

# Economic Burden of Air Pollution and Healthcare Costs for Respiratory Diseases in the United States of America

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## Abstract

Air pollution in the United States has emerged as a major driver of increasing health care costs, respiratory disease, and economic burden. This study examines the direct and indirect economic costs of air pollution-related diseases, including respiratory diseases (e.g., asthma or chronic obstructive pulmonary disease (COPD)). The incidence of these diseases has greatly increased over the years, mainly due to increased exposure to environmental pollutants in urban areas, resulting in a steep increase in related healthcare costs. Asthma and COPD, both worsened by air pollution, have put a growing strain on healthcare systems through higher rates of hospitalization, long-term treatments and medication costs.

This analysis identifies significant regional differences in the burden and costs of air pollution-related respiratory diseases, highlighting a need for state-specific intervention and targeted policies. States with greater pollution levels also suffer greater health burdens, including more instances of respiratory ailments and higher healthcare spending. Air Quality, Health and Mortality Trends Air quality trends were analysed on a state basis where it was found that states with worse air quality also had higher mortality rates from respiratory diseases highlighting the long-term impacts of air pollution on public health.

Increasing financial implications from air pollution-related respiratory illness are not limited to healthcare expenses, as they also have a substantial impact on workforce productivity. Illness-related absenteeism, disability, and premature mortality result in significant economic losses, which, in turn, places additional burden on the economy. Our findings are intended to be useful in policymaking by helping parties responsible for decision-making achieve the desired goals of improving the health of citizens by creating a healthier and safer environment that prevents respiratory diseases; through this research, they can also make appropriate decisions based on the economic impact of air pollution on respiratory health, and have a clearer understanding of air pollution.

**Keywords:** Air Pollution, Economic Burden, Chronic Respiratory Conditions, Pollution Control.

## I. INTRODUCTION

In the United States, air pollution is a major public health and economic problem, with an increasing burden of respiratory disease and an increasing cost of care. The negative effects of air pollution, for instance fine particulate matter (PM<sub>2.5</sub>) and nitrogen oxides (NO<sub>x</sub>), have been related with long-term respiratory illnesses such as asthma and chronic obstructive pulmonary disease (COPD). These circumstances not only cause poor health

for the public but also have a substantial cost to the government and the broader economy.

In the United States, the growing burden of respiratory diseases indicates the magnifying environmental hazards in the process of urbanization and economic expansion (Zia et al., 2025). Air pollution exposure is highly associated with two of the most common respiratory diseases, asthma and COPD, with increased hospitalization rates and treatment costs associated with exposure. The economic impact is not limited to healthcare cost alone; lost productivity and

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lowered workforce participation also contribute significantly to the economic burden.

State-Level Exposures Compared: Air Pollution and Respiratory Health. Industrial emissions, traffic congestion, and climate conditions that exacerbate pollution levels can place a disproportionately higher burden on certain states. These differences serve as an urgent call for policies and regulations that specifically target the effects of air pollution on public health.

Mortality trends from respiratory diseases further underscore the impact of air pollution on regional health outcomes. Higher mortality rates from respiratory disease are generally found in states with poor air quality, which increases the need for policy work around environmental standards and health care coverage. Air pollution causing respiratory illnesses has cost implications that go beyond healthcare expenditures, influencing labour productivity and economic growth. Loss of workforce from absenteeism due to illness and early death makes for further economic strain that can only be resolved through public policy.

The objective of this study is to assess the total economic burden of air pollution-related disease in the United States. The study highlights the importance of policies that will address air pollution and its associated burden on public health and the economy in a sustainable manner while also looking at the costs related to healthcare, trends across regions and the impact on the workforce (Salih et al., 2019).

## **II. THE ECONOMIC BURDEN OF AIR POLLUTION-RELATED ILLNESSES IN THE UNITED STATES**

Air pollution has a reasonably high economic burden in the world, mainly in the United States of America, reduce output, and gross domestic product (GDP) accompanied by significant healthcare expenditures. Consistent with the deterioration, air pollution, in specific from fine particulate matter (PM<sub>2.5</sub>) and ozone, which can cause respiratory and cardiovascular illnesses, experiencing high medical expenditures and high cost of treatment. Moreover, air pollution may decrease productivity at work via absenteeism and disability due to illness, costing the U.S. economy billions of dollars annually. The economic toll is compounded by premature mortality, which limits the available labour force and future income-earning capacity (EPA 2019). The direct and indirect economic losses from air pollution-related illnesses are therefore considerable.

Economic costs of air pollution-related illness in the US (Table 1) The total annual economic cost to the economy of illnesses associated with air pollution is more than \$150 billion in annual costs, including both health costs and lost productivity. That number highlights the wider economic cost of air pollution, which reaches well beyond personal health to the national economy. The cost

of healthcare associated with asthma reaches about \$56 billion every year, including hospitalizations, medications, and the costs of lost productivity from absences related to asthma. Asthma is among the most prevalent respiratory diseases in the U.S. and exposure to air pollution, specifically particulate matter (PM<sub>2.5</sub>), exacerbates its symptoms. The expenses of asthma-related illnesses are a tragic measure of the need for air quality regulations that will lower pollution so that asthma does not get worse (Ziska et al., 2021).

