ages and in both sexes. However, it is most common among African Americans and northern European Whites. People of Scandinavian, German, Irish, Asian and Puerto Rican origin also are more prone to sarcoidosis than the general population.³

Prevalence rates for sarcoidosis can only be estimated because it can easily escape diagnosis. Prevalence estimates in the United States range from less than 1 to 40 cases per 100,000 population.⁴ Sarcoidosis can affect people of all ages, but it occurs most commonly in adults from 20 to 40 years of age.⁵ Newer research suggests that there is a second peak in sarcoidosis, especially among women, over the age of 50.⁶

Deaths

Although uncommon, death from sarcoidosis can occur if the disease causes serious damage to a vital organ. The most common cause of mortality associated with sarcoidosis is pulmonary fibrosis resulting from the disease.⁷ In the United States, there were 924 deaths due to sarcoidosis in 2006, an age-adjusted death rate of 0.32 per 100,000. Both of these numbers are higher than the average number of deaths (about 821 per year) and the age-adjusted death rate (0.30 per 100,000) for 1999 through 2006.⁸

Cause

The cause of sarcoidosis is not yet known. Most researchers agree that sarcoidosis involves an altered immune system but they do not know the source of the problem or what triggers such a

response. Some researchers believe that sarcoidosis results from a respiratory infection caused by a virus, bacteria, or an unidentified environmental toxin. There is also some evidence of a genetic basis for sarcoidosis. Current theories are that sarcoidosis develops from an interaction between a preexisting genetic risk for it and a triggering event, such as an infection or environmental exposure. More research is needed to determine the exact cause for this disease.⁹

Symptoms

In more than 90 percent of cases, sarcoidosis affects the lungs. Respiratory symptoms are present in one-third to half of cases, such as shortness of breath, dry cough, and chest pain.¹⁰ Other common symptoms include fatigue, lymph node swelling or soreness, weight loss, and reddened, watery, or sore eyes. In some cases, symptoms can also appear outside of the lungs, such as lumps, ulcers, discolored skin or skin sores on the back, arms, legs, scalp and face.¹¹

Diagnosis

Diagnosing sarcoidosis is a process of elimination. Many other respiratory diseases must be ruled out first. X-rays and other scans are often used to check the lungs and other organs for granulomas. A sample of tissue from the affected area (biopsy) is usually required to confirm the disease. When the lungs are involved, a bronchoscopy is used to acquire the tissue sample. In this procedure, a long, thin tube is inserted through the nose or mouth and down the throat to the lungs.¹²

Treatment

Treatment for sarcoidosis varies for each individual patient. In over half of the cases, sarcoidosis only lasts for 12 to 36 months.¹³ In cases that do not involve certain organs or that have no additional problems from the disease, treatment is not always necessary.¹⁴ However, 10 to 20 percent of sarcoidosis patients are left with permanent effects from the disease.¹⁵ Among those whose lungs are impacted, 20 to 30 percent end up with permanent lung damage.¹⁶

For a small percentage of patients, their sarcoidosis can become chronic, lasting for many years. For those patients, therapy primarily targets ways to keep the lungs and any other affected organs working and to relieve the symptoms. Steroids are commonly prescribed to reduce inflammation. Frequent check-ups are also important so that doctors can monitor the illness and if necessary, adjust treatment.¹⁷

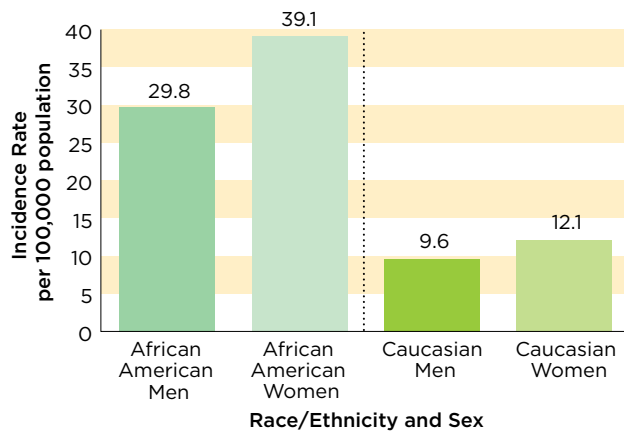
Most people with sarcoidosis can lead normal lives. Patients need to follow instructions from their physician and take all medication diligently. It is also particularly important that sarcoidosis patients do not smoke, and avoid exposure to dust and chemicals that can harm the lungs.¹⁸

Racial/ Ethnic Differences

African Americans

The burden of sarcoidosis is borne disproportionately by African Americans in the U.S. The age-adjusted incidence rate for African Americans is over three times that of Caucasians, at 35.5 versus 10.5 cases per 100,000 population, respectively. Incidence of sarcoidosis is consistently higher for African American females (39.1 per 100,000) compared with African American males (29.8 per 100,000), and African Americans of both genders compared to Caucasians males (9.6 per 100,000) and females (12.1 per 100,000; Figure 1). African American females 30 to 39 years of age have the highest rate of any specific age group at 107 per 100,000.¹⁹

Figure 1: Sarcoidosis Incidence Rate by Race/Ethnicity and Sex



Source: Rybicki BA, Major M, Popovich J Jr., Maliangk MJ, Iannuzzi MC. Racial Difference in Sarcoidosis Incidence: A 5-Year Study in a Health Maintenance Organization. *American Journal of Epidemiology*. 1997; 145(3): 234-41.

Although sarcoidosis has a low overall mortality rate, it is more likely to be chronic and fatal in African Americans.²⁰ African Americans have 17 times the mortality rate due to sarcoidosis compared to Caucasians. In the United States, the mortality rate among African Americans is 1.7 per 100,000 compared with 0.1 per 100,000 among Caucasians. The age-adjusted mortality rate for African American women (1.9 per 100,000) is higher than for African American men (1.3 per 100,000).²¹

Sarcoidosis is more severe in the African American population. Those of European descent are less likely to have symptoms compared to African Americans. Sarcoidosis is also more likely to be spread throughout

the body in African Americans, who show a higher frequency of ophthalmological (relating to the eyes), cutaneous (relating to the skin), hepatic (related to the liver), and lymphatic symptoms than Caucasians.²²

A review of patients with sarcoidosis found that granulomas from African-Americans were twice as dense on average as those from Caucasian patients. When adjusted for disease stage, the granulomas from the bronchial tissue of African-American patient was 49 percent more dense than that from Caucasians, but tissue from their alveoli was only 23 percent more dense, a difference that was not significant. These differences could help explain disparities in disease severity at diagnosis between African-American and Caucasian patients with sarcoidosis.²³