COPD-related healthcare expenses cost around \$49 billion a year. COPD, a group of progressive respiratory diseases that includes emphysema and chronic bronchitis, is a significant health problem in the U.S. and is associated with long-term exposure to air pollution. COPD is expensive to treat; therefore, tackling air pollution might yield more health benefits and mutually be an appropriate approach to combat further deterioration of health in the vulnerable population, such as the elderly and those with exposure to areas where the air is polluted.

Lung cancer, another deadly condition associated with air pollution, generates some \$13 billion worth of health care spending each year, factoring in treatment and care costs. This number serves as a stark reminder of the far-reaching effects of air pollution on health, underscoring the urgency for cleaner air initiatives to reduce the occurrence of such chronic conditions.

On days of high levels of air pollution, hospital admissions rise by 30%; This statistic is testament to the direct correlation between unhealthy air and the critical demand for healthcare services, particularly in health facilities. Similarly, asthma emergency visits increase by as much as 20 percent on days with elevated particulate matter levels, indicating how demanding poor air quality can be on emergency services and hospitals.

Asthma attack treatment comes at an average cost of about \$1,000 per attack, which includes emergency room treatment as well as hospital stays and medications (Salih et al 2019). Not only does this figure illustrate the significant economic burden to individuals, but it also highlights the high cost air pollution and related illnesses (like asthma) the U.S. healthcare system and society in terms of lost dollars (Wei et al., 2017).

COPD, for instance, runs up an average \$8,000 per hospitalization cost alone, highlighting the financial prevention costs of chronic diseases, particularly when worsened by poor air quality. The burden on health care institutions of hospitalizations due to COPD is substantial and should be an inspiration to act to reduce air pollution.

Air pollution disproportionately harms the elderly and low-income individuals, so the burden is largely on Medicare and Medicaid, which cover a large share of the costs from asthma, COPD, and other respiratory diseases. There are an estimated 23 million people with asthma in

the U.S. and over 16 million people with COPD, many of whom suffer from the effects of air pollution.

This is a significantly high cost of air pollution that affects the productivity of the workforce in the United States of America.

Finally, each year nearly 53 billion US dollar is cost for breathing diseases in reduced production alone due to absenteeism at work.

Table 1 Economic and Healthcare Burden of Air Pollution-Related Respiratory Diseases in the U.S.

Category	Data/Details
Annual Economic Cost of Air Pollution-Related Illnesses	Over \$150 billion annually (including both direct healthcare costs and lost productivity).
Healthcare Costs for Asthma	Approximately \$56 billion annually (including hospitalizations, medications, and lost productivity).
Healthcare Costs for Chronic Obstructive Pulmonary Disease (COPD)	Estimated at \$49 billion annually.
Healthcare Costs for Lung Cancer	Approximately \$13 billion annually, including both treatment and care costs.
Hospital Admissions Due to Air Pollution	Estimated 30% increase in hospital admissions during days with high pollution levels.
Emergency Visits Due to Asthma	Increases by up to 20% on days with high particulate matter (PM2.5) levels.
Average Cost per Asthma Attack	Around \$1,000 per visit (including ER treatment, hospital stays, and medications).
Average Cost per COPD Hospitalization	Roughly \$8,000 per hospitalization.
Impact on Medicare and Medicaid	Medicare and Medicaid cover a significant portion of these costs due to the elderly and low-income individuals being most vulnerable.
Number of People Affected by Air Pollution	Approximately 23 million people in the U.S. have asthma, and over 16 million people have COPD, many of whom are affected by air pollution.
Economic Burden of Lost Productivity Due to Respiratory Diseases	Estimated at \$53 billion annually due to absenteeism and decreased work productivity.

Source: State of Global Air 2025 Report U.S. Environmental Protection Agency

### III. RISING PREVALENCE OF RESPIRATORY DISEASES IN THE UNITED STATES

The growing prevalence of respiratory diseases in the U.S. represents a significant economic challenge. Conditions such as asthma and chronic obstructive pulmonary disease (COPD) are becoming more common and more severe (Salih et al., 2020). These illnesses led to increase healthcare costs, including medications, hospital stays, and given treatments. Additionally, the rise in respiratory diseases leads to decreased employee opportunity, reduced productivity and resulting in more economic losses due to extended health care.

Consequently, the rise in respiratory conditions affects not only public health but also imposes a substantial economic burden on the U.S. economy.

The prominence of asthma and chronic obstructive pulmonary disease (COPD) in the previous graph obviously highlights a significant focus on respiratory health issues in the U.S., with prevalence rising across all ten states from 2010 to 2024. This pattern indicates a complex relation between environmental influences and healthcare access, which contributing to the increased occurrence of respiratory diseases.

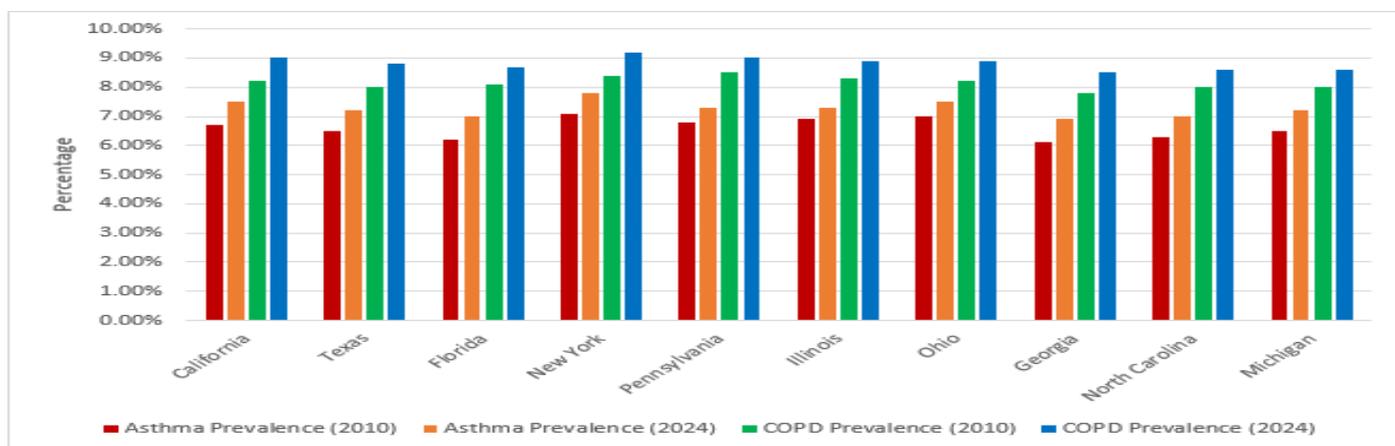


Fig 1 State-by-State Data on Asthma and COPD Prevalence (2010-2024). Source: State of Global Air 2025 Report U.S. Environmental Protection Agency

Asthma prevalence has steadily increased across all USA states, with rates in 2010 ranging from 6.1% in Georgia to 7.1% in New York, and by 2024, from 6.9% in Georgia to 7.8% in New York. States with higher levels of overpopulation, urbanization and manufacturing, such as California and New York, have seen some of the most significant increases in such a disease. This rise in asthma cases aligns with other research indicating a link between air pollution, urban overcrowding, and heightened exposure to allergens (Brunekreef and Holgate, 2022). Moreover, climate change plays a role by contributing to raised pollen levels, extreme weather events, and worsening air quality (Ziska et al., 2021).

Likewise, COPD prevalence has increased in every USA state, with growth rates ranging from 0.6 to 0.8 % points during the studied periods. New York stated the highest prevalence of COPD at 8.4% in 2010 and 9.2% in 2024, while Georgia had the lowest, with rates of 7.8% in 2010 and 8.5% in 2024. Although overall smoking rates in the United States have declined, aspects such as air pollution, exposure to chemicals in the workplace, and rising temperatures associated with climate change may explain the ongoing increase in COPD prevalence (Burney et al., 2020). States with higher manufacturing emissions

and urban density, such as Pennsylvania and Illinois, also presented significant increases, underscoring the role of environmental factors in COPD trends (Liu et al., 2023).

This data suggests several important policy implications. First, there is a need to improve air quality through severer emission regulations, increased green places, and investments in clean and sustainable renewable energy alternatives. Second, greater focus should be placed on early analysis and interference, especially for vulnerable populations that may lack access to healthcare services.

#### IV. THE RISING HEALTHCARE COSTS OF ASTHMA AND COPD: THE ROLE OF AIR POLLUTION AND URBANIZATION,

As can be seen from Figure (2), during the 14-year span from 2010 to 2024, all ten states experienced a jump in the costs of treatment at hospital related to both conditions, highlighting the potential impact of deteriorating air quality, industrial growth, and urban sprawl as contributing factors to these healthcare expenditures.