In a review of African-American sarcoidosis patients, 90 percent had at least one other disease. Those additional diseases included high blood pressure (hypertension, 39%), diabetes mellitus (19%), anemia (19%), asthma (15%), gastroesophageal reflux disease (15%), depression (13%), and heart failure (10%). This high prevalence of additional diseases among African-Americans with sarcoidosis may

affect the prospect of survival and recovery, as well as the symptoms of sarcoidosis itself. It is also an important reason to screen for such conditions during diagnosis.²⁴

African American sarcoidosis patients have higher prevalence of family history of sarcoidosis compared with Caucasian patients. African Americans with sarcoidosis are 3 times more likely than Caucasians to have a first-degree or second-degree relative with the disease.²⁵ In African Americans, the sibling recurrence risk ratio is approximately 2.2.²⁶ This means that among African Americans, brothers and sisters of someone with sarcoidosis are 2.2 times more likely to have the disease than someone in the general population. This increased risk may be due to siblings having similar environmental exposures, sharing an inherited (genetic) risk, or a combination of both these factors.²⁷

Since sarcoidosis occurs more often among certain families and specific races, researchers believe there may be a genetic factor associated with its development. A scan of the entire genome among African American families, with follow-up fine mapping studies, identified chromosome 5 as a potential home for a gene that could be related to sarcoidosis risk. Follow-up studies are currently underway in order to investigate regions linked to this gene.²⁸

Two common genetic markersⁱ were found to be associated with increased (OR = 1.78) and decreased (OR = 0.39) risk of sarcoidosis, respectively, but only among African Americans. This genetic area is thought to affect inflammation through a chain of other actions. These findings support the idea that blacks may be at increased risk of sarcoidosis due to genetic factors.²⁹

● Hispanics/Latinos

Very little data are available on sarcoidosis among Hispanics and Latinos in the United States. However, looking at the incidence of this disease in the countries of origin gives an indication of the likely impact on these populations. Sarcoidosis is rarely reported in Central and South America. In Spain, the incidence rate is only 1.2 per 100,000 persons.³⁰

Like Caucasians, Puerto Ricans and Mexicans are more likely to have sarcoidosis that involves the skin. Specifically, they are at risk of developing a skin condition with lesions known as Erythema nodosum. The lesions consist of raised, red, tender bumps or nodules on the front side of the legs, and nearby joints are usually sore and swollen. Erythema nodosum usually goes away within six to eight weeks. Sarcoidosis may remain undiagnosed among certain populations, including Spain, Portugal, and South America, due to a lack of screening and a greater focus on other, similar diseases that mask sarcoidosis detection, such as tuberculosis, leprosy or fungal infections.³¹

i Haplotypes -1377G/-690T/-670G and -1377G/-690C/-670A, respectively.

● Asian Americans and Native Hawaiians/ Pacific Islanders

No data are available on sarcoidosis among Asian Americans/Pacific Islanders. However, looking at the incidence of this disease in the countries of origin gives an indication of the likely impact on these populations. Within these populations, sarcoidosis primarily affects Japanese people. The disease is rare in Southeast Asian, Korean, Chinese, and Indonesian populations.

In Japan, the annual incidence of sarcoidosis ranges from 1 to 2 cases per 100,000 people.³² Sarcoidosis occurs most often in both Japanese men and women between the ages of 25 and 40 years.³³

In Japanese sarcoidosis patients, cardiac and ophthalmological symptoms are common. Cardiac involvement is most common in females over the age 50, compared with Europeans and Americans.³⁴ Death due to heart complications is also much more common in Japan than the U.S., accounting for 77 percent of deaths related to sarcoidosis there.³⁵

Japanese sarcoidosis patients sometimes face a different set of obstacles than Caucasian patients. In a Japanese study of 228 sarcoidosis patients, 8.8 percent were found to have airflow limitation, and none had airway reversibility. Unfortunately, airflow limitation in patients with sarcoidosis is associated with poor prognosis.³⁶

● American Indians/ Alaska Natives

There are no data available on Americans Indians/Alaska Natives.

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Sudden Infant Death Syndrome (SIDS)

Sudden infant death syndrome (SIDS) refers to the unexpected death during sleep of an apparently healthy infant under the age of one. Infant deaths are classified as SIDS if the death remains unexplained after a thorough case investigation including an autopsy, death scene investigation, and review of the medical history.¹

In 2006, 2,323 infants died from SIDS, accounting for 8.1 percent of all infant deaths. SIDS is the third leading cause of infant death in the United States.² The death rate in 2006 was 54.5 per 100,000 live births. Caucasians, African Americans, and American Indians/Alaska Natives all have SIDS death rates greater than the national rate. In contrast, Asian Americans/Pacific Islanders and Hispanics have death rates below the national rate.³

SIDS is more likely to occur in male than female infants (3:2 ratio).⁴ In addition, most cases of SIDS occur during the first to sixth months of life, and especially during the second and third months. Premature or low birth weight infants are also at increased risk, as are those born during the fall and winter as more cases occur during the cooler seasons. Many SIDS investigations find that the infant suffered from an upper respiratory infection in the weeks preceding the incident.⁵

Some risk factors cannot be controlled, but others can be modified. Recommended steps to reduce the risk of SIDS includes not allowing the child to sleep on soft bedding or with soft objects, not allowing children to share a bed with anyone, and not overheating the infant. The most important risk factors that can easily be changed include:⁶

- Not smoking while pregnant,
- Place children on their back to sleep, NOT their stomach (also called prone sleeping), and
- Avoid secondhand smoke exposure.