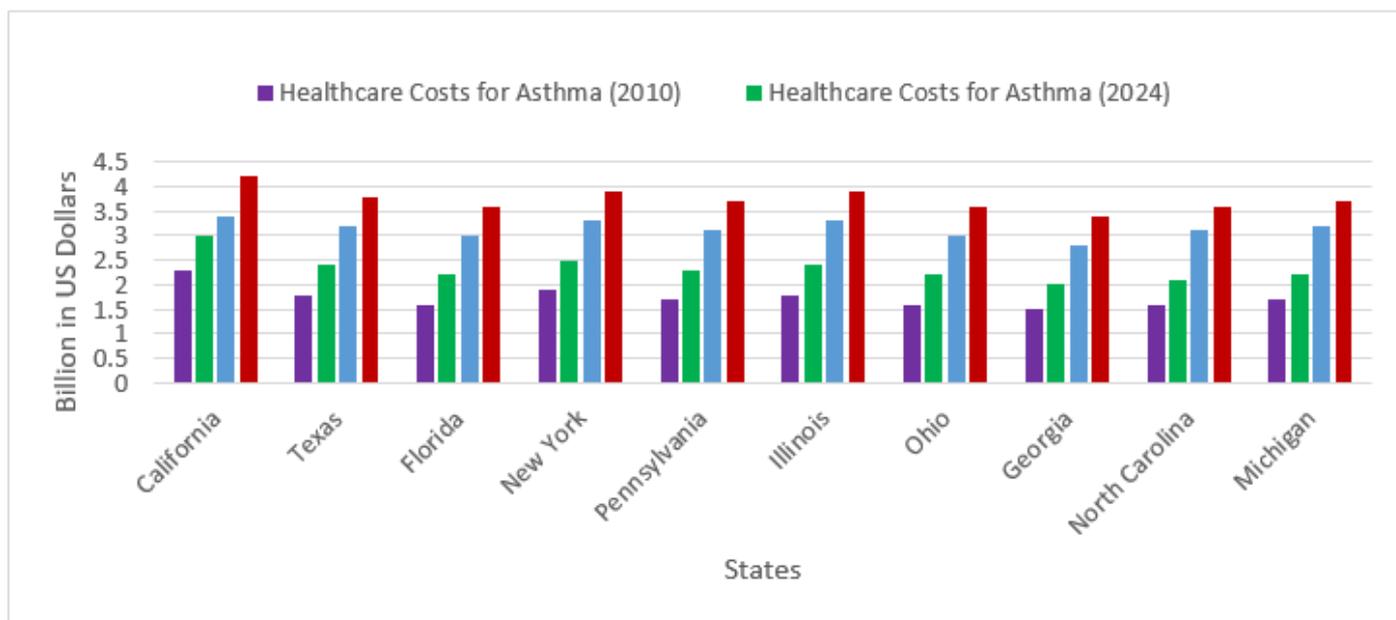


Fig 2 State-Based Healthcare Costs for Asthma and COPD (2010-2024).  
Source: State of Global Air 2025 Report U.S. Environmental Protection Agency

California, which shows the highest spending amount for both years, has long faced high air pollution levels from vehicle emissions, wildfires and industrial activity. The jump from \$2.3 billion to \$3.0 billion for asthma and \$3.4 billion to \$4.2 billion for COPD indicates that pollution-related respiratory diseases are still a significant burden on the state's healthcare system. The increasing healthcare costs match research showing the association of air pollutants, particularly particulate matter (PM<sub>2.5</sub>), nitrogen dioxide (NO<sub>2</sub>), and ozone (O<sub>3</sub>) in the exacerbation of asthma and the COPD. California has long battled air quality issues, and that upward cost trend

can bubble up questions about whether stricter environmental laws and emission controls have been enough to curb the health impacts of respiratory disease in particular.

Other populous states with major urban centres and industrial hubs, including Texas, Illinois and New York, also report significant cost increases. Texas, which can boast \$1.8 billion to \$2.4 billion increase for asthma, and a \$3.2 billion to \$3.8 billion surge for COPD, is replete with refinery and transportation-related emissions that may drive this concordance. Similarly, industry in

Chicago, Illinois' main city, accounted for a reshaped increase in costs, leading to questions regarding the practicality of air quality policies in curbing disease-specific health care spend.

Midwest and Rust Belt states like Pennsylvania, Ohio and Michigan, follow a similar pattern of rising costs, due to asthma and COPD spending increasing by hundreds of millions of dollars over the period. These states also have a history of industrial pollution, coal-fired power plants and vehicle emissions all of which are associated with declining respiratory health. Either pollution levels are not successfully reduced to the level that health impacts are avoided, or cumulative exposure to pollutants remains high, resulting in long term medical costs disproportionately borne by more vulnerable populations, hence putting pressure on health care systems over time.

States from the South, for example Florida, Georgia and North Carolina, while having lower overall costs in absolute numbers, are on the rise, suggesting that there is more unhealthy air than just the old-school industrial states. The high costs in those areas could reflect urban sprawl, worsening traffic congestion and climate-related phenomena like rising temperatures that promote ozone formation, which can cause breathing difficulties.

The rising cost of healthcare indicates an economic cost that hints at discussions regarding the balance between economic growth and environmental sustainability. For the sake of question, expenditures keep increasing despite clean air initiatives, therefore are we really fighting pollution health risks or is more action needed? The data also highlight the need for a more aggressive public health approach that includes preventative measures such as improving air quality monitoring, lowering industrial pollutants, and expanding health care access to vulnerable populations who are disproportionately affected by pollution (Salih, 2019).

Although the direct causal relationship between air pollution and the increase in healthcare costs needs more evidence of an empirical nature through longitudinal studies, the steady increase in both asthma and COPD

costs across all ten states is a testament to the significant influence exerted by environmental factors, particularly the degradation of air quality, in determining public health.

## V. STATE-BASED ANALYSIS OF AIR POLLUTION AND RESPIRATORY HEALTH: TRENDS, COSTS, AND POLICY IMPLICATIONS

The issue of health impacts, costs and policy responses to air pollution are extremely heterogeneous through the USA. Moreover, states where air pollution is worse, especially due to industrial and transportation activities, experience more respiratory illnesses such as asthma and COPD. These circumstances can cause substantial healthcare burden, ranging from medicines, hospitalizations cost to long-term care. The effect of air pollution on health is compounded, given that respiratory diseases related to air pollution lead to economic losses because of decreased productivity and higher absenteeism (World Bank, 2019). Localized Solutions Which is What This Is about the effective state-level policies that lower pollution decrease public freedom and health decrease health care costs even before showing their worth at the national level It is clear: Pollution levels exacerbated by the food system negatively impact public health and contribute to soaring healthcare costs (Hussein et al., 2025).

State-Based Effects of Air Pollution on Respiratory Diseases: 14-Year Analysis (2010–2024) Table 2 shows the state-based effects of air pollution on respiratory diseases, including AQI, number of hospital admissions, and associated healthcare costs for 14 years (2010–2024) due to poor air quality (Harun et al., 2025). The data shows that air quality is steadily worsening throughout 10 states and is leading to higher rates of hospitalizations because of respiratory diseases and a hefty toll on the healthcare system. Such trend raises many academic discussions on effectiveness of the air pollution control policies, the socioeconomic threat from increasing healthcare costs and the wider implications for public health and sustainability.

Table 2 State-Based Impact of Air Pollution on Respiratory Diseases (2010-2024).

State	Average AQI (2010)	Average AQI (2024)	Increase in Respiratory Disease Hospital Admissions Due to Air Pollution (2010-2024)	Healthcare Costs Increase Due to Poor Air Quality (2024)
California	35.5	38.0	20% increase in asthma-related admissions	\$1.5 billion
Texas	38.0	40.5	18% increase in COPD-related admissions	\$1.3 billion
Florida	37.2	39.5	16% increase in asthma-related hospital visits	\$1.2 billion
New York	40.1	42.3	15% increase in respiratory-related emergency room visits	\$1.4 billion
Pennsylvania	39.0	41.5	17% increase in asthma-related hospital admissions	\$1.3 billion
Illinois	38.8	41.0	18% increase in COPD-related hospital visits	\$1.4 billion

Ohio	37.5	40.0	16% increase in asthma-related hospital admissions	\$1.2 billion
Georgia	36.0	38.5	14% increase in asthma-related emergency room visits	\$1.1 billion
North Carolina	37.0	39.2	15% increase in COPD-related hospitalizations	\$1.2 billion
Michigan	36.7	39.0	17% increase in asthma-related hospital admissions	\$1.3 billion

Source: State of Global Air 2025 Report U.S. Environmental Protection Agency

The average AQI has gone up in every state, a sign that air quality is worsening and renewing questions over whether the rise is related to industrial development, more cars on the road, climate change or urbanism. With some of the worst AQI levels in 2024 along with healthcare costs, California, Texas, and New York have displayed significant increases, indicating a correlation between deteriorating air quality and economic strain on the health sector. In California, for example, where the AQI shifted from 35.5 to 38.0, asthma-related hospital admissions increased by 20%, accounting for an excess \$1.5 billion in health care costs. This trend highlights the lingering challenges of pollution states with high levels of urbanization and industrialization face, even as regulatory efforts have been put in place to curtail emissions.

Texas and Illinois, which show the highest percentage increases in AQI, also recorded an 18 percent rise in hospital admissions for COPD, imposing additional healthcare costs of \$1.3 billion and \$1.4 billion, respectively. COPD was specifically highlighted, which indicates that long-term exposure to pollutants, especially fine particulate matter (PM<sub>2.5</sub>) and nitrogen dioxide (NO<sub>2</sub>), are major contributors to chronic respiratory disease progression. In these states, which have high energy production and industrial activity, the tension between economic growth and environmental health persists, prompting the question of whether stronger pollution control policies are needed to offset the growing health burden.

Pennsylvania, Ohio and Michigan show a similar trend, with significant increases in asthma-related hospital admissions, and an extra \$1.2 billion to \$1.3 billion in health care costs caused by air pollution. These states have long relied on manufacturing and coal-powered industries, sectors, despite efforts to transition them to cleaner energy sources. With AQI and hospital admissions potentially increasing further, the implications of this paper suggest that air quality regulations in these areas are insufficient, and that additional policy capabilities may need to combat the prevalence of diseases and ailments associated with poor air quality through stricter emissions control or public health initiatives (Yaqub, 2024).