In 1992, the American Academy of Pediatrics (AAP) released its first policy statement that recommended that all healthy infants be placed on their backs to sleep in order to reduce the risks of SIDS. In 1995 the CDC initiated a national “Back to Sleep” education campaign to help inform all parents and infant care givers about the importance of back sleeping. Since then, the frequency of prone (stomach) sleeping has decreased from 70 percent to 20 percent and the SIDS death rate has decreased by more than 50 percent in the United States.⁷

New research has shown that prone sleeping can lead to infections,

which may trigger SIDS in some infants. Prone sleeping can increase airway temperature as well as stimulate the creation of bacteria and bacteria-related toxins. This research furthers the knowledge of how factors related to SIDS may be connected to one another by showing a relationship between stomach sleeping and infections.⁸

Maternal smoking during pregnancy is estimated to double the risk of SIDS; one study found that the risk of SIDS is 2.6 times higher among smoking pregnant women compared to mothers who do not smoke during pregnancy. Among smokers, 61 percent of SIDS cases were due to maternal smoking; out of all SIDS cases, 21 percent were due to maternal smoking and thus could be prevented.⁹

Some health experts believe that SIDS babies are born with brain abnormalities that make them unable to awaken from sleep when exposed to high carbon dioxide or low oxygen levels, leading to abnormal breathing or heart function. One study found that infants who eventually died from SIDS tended to arouse less by the end of the night compared to a control group. The infants who died from SIDS also tended to partially wake more frequently and for a longer period of time in the first part of the night (between 9:00 pm and 12:00 am) and had fewer full arousals during the latter part of the night (between 3:00 am and 6:00 am).¹⁰

A recent study found that using a fan in an infant's sleeping room might decrease the risk of SIDS by 72 percent. However, the fan was most useful in preventing SIDS in the situations with the most other risk factors present, such as prone sleeping. Fans should not be used as a substitute for following other recommendations for preventing SIDS, but does offer another way of combating the problem.¹¹

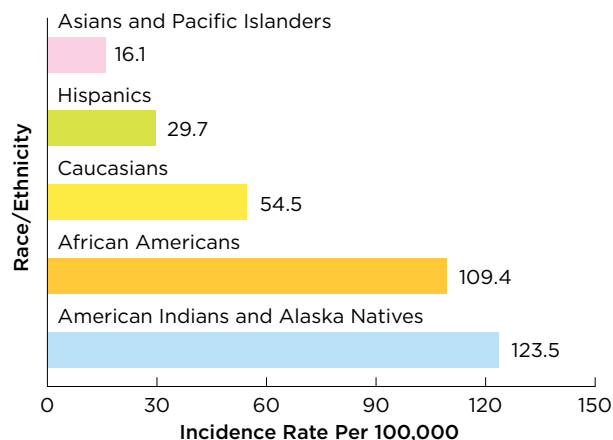
Studies have linked high levels of particulate matter air pollution (PM₁₀ and PM_{2.5}) to increased risk of SIDS. One recent case controlled study in California found that every 10 µg/m³ increase in particles (PM₁₀) increased the risk of SIDS by 3 percent.¹² Another case-controlled study found a similar effect for the smaller particles (PM_{2.5}), where researchers reported that the risk increased by 3 percent for every 10 µg/m³ increase in particles when using a broader definition of SIDS.¹³ One review of multiple studies on the effect of fine particulate matter on SIDS found consistent evidence that higher levels of particulate matter increased the risk of SIDS,¹⁴ while another review found that the evidence suggests that such a relationship exists but called for more research on the topic.¹⁵ A third review found the evidence was not sufficient to draw conclusions.¹⁶

Racial/ Ethnic Differences

African Americans

In 2006, 695 African American Infants died from SIDS, a death rate of 109.4 per 100,000. African Americans had a death rate approximately twice as large as Caucasians (54.5 per 100,000; Figure 1).¹⁷ While overall death rates for SIDS have

Figure 1: SIDS Rates by Race/Ethnicity, 2006



Source: NCHS 2006

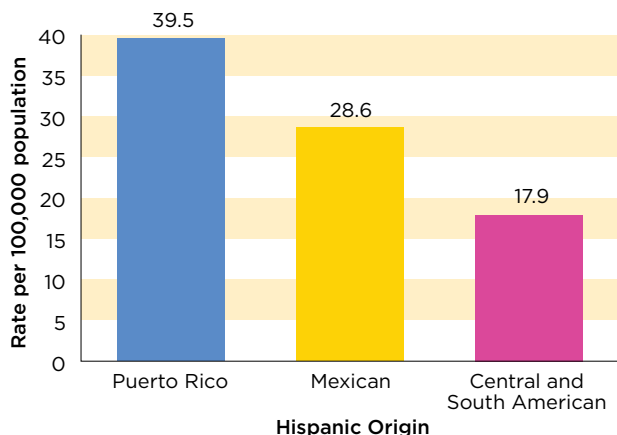
decreased, the reduction has been smaller among African Americans.¹⁸

There is growing evidence that infants who share a room but not a bed with their parents or caretakers have a reduced risk of SIDS. Several countries, including the U.S., recommend that infants sleep in a crib or bassinet next to their parent's bed.¹⁹ A survey of over 700 mothers, 66 percent of whom were African American, measured bed-sharing trends in the U.S. Almost half of mothers shared a room but not a bed with their child. About a third shared a bed with their child, and just under a fifth slept in a separate room. Over three-quarters of those

who shared a bed with an infant were African American, compared to only 12 percent for Hispanics and 9 percent for Caucasians. As sharing a bed with an infant is a risk factor for SIDS, and the rate of SIDS is so high among the African American community, this research suggests an area in which intervention may be useful in addressing this disparity.²⁰

One study of how infants were placed to sleep found that African Americans were less likely than Caucasians or Hispanics to place their child on its back to sleep. This difference was largely due to differences in parents attitudes about the child choking or being comfortable while sleeping on its back, and if a doctor had recommended back sleeping. Future efforts must be made to ensure that health care professionals urge that infants be placed to sleep on their back and that concerns about comfort and choking be addressed.²¹

Figure 2: SIDS Rates by Hispanic Origin, 2005



Source: NVSR 2006

● **Hispanics**

In 2006, SIDS was responsible for 288 Hispanic infant deaths, a rate of 29.7 per 100,000. This rate is 46 percent lower than the rate of 54.5 per 100,000 among Caucasians (Figure 1, above).²²

SIDS rates tend to vary among Hispanic subgroups. Puerto Ricans have much higher rates of SIDS than any other Hispanic subgroup. In 2005, Central and Southern American Hispanics had the lowest death rate (17.9 per 100,000), followed by Mexicans (28.6 per 100,000) and then Puerto Ricans (39.5 per 100,000; Figure 2).²³

● **Asian Americans and Native Hawaiians/Pacific Islanders**

Asian Americans/Pacific Islanders have a lower rate of SIDS than any other racial/ethnic group except for Central and Southern American

Hispanics. In 2006, 32 Asian Americans/Pacific Islanders died from SIDS. The death rate for SIDS among this population was 16.1 per 100,000 compared with 54.5 per 100,000 for Caucasians, 109.4 per 100,000 for African Americans, and 29.7 per 100,000 for Hispanics (Figure 1, above).²⁴