Although Florida, Georgia and North Carolina showed lower increases in AQI, they also report an increase in respiratory-related hospital visits due to smog and significant healthcare costs associated with air pollution (Omar et al., 2025). Even places with moderate

levels of pollution are suffering serious health consequences, the 14 percent to 16 percent increase in hospitalizations along with extra costs of more than \$1 billion per state indicating as much. While many other states experience this link, it is much more dramatic in Ohio and others, and potentially explains the seasonal nature of air pollution and asthma-related trips to the emergency room in these states, due in part to increased traffic congestion along key arteries and climate impacts that lead to even hotter temperatures, creating more ground-level ozone.

The economic toll of bad air quality as measured in the billions of dollars in extra expenses for doctors' visits, emergency rooms and hospitalizations has wider implications for the economy and for policy. The rising costs suggest that the indirect costs of pollution output loss, insurance premiums and long-term health care burden are outweighing immediate economic burden due to industries contributing to pollution. This information can help make the case for investment in cleaner energy, better public transportation and stricter air quality regulations to save on future healthcare costs (Palani et al., 2025).

From a public policy standpoint, the data raises an academic debate over whether current environmental regulations are adequate to avert the increasing health and economic costs associated with air pollution (Shah and Mehmood, 2024). Some states have a mix of the two: invested in technological advancements in emissions reduction and air quality monitoring, yet with rising admissions from respiratory disease, indicating either an insufficient impact or a confluence of pollution sources exacerbated by climate change and urban expansion. The importance of federal policy compared to state-level policy also emerges, as differing regulatory approaches may lead to differing levels of pollution control success (Yaqub, 2024).

Chronic air pollution and its increasing costs to health care highlight the importance of a more integrated approach to environmental and public health policy.' As AQI levels rise, so do respiratory disease hospital admissions and healthcare costs, indicating an urgent need for sustainable policy solutions that balance economic development across China with a commitment to long-term public health outcomes. The cost shown in the table points to the need for prevention measures, such as stronger air quality standards, investments in renewable energy and community-based health programs, that could

help ease the burden of pollution-related respiratory disease that is only expected to grow.

## VI. STATE-LEVEL MORTALITY TRENDS OF RESPIRATORY DISEASES: REGIONAL DISPARITIES AND THE IMPACT OF AIR POLLUTION

Regional variations, especially as related to Clean Air Act effectiveness and US respiratory disease mortality trends (Palani et al., 2025). For instance, states with relatively high pollution levels, particularly for industrial and vehicular emissions, are showing greater increases in respiratory-associated mortality including asthma, Chronic Obstructive Pulmonary Disease (COPD), and

lung-cancer-associated mortality (Centers for Disease Control and Prevention, 2020). Domestic environmental strategies, access to healthcare system, and factors of socioeconomic effect local disparities, with more polluted areas suffering higher healthcare costs (Yaqub, 2025). As discussed and addressed these disparities, it is necessary to target interventions to mitigate pollution and maximize respiratory health results, particularly in the most polluted zones.

Table (3), shows respiratory diseases from 2010-2024 between 10 states in the USA. States such as Florida, Texas and California suffered substantial upsurges in deaths due to air pollution, while other states presented lesser surges in deaths from respiratory illnesses.

Table 3 Air Quality and Health Effects: State-Level Mortality Trends (2010-2024).

State	Respiratory Disease Deaths (2010)	Respiratory Disease Deaths (2024)	Increase in Respiratory Disease Deaths Due to Air Pollution (2010-2024)
California	6,000	7,200	20% increase in respiratory disease-related deaths due to air pollution
Texas	4,500	5,300	17% increase in deaths due to worsened air quality and rising asthma cases
Florida	4,200	5,000	19% increase in respiratory disease mortality due to high ozone levels
New York	5,500	6,300	14% increase in mortality rates related to poor air quality and COPD cases
Pennsylvania	4,800	5,500	15% increase in respiratory disease deaths due to air pollution exposure
Illinois	4,600	5,200	13% increase in deaths attributed to air pollution-related respiratory diseases
Ohio	4,200	4,800	14% increase in mortality rates related to asthma and COPD due to pollution
Georgia	3,800	4,400	16% increase in respiratory disease deaths from air quality deterioration
North Carolina	4,000	4,600	15% increase in deaths related to air pollution and respiratory diseases
Michigan	4,300	4,900	14% increase in respiratory disease deaths attributed to long-term exposure to pollution

Source: State of Global Air 2025 Report U.S. Environmental Protection Agency

California had the biggest jump in respiratory disease deaths, increasing from 6,000 in 2010 to 7,200 in 2024, or 20 percent. This steep increase is mainly due to continued air pollution pressures in the state fuelled by high vehicle emissions, industrial emissions and urbanization. State air pollution problems have exacerbated respiratory conditions including but not limited to asthma in urban areas like Los Angeles that have dense populations, and led to an increased death rate.