● American Indians/ Alaska Natives

In 2006, SIDS claimed 47 lives among American Indian and Alaska Native populations. While the overall number of death is low compared to other, larger, populations, the death rate was the highest recorded at 123.5 per 100,000 (Figure 1, above).²⁵

Resources

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Tobacco Use

The numbers from the story of the smoking epidemic and its related diseases in the U.S. are staggering. Tobacco use remains the number one cause of preventable disease and death in the United States, accounting for 393,000 deaths a year.¹ This is over twice the number of deaths attributed to alcohol, homicide, illicit drug use, and suicide combined. The majority of these smoking-related deaths are caused by lung cancer, coronary heart disease, and chronic obstructive pulmonary disease (COPD).²

In addition to smoking-related mortality, tobacco use causes or contributes to an additional increase in disease rates. About 8.6 million people in the U.S. have at least one serious illness caused by smoking. This means that for every person who dies from a smoking-related disease, 20 more people suffer from at least one serious illness associated with smoking. Chronic lung disease accounts for 73 percent of all smoking-related health conditions among current smokers.³ Smoking is also a major factor in a variety of other conditions and disorders, including slowed healing of wounds, infertility, and peptic ulcer disease.⁴

Who Smokes

Despite these sobering numbers, about one in five Americans continues to smoke. In 2008, an estimated 46 million, or 20.6 percent of adults (18 years of age and older) were current smokers. Since 1965, the annual prevalence of smoking has decreased by over 50 percent, from 42.4 percent. Males tend to have significantly higher rates of smoking prevalence than females. In 2008, 23.1 percent of males smoked, compared to 18.3 percent of females.⁵

Secondhand Smoke

Smoking harms more than just the smoker. Secondhand smoke is responsible for approximately 50,000 additional deaths a year.⁶ Secondhand smoke is involuntarily inhaled by nonsmokers, lingers in the air hours after cigarettes have been extinguished and can cause or worsen a wide range of adverse health effects, including cancer, respiratory infections, and asthma.⁷ The Surgeon General concluded that there is no risk-free level of exposure to secondhand smoke.⁸

Secondhand smoke is especially harmful to young children. It is responsible for between 150,000 and 300,000 lower respiratory tract infections in infants and children under 18 months of age, resulting in between 7,500 and 15,000 hospitalizations each year, and causes 430 sudden infant death syndrome (SIDS) cases in the United States annually. It may also aggravate symptoms in 400,000 to 1,000,000

children with asthma and cause buildup of fluid in the middle ear, resulting in 790,000 physician office visits per year.⁹

In the United States, 21 million, or 35 percent of, children live in homes where residents or visitors smoke in the home on a regular basis.¹⁰ Approximately 50 to 75 percent of children in the United States have detectable levels of cotinine, indicating they have been exposed to secondhand smoke. Cotinine is a product that results from the breakdown of nicotine within the body.¹¹

Smoking During Pregnancy

Despite the risks associated with it, approximately 10.0 percent of women smoked during their pregnancy in 2006. This rate has been decreasing, although too slowly for the health of mothers and their babies.¹² While it is best to not smoke at all while pregnant, quitting before the 15th week has been found to reduce the risk of premature birth and the infant being undersized.¹³

Smoking during pregnancy accounts for an estimated 20 to 30 percent of low-birth weight babies, up to 14 percent of preterm deliveries, and some 10 percent of all infant deaths. Even apparently healthy, full-term babies of smokers have been found to be born with narrowed airways and reduced lung function.¹⁴ Newborn health-care costs attributable to maternal smoking in the U.S. have been estimated at \$366 million per year, or \$704 per maternal smoker.¹⁵

Pregnant women who smoke are significantly more likely to be younger (teenager), Caucasian, have less than 12 years of education, be unmarried, have an annual income of less than \$15,000, be underweight, have an unintended pregnancy, and be first-time mothers.¹⁶

Smoking Cessation

While the proportion of former smokers has more than doubled since 1965, rates continue to differ between groups. By 2008, 51.1 percent of ever smokers 18 years and older reported having quit smoking. The percentage of former smokers increases with higher levels of education, and was highest among Asian Americans (54.1%) and Caucasians (53.1%) and lowest among African Americans (39.9%) and American Indian/Alaska Natives (39.7%). The percentage of Hispanic former smokers fell between those of other groups at 47.9 percent.¹⁷

Disparities also exist in who receives advice to quit from healthcare providers. Compared to Caucasian smokers, African American smokers were 70 percent less likely to be asked by their doctor about tobacco use, 72 percent as likely to be advised to quit, and 60 percent as likely to have used a cessation medication (such as the patch, nicotine gum, or other drug) during the past year in a quit attempt. Hispanic smokers were 69 percent less likely to be asked about tobacco use, 64 percent as likely to be advised to quit, and 59 percent as likely to have used a tobacco-cessation aid during the past year in a quit attempt compared to Caucasian smokers. These differences were unexplained even when

factors known to impact these rates were taken into account.¹⁸

Research suggests that the success rate of smoking cessation programs may vary among different racial/ethnic groups. For example, a study on the effectiveness of combined bupropion (a drug that helps with smoking cessation), nicotine patch, and individual counseling on quitting smoking over 8 weeks had an overall success rate of 53 percent. However, 60 percent of Caucasians were successful, while only 38 percent of African Americans and 41 percent of Hispanics successfully quit. These differences in treatment effectiveness may be lessened by using programs that are culturally competent and relevant to African Americans or Hispanics.¹⁹

Advertising

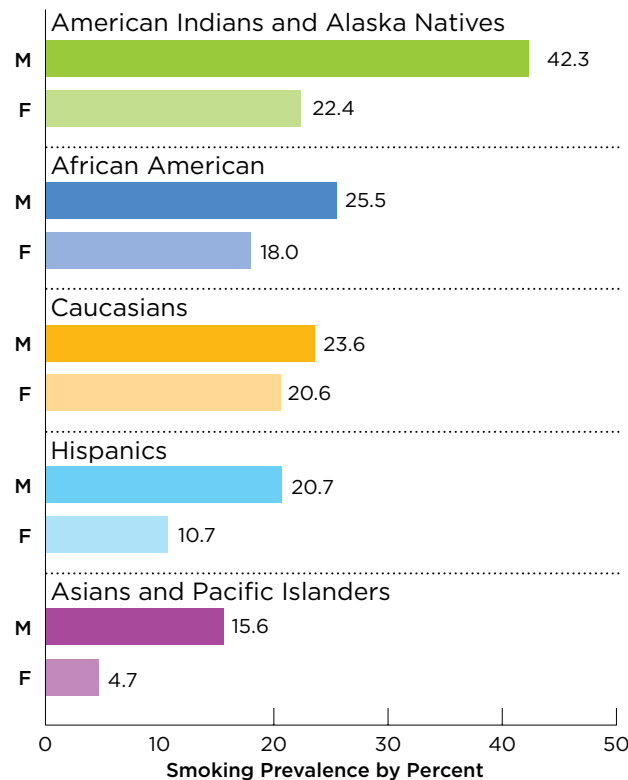
As Americans have decreased their use of tobacco products over the past few decades, tobacco companies have redoubled their efforts to gain new patrons through advertising. In 2006 alone, close to 12.5 billion dollars were spent on cigarette advertising and promotion.²⁰



African Americans

Smoking among African Americans used to be higher than Caucasians, but recently the gap between the two

Figure 1: Smoking Prevalence by Race/Ethnicity and Sex, 2008



Source: NHIS 2008

rates has decreased. In 2008, 22.6 percent of African Americans smoked, compared to 21.8 percent of Caucasians. Smoking rates are not equal between the genders; 25.5 percent of African American men smoke, compared to 18.0 percent of African American women. Among Caucasians, 23.6 percent of men and 20.6 percent of women smoke (Figure 1).²¹

On average, Caucasian men tend to consume more cigarettes (about 30–40% more) than African American men.²² Despite their lower exposure, however, African American men are 37 percent more likely than Caucasian men to develop lung cancer. Black women tend to smoke less than Caucasian women but the two groups have similar lung cancer rates.²³ These differences may be due to disparities in access to healthcare, genetics, or socioeconomic factors.

A study in California found that while African Americans made up only 6 percent of the state’s adult population, they

accounted for over 8 percent of smoking-related health care costs and 13 percent of the costs associated with dying early because of smoking. This means that this population is bearing a disproportionately large burden of the cost of smoking. These results are especially alarming given that California has the most effective state tobacco control program in the U.S.²⁴

African American high school students were significantly less likely than Caucasian and Hispanic students to report current smoking in 2007. They also have the highest percentage of smokers trying to quit in the past 12 months (58.4%). The difference between genders in cigarette smoking among African Americans is also seen in high school, where 14.9 percent of African American male students smoke, compared to 8.4 percent of African American female students.²⁵

In 2006, 5.5 percent of African American middle school students smoked cigarettes. This rate was slightly lower than that for Caucasian (6.5%) and Hispanic (6.8%) middle school students.²⁶

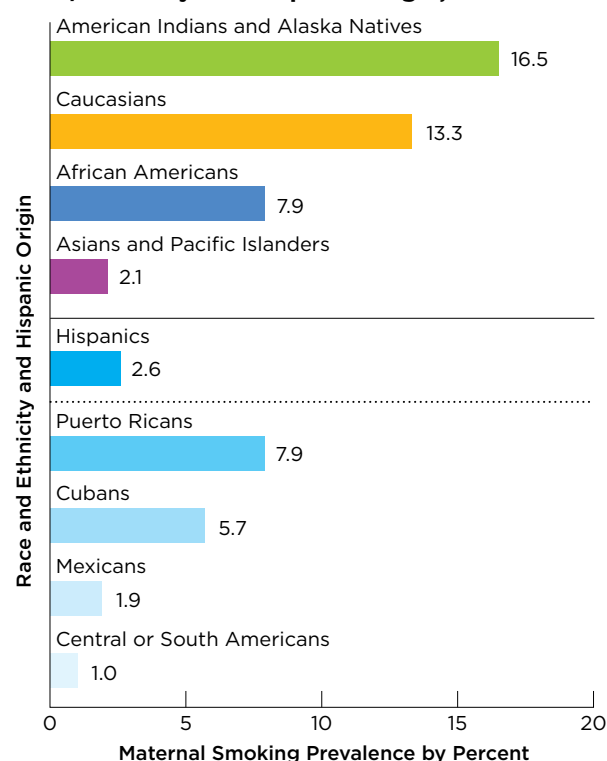
Smoking during pregnancy is lower among African American women (7.9%) compared to Caucasian women (13.3%; Figure 2).²⁷

Quitting smoking is one of the easiest and most cost-effective ways to improve health, and the single most important step a smoker can take to increase the quality and length of life.²⁸ As a group, African Americans may face a different set of obstacles that stand in the way of quitting smoking.

One of these obstacles is the high percentage of African Americans who smoke menthol cigarettes. Almost 84 percent of African Americans smokers aged 12 years or older reported smoking a mentholated brand of cigarette compared to 24 and 32 percent of their Caucasian and Hispanic counterparts, respectively.²⁹

Researchers have found that menthol cigarettes may be harder to quit than non-menthol cigarettes³⁰ particularly among African American and Hispanic smokers. In one study of smokers, 81 percent of African Americans and 66 percent of Hispanics smoked menthols, compared with 32 percent of Caucasians. At a 4 week follow up among menthol smokers, African Americans and Hispanics had lower quit rates (30% and 23% respectively) compared with Caucasians (43%). African American, Hispanic, and Caucasian non-menthol smokers had similar quit rates (54%, 50%, and 50% respectively). A similar pattern was seen at

Figure 2: Maternal Smoking During Pregnancy by Race/Ethnicity and Hispanic Origin, 2006