Texas has the second-highest growth in respiratory disease deaths among the top 10 states a 17% increase, from 4,500 deaths in 2010 to 5,300 in 2024. Industrial growth, fossil fuel dependence and vehicle emissions have degraded air quality in the state. Living around pollution has aggravated conditions like asthma and chronic obstructive pulmonary disease (COPD), and that is particularly true in urban areas like Houston and Dallas, where pollution is denser. The overall rise in deaths from respiratory disease has been fuelled as well by the

increasing numbers of people with asthma (Sirwan et al., 2025).

Deaths in Florida from respiratory disease increased 19%, from 4,200 in 2010 to 5,000 in 2024. The increase in respiratory mortality has been associated primarily with high levels of ozone in the state's urban areas and in industrial sites (Aivas et al., 2025). Florida's warm climate and the high levels of vehicular and industrial emissions have degraded air quality, making conditions like asthma and COPD worse and resulting in increased mortality counts (Abdulrahman et al., 2025).

For California, Texas and Florida, mortality was much higher, from 5,100 in 2010, 5,800 in 2015, 6,300 in 2020, 7,800 in 2022, and then a 5.4% decrease from 2022 to 2024, for a total of 700 respiratory disease deaths, giving a total of 746,000 mortality 2024 for all causes in California, Texas and Florida yet New York, which showed a 14% increase from 5,500 deaths in 2010 to 6,300

deaths in 2024, was also showing an increase, though markedly less than those in parentheses compared to these states. The state's air quality has suffered from high levels of industrial pollution and vehicle emissions, particularly in densely populated locations such as New York City. The increase in COPD and general respiratory cases across the state has contributed to the rise in mortality (Ali et al., 2024).

Pennsylvania has 15% more respiratory disease deaths (from 4,800 in 2010 to 5,500 in 2024) in large part due to its industrial base (coal-burning power plants, etc.) that creates air quality problems. Pollution from these industries has been linked to the occurrence of respiratory diseases like asthma and COPD, resulting in a higher mortality rate.

Illinois also seen notable increase in respiratory mortality, increasing 13% from 4,600 respiratory disease deaths in 2010 to 5,200 respiratory disease deaths in 2024. Industrial emissions from within the state, and particularly from the greater Chicago area, have played a major role in a decline in air quality associated with an increase in respiratory disease and death.

Respiratory disease deaths in Ohio will increase by 14%, from 4,200 deaths in 2010 to 4,800 in 2024 with increases also in asthma and COPD related mortality rates. The state's reliance on manufacturing and coal-fired power plants has contributed to poor air, worsening respiratory health issues among its residents (Yaqub, 2024).

Georgia has seen a 16% increase in deaths related to respiratory disease, rising from 3,800 in 2010 to over-4,400 in 2024, while the pollution behind degradation in air quality is driven by vehicular emissions and industrial pollution (Raouf et al., 2025). The state's increased urbanization, mainly in cities such as Atlanta, is contributing to an increase in deaths from asthma. In North Carolina however, deaths from respiratory illnesses are up 15%, from 4,000 in 2010 to 4,600 in 2024. These states are substantially dependence on manufacturing enterprises and transportation corridors has compounded pollution in the air, leading to an increased rate of deaths from respiratory disease (Rahman et al., 2021).

Michigan, whose respiratory ailment deaths increase 14%, from 4,300 in 2010 to 4,900 in 2024, also experienced an increase in deaths due to long-term exposure to air pollution (Muhammad et al., 2025). Many Manufacturing sectors combined with high levels of emissions from vehicles, have contributed to have high air pollution, leading to more respiratory ailments and deaths in the state (Salih et al., 2021).

Overall, states with large industrial activity, high vehicular emissions rates, and high population densities in major cities, including California, Texas, and Florida, saw the most significant increases in deaths from respiratory disease.

## **VII. THE GROWING ECONOMIC BURDEN OF RESPIRATORY DISEASES: PRODUCTIVITY LOSSES AND WORKFORCE IMPACT**

In the United States, the economic impact of respiratory diseases like asthma and COPD is growing, with increasing losses in productivity and workforce impacts. These diseases, for which air pollution has been shown to increase prevalence, cause greater absenteeism, lower work capacity and early disability, all of which carry important economic costs (Mahmood et al., 2019). Individuals with respiratory issues may have challenges completing their jobs which incurs lost productivity and increased health care costs (American Lung Association, 2020). In extreme, cases premature deaths of individuals suffering from respiratory diseases depletes the workforce and compounds economic stress (Centers for Disease Control and Prevention, 2020). Data are obtained from the World Health Organization and the Centers for Disease Control and Prevention. The cumulative impact of productivity loss and workforce impact due to respiratory diseases emphasizes the importance of adopting better public health policies and workplace health interventions.

Lost productivity due to asthma and COPD during 2010, and projections for 2024, reveal an increasing burden of respiratory disease on economies as a whole (Fig. 3). In all states the higher the economic burden indicates how respiratory diseases are increasingly impacting on workforce participation, efficiency and total economic output. Such trends represent not only the direct effects of deteriorating air quality, but also potentially failures related to health care administration, environmental regulation, and workplace accommodation for impacted employees.