Source: NCHS 2008

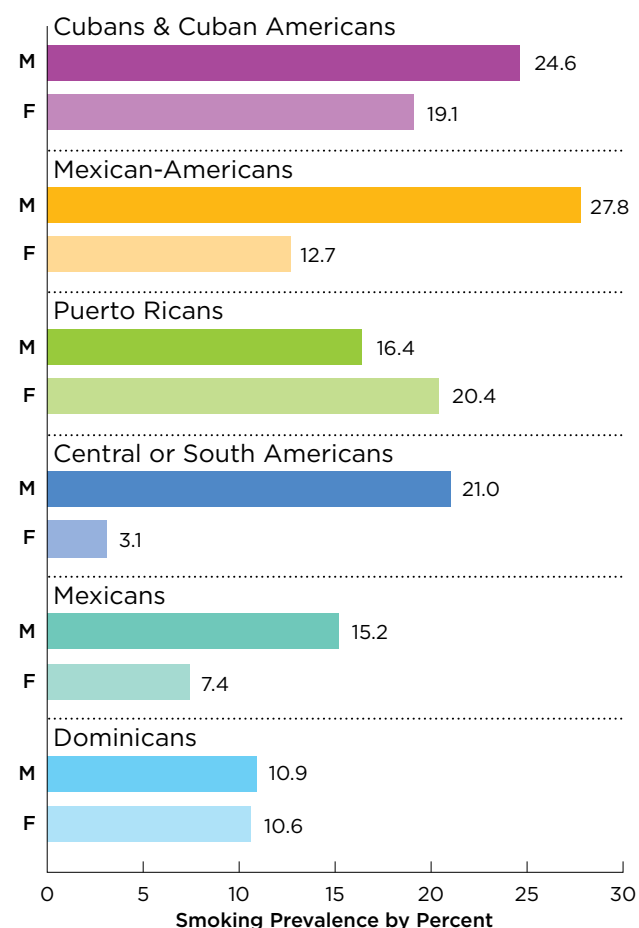
a 6 month follow-up. This suggests that menthol cigarettes may be harder to quit for everyone, and especially so for African Americans and Hispanics, who are also more likely to smoke menthol cigarettes in the first place.³¹

This pattern of lower quit rates among Hispanic and African American menthol smokers was also seen in another study that found that menthol smokers were less likely to attempt to quit smoking compared to those who were non-menthol smokers, but only among African American and Hispanics. In contrast, Caucasians who smoked menthols were more likely to have quit compared to those who smoked non-menthols.³²

● Hispanics/Latinos

Smoking rates tend to be lower among Hispanics, although rates vary among subgroups. In 2008, 15.8 percent of Hispanics smoked cigarettes;

Figure 3: Smoking Prevalence by Hispanic Origin and Sex, 2008



Source: NHIS 2008

20.7 percent among men, and 10.7 percent among women (Figure 1, above). Among subgroups, Cubans had the highest overall rate at 24.6 percent among men and 19.1 among women. Mexican Americans were next (27.8%, 12.7%), followed by Puerto Ricans (16.4%, 20.4%), Central or South Americans (21.0%, 3.1%), Mexicans (15.2%, 7.4%), and Dominicans (10.9%, 10.6%). Puerto Ricans are the only group with a smoking rate that is higher among women than men (Figure 3). These estimates are all for populations living in the U.S., rather than for populations in the country or region of origin.³³

The percentage of Hispanic high school students that smoke increased 34 percent from 1991 to 1997. However, between 1997 and 2007, the smoking rate has declined 51 percent to 16.7 percent.³⁴

In 2006, 6.8 percent of Hispanic middle school students smoked cigarettes, a rate relatively equal to other racial/ethnic groups.³⁵

In 2005, Hispanics had a lower prevalence rate of smoking during pregnancy than any other racial/ethnic group in the United States except for Asian Americans. Only 2.6 percent of Hispanics smoked while pregnant, compared with 7.9 percent of African Americans and 13.3 percent of Caucasians. Among Hispanic subgroups, smoking during pregnancy was highest among Puerto Ricans (7.9%), followed by Cubans

(5.7%), Mexicans (1.9%), and Central or South Americans (1.0%; Figure 2, above).³⁶

In 2006, Hispanics reported being protected from secondhand smoke less often than any other racial or ethnic group besides American Indians and Alaska Natives. Only 68.4 percent of Hispanics worked in a place where smoking was not allowed, a significantly lower percent than the national rate of 75.3.³⁷

● **Asian Americans and Native Hawaiians/ Pacific Islanders**

Smoking rates tend to be far lower among Asian American and Native Hawaiian/Pacific Islander populations. In 2008, smoking among these groups was 9.9 percent overall, and 15.6 and 4.7 percent among men and women, respectively (Figure 1, above).

Data on Native Hawaiians and Pacific Islanders is limited. These groups are often included in an “Other” category on surveys due to low sample sizes, and would give inaccurate estimates if used separately.

There are significant variations in smoking rates among Asian groups. Southeast Asians (e.g., people from Vietnam, Cambodia, Laos) and Chinese men tend to have much higher rates of smoking than population groups from other Asian locations (e.g., Philippines, Korea, Japan).³⁸

Studies have shown that Southeast Asians who had a higher English language-proficiency and who had lived in the U.S. longer were less likely to be smokers. In contrast, the average number of cigarettes smoked per day by Chinese men increases with the time they live in the U.S.³⁹

In 2006, 7.3 percent of Asian American high school and 2.6 percent of Asian American middle school students smoked cigarettes. This was a significant decrease for Asian American high school students from 2004, when 11.3 percent smoked cigarettes.⁴⁰

Additionally, Asian Americans have the lowest prevalence rate of smoking during pregnancy compared with all other racial/ethnic groups in the U.S. In 2006, 2.1 percent of Asian American mothers were found to have smoked during pregnancy, compared with 13.3 percent of Caucasians (Figure 2, above).⁴¹

● **American Indians/ Alaska Natives**

American Indians and Alaska Natives have high rates of smoking across different studies and measures. In 2008, 32.4 percent of this population smoked, compared to 22.0 percent of Caucasians. American Indian and Alaska Native men have the highest measured smoking rate in the U.S. at 42.3 percent, while the rate of 22.4 percent among women is also higher compared to women in many other groups (Figure 1, above).⁴²

Tobacco products sold on American Indian and Native Alaskan lands are not subject to state and local taxes, although they may choose to impose their own taxes. As a result, cigarettes and other tobacco products are available to most American Indians and Alaska Natives at much lower prices on reservations compared to elsewhere. Lower prices have been tied to increased smoking rates. In addition, many tribes consider tobacco a sacred gift and use it during religious ceremonies and as a traditional medicine.⁴³

Smoking rates may vary between tribes from different parts of the country. A study that compared Northern Plains Indians to Southwest Indians found differences between the two in how many started smoking before age 18. While overall, more Northern Plains Indian smokers started before age 18, Southwest Indian men had more smokers starting earlier compared to women. The number of smokers starting early was greater for younger generations among all Northern Plains Indians, but only for Southwest Indian women. The authors found these results “alarming” and hoped for more research on smoking among American Indians that could inform culturally relevant and effective smoking prevention and quitting programs.⁴⁴

In 2004, among youths, American Indians and Alaska Natives had the greatest cigarette smoking prevalence (23.1%), followed by Caucasians (14.9%), Hispanics (9.3%), African Americans (6.5%), and Asian Americans (4.3%).⁴⁵ A study that looked at more recent data supported these findings by reporting that among 8th grade girls, smoking was highest among American Indians and Alaska Natives.⁴⁶

Smoking during pregnancy is also highest among American Indian and Alaska Natives populations, at 16.5 percent in 2006.⁴⁷

In 2006, American Indians and Alaska Natives reported being protected from secondhand smoke at work less often than any other racial or ethnic group. Only 68.4 percent of this population were employed somewhere that did not allow smoking at work. This was significantly less than overall, (75.3%), Caucasians (76.3%), and Asian Americans and Pacific Islanders (77.0%).⁴⁸

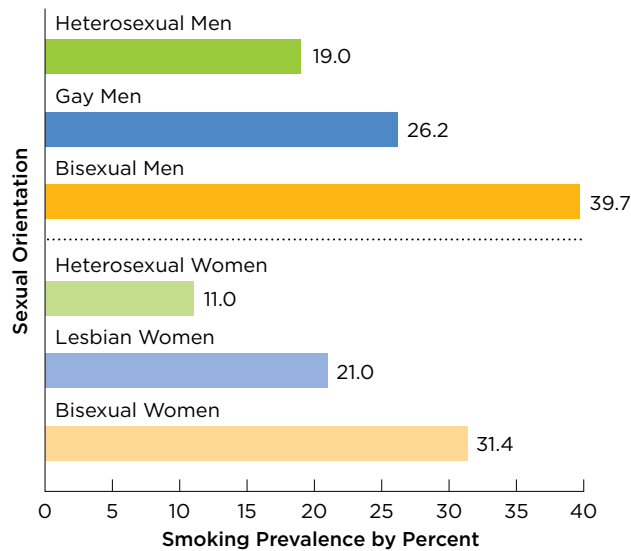
● **Lesbian, Gay, Bisexual and Transgender (LGBT) Populations**

Although there is comparatively little surveillance data documenting tobacco use among LGBT populations, those studies that have been published indicate that gay men and lesbians tend to smoke more than their heterosexual counterparts. Data on smoking among transgendered populations is rare and usually comes from small surveys or studies.

Results from the 2007 California Health Interview Survey found significantly higher smoking rates among gays and lesbians (24.0%) and bisexuals (34.6%) compared to heterosexuals. However, differences were evident between the genders. Gay men had higher smoking rates than straight men, and bisexual men higher still, although the

only significant difference was between bisexual (39.7%) and straight (19.0%) men. Among women, both lesbians (21%) and bisexuals (31.4%) had smoking rates that were significantly higher compared to straight women (11.0%).⁴⁹

Figure 4: Smoking Prevalence by Sexual Orientation and Sex, California, 2007



Source: CHIS 2007

smoking among these groups. When compared to their heterosexual counterparts, men in these populations had between 2.0 and 2.5 times the odds of smoking, somewhat higher than the odds of 1.5 to 2.0 for women in these populations. No conclusion was possible for bisexual men due to data limitations.⁵⁰ This review included studies that found rates as high as 44 percent among women who sleep with women⁵¹ and 42 percent among Caucasian gay or bisexual men.⁵²

Research in this area is complicated due to the use of limited samples that may not be comparable to the nation at large, different definitions of smoking and sexual orientation, and because large, national surveys often do not include questions on sexual orientation. If two studies define smoking as having a cigarette on most days of the previous month and having smoked at all in the last month, respectively, they may show far different results, even if they are looking at the exact same population. This could be because the group under consideration tends to smoke lightly and infrequently and this difference is obscured by the use of separate definitions. Similarly, many studies use different descriptions of sexuality, such as men who self-identify as gay versus men who have sex with men even though they may identify themselves as straight. As sexuality is a difficult concept to define and research has not identified which subgroups or categories may be at the greatest risk for smoking, comparisons between studies in this area remains difficult.

Resources

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women (11.0%).⁴⁹ These results reflect the difference seen in smoking rates between men and women in the general population, but at higher overall rates (Figure 4).

A review of 42 separate studies that measured smoking prevalence among gay, lesbian, bisexual, and transgender youth, including those with same sex attraction or relationships, found a generally increased risk of cigarette

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Tuberculosis

Tuberculosis is an airborne bacterial infection caused by the organism *Mycobacterium tuberculosis* that primarily affects the lungs, although other organs and tissues may be involved. Almost 2.2 billion people, or one third of the world's population, are infected with tuberculosis. Most infected people have latent TB, meaning they have the tuberculosis germs in their bodies, but their immune systems protect them from becoming sick. However, over 9.2 million people have active TB disease, worldwide.¹

Tuberculosis in the United States was thought to be largely under control with the introduction of antibiotics in the 1950s. However, there was a serious resurgence of TB in the mid 1980s to early 1990s due to numerous reasons: the HIV/AIDS epidemic; immigration from countries with high TB prevalence; TB drug resistance; and funding cuts for TB control programs. Fortunately, with increased attention between 1993 and 2008, the number of reported cases of TB has decreased by 50 percent and the number of cases and case rates are now at record lows.²

In 2008, approximately 12,904 active cases of tuberculosis were diagnosed in the United States, an incidence rate of 4.2 per 100,000 population.³ Culturally diverse and foreign-born populations bore the greatest burden of tuberculosis in the U.S., accounting for over 80 percent of all TB cases. Foreign-born persons represented almost 60 percent of TB cases, with Hispanics and Asians accounting for 47 percent. The case rate among foreign-born persons was more than 10 times higher than among U.S.-born persons (20.3 per 100,000 and 2.0 per 100,000, respectively; Table 1).⁴

Overseas tuberculosis screening programs have been initiated in order to actively combat the increasing number of foreign-born persons bringing TB into the United States. Screening programs have found that new immigrants, with TB detected in the lungs, are often asymptomatic.⁵ However, they are also at a higher risk for developing resistant TB strains. Studies have found that post-migration follow-ups of these cases are essential in order to control TB among immigrants.⁶ Other initiatives include strengthening the current notification system that alerts local health departments about the arrival of immigrants or refugees who have suspected TB to enhance the evaluation and treatment of such persons; and improving coordination of TB control activities between the United States and Mexico to ensure completion of treatment among TB patients who cross the border.⁷

Treatments for TB vary depending upon the type of TB a person has contracted. A person who has latent TB, but does not have active TB

disease, may be given preventive therapy.⁸ Preventive therapy aims to kill germs that are not doing any damage right now, but could do so in the future. Someone with latent tuberculosis does not appear sick and cannot infect others. However, people with latent TB should receive treatment because if their immune system weakens, they will become susceptible to developing active TB.

In order to contract tuberculosis, one must usually have repeated contact with an infected person over time. Most cases of active TB result from the activation of old infections in people with impaired immune systems. Persons with active TB will display symptoms and can spread the disease to others. People with weak immune systems, such as the elderly, young children, and HIV/AIDS patients, are at high risk of developing TB. A person who suspects that he or she may have TB should get tested by and notify their doctor or health department.

If a person has contracted active TB disease, they are treated with a combination of drugs for six months to a year.⁹ People with active TB disease are symptomatic and will be able to infect others. While the patient will probably begin to feel better after only a few weeks of taking the drugs, it is extremely important that medication continue to be taken diligently for the entire length of treatment. People who do not take their medicines correctly or stop midstream may be at risk for developing multi-drug resistant (MDR) and extensively drug resistant (XDR) TB, which are very dangerous strains of TB that require intensive case management for up to two years and more toxic treatment courses. Treatment of drug-resistant TB can be more than 100 times as costly as treatment of drug-susceptible TB.¹⁰

Racial/ Ethnic Differences

African Americans

In 2008, 3,273 African Americans were diagnosed with TB, accounting for 25 percent of total TB cases in the United States. African Americans represented 42 percent of TB cases in US-born persons and 14 percent of TB cases in foreign-born persons. In 2008, Asian Americans surpassed African Americans as the second largest racial or ethnic group in the number of TB cases in the US.¹¹

In 2008, African Americans had a TB incidence rate approximately 8 times greater than Caucasians (8.8 per 100,000 compared to 1.1 per 100,000, respectively). African Americans had the third highest incidence rate of TB behind Asian Americans (25.6 per 100,000) and Native Hawaiians/Pacific Islanders (15.9 per 100,000).¹²

Between 1993 and 2008, the number of cases and the TB case rate in African Americans declined 63 and 69 percent, respectively.¹³ Additionally, the number of cases of XDR- and MDR-TB continues to decline among African Americans each year. Between 1993 and 2007, 964 cases of XDR- or MDR-TB were diagnosed in African Americans.¹⁴

Table 1: Tuberculosis Incidence and Mortality¹

	Total		Hispanic		Non-Hispanic White		Non-Hispanic Black		Non-Hispanic Asian American		Non-Hispanic Native Hawaiian/Pacific Islander		Non-Hispanic American Indian/Alaska Native	
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate
Incidence (2008)														
U.S.-born	5,283	2.0	920	***	1,748	***	2,234	***	153	***	50	***	135	***
Foreign-born	7,563	20.3	2,861	***	389	***	1,030	***	3,217	***	19	***	4	***
Total ^{II}	12,904	4.2	3,798	8.1	2,142	1.1	3,273	8.8	3,391	25.6	69	15.9	139	6.0
									Non-Hispanic Other Races					
Mortality (2006)²	652	0.2	104	0.2	284	0.1	158	0.4			103	0.2		

Notes:

I. Incidence and Mortality rates are per 100,000 population.

II. Totals include unknown or missing.

*** Data not available.

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● Hispanics

In 2008, Hispanics (29%) exceeded all other racial or ethnic groups with the largest percentage of TB cases in the U.S. for the fifth consecutive year. Close to 3,800 Hispanics were diagnosed with TB. Hispanics represented only 17 percent of TB cases in U.S.-born persons but 38 percent of TB cases in foreign-born persons. The highest percentage of TB cases among foreign-born persons in 2008 came from Mexico (23%).¹⁵

In 2008, Hispanics had a TB incidence rate of 8.1 per 100,000; over 7 times greater than rate for Caucasians (1.1 per 100,000). Incidence rates among Hispanics were lower than those among African Americans, Asian Americans and Native Hawaiians/Pacific Islanders.¹⁶

Between 1993 and 2007, 983 cases of XDR- or MDR-TB were diagnosed in Hispanics in the U.S. Hispanics exceeded all other racial or ethnic groups with the largest percentage of XDR-TB cases during this time.¹⁷

According to a 2000 survey of the U.S.-born population, Mexican Americans were almost 5 times as likely as Caucasians to be infected with latent TB. Among the entire U.S. population, Mexicans/Mexican Americans (9.4%) and other races and ethnicities (10.8%) had significantly higher estimated latent TB infection rates compared to Caucasians (1.9%).¹⁸

● Asian Americans and Native Hawaiians/Pacific Islanders

In 2008, Asian Americans (26%) surpassed African Americans (25%) as the second largest racial or ethnic group in the number of TB cases in the U.S.¹⁹ Asian Americans represented less than 3 percent of TB cases in U.S.-born persons, but 43 percent of TB cases in foreign-born persons. Four out of the top five countries of origin of birth for foreign-born TB cases were in Asia: Philippines, Vietnam, India and China. During that same year, 69 TB cases were diagnosed in Native Hawaiians and Pacific Islanders.

Asian Americans had the highest TB incidence rate (25.6 per 100,000) followed by Native Hawaiians/Pacific Islanders (15.9 per 100,000). Asian

Americans had 23.3 times the incidence rate of Caucasians, while Native Hawaiians/Pacific Islanders had a rate over 14 times greater than Caucasians.²⁰

Between 1993 and 2007, 873 cases of XDR- or MDR-TB were diagnosed among Asians in the U.S.²¹ Despite the fact that the number of cases of XDR-TB decreased in the U.S. between 1993 and 2006, one study found that Asian Americans have come to account for a larger percent of those cases. Asian Americans accounted for 9 percent of XDR-TB cases in 1993, but 41 percent of all XDR-TB cases in 2006.²²

● American Indians/Alaska Natives

In 2008, 139 cases of TB were diagnosed in American Indians and Alaska Natives. This population only accounts for about 1.5 percent of the U.S., but in 2008 they had a TB case rate that was approximately 5.5 times greater than Caucasians (6.0 per 100,000 vs. 1.1 per 100,000).²³

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We will breathe easier when the air over every
American city is clean and pure.

We will breathe easier when the air in our public spaces,
workplaces and children's homes is free of secondhand smoke.

We will breathe easier when Americans are free from the addictive grip
of cigarettes and the debilitating effects of lung disease.

We will breathe easier when our nation's children no longer battle
airborne poisons or the fear of an asthma attack.

Until then, we are fighting for air.