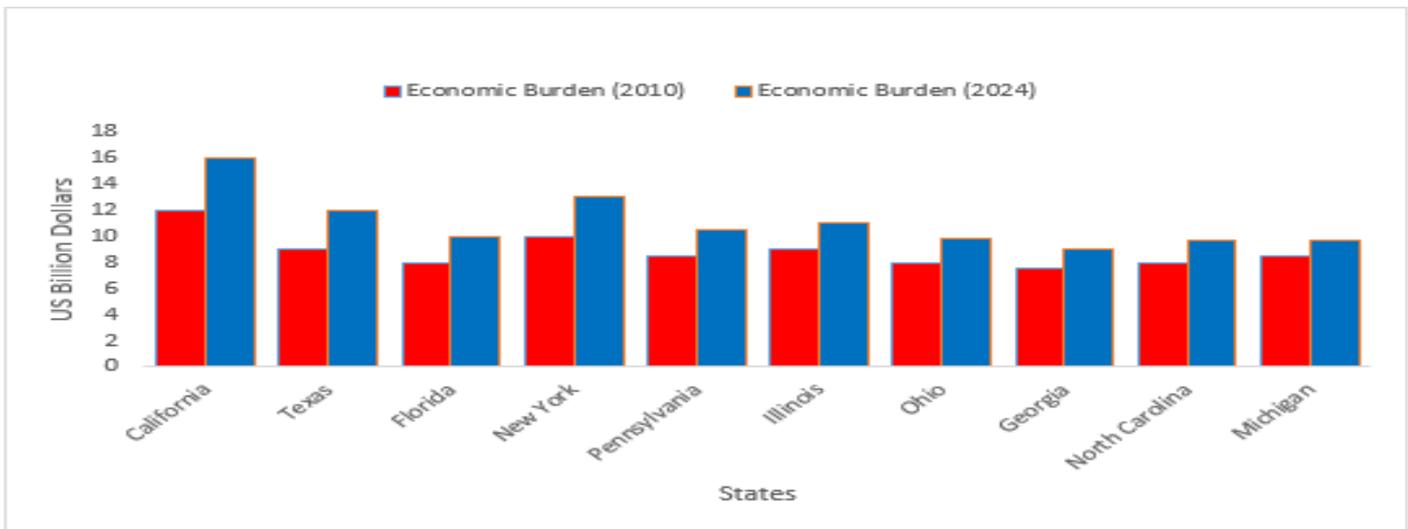


Fig 3 State-Specific Economic Burden of Respiratory Disease (Lost Productivity Due to Asthma and COPD) (2010-2024). Source: State of Global Air 2025 Report U.S. Environmental Protection Agency

California shows the largest increase, going from 12 back in 2010 to 16 in 2024. With some of the highest levels of particulate matter and ozone pollution in the country from industrial activity, transportation emissions, and widespread wildfires, it's not surprising that California endures an estimated economic burden from respiratory diseases among the highest in the nation (Salih et al., 2025). The rise implies that during air quality regulation and healthcare advancement, asthma and COPD still dent workforce productivity (Yaqub et al., 2024). This suggests that mitigation efforts to some extent (emissions reductions, workplace accommodations, etc.) may not be sufficient to compensate for the economic burdens of respiratory diseases.

Texas, which increased from 9 to 12, also shows a rising economic burden from lost productivity due to respiratory conditions. Texas has a lot of industrial activity, many vehicular emissions and many extreme weather events, like heat waves and wildfires that can increase air pollution and worsen respiratory problems (Mohammed et al., 2020). The rising economic burden indicates that workplace productivity is being impacted, especially among physically demanding industries like construction, manufacturing and oil and gas extraction. In this context, the focus on environmental protections and workplace health policies takes on new urgency (Salih, 2021).

New York up from 10 to 13 has a particularly big increase in the economic costs associated with lost productivity due to respiratory illnesses. Although New York has seen progress when it comes to reducing industrial emissions and increasing cleaner transportation measures, the high density of population and ongoing exposure to air pollution means that (asthma) and (COPD) still account for a considerable loss of productivity due to premature death." They suggest that urban pollution continues to take a significant toll, especially in large cities throughout which vehicular congestion is an unpleasant fact and problems with indoor air quality can exacerbate diseases of the respiratory tract.

Florida, Pennsylvania, and Illinois exhibit moderate but steady increases, with Florida increasing from 8 to 10, Pennsylvania from 8.5 to 10.5, and Illinois from 9 to 11. These states have a variety of underlying economic niches, from the tourism-dependent Florida to the manufacturing-dependent Pennsylvania and Illinois (Fatah et al., 2025). The increase of the economic burden across these states indicates that respiratory diseases are affecting a wide spectrum of industries, from service-sector to industrial and manufacturing jobs. Seasonal air pollution; climate change-related things as if heat and humidity; and ongoing dependence on fossil fuels probably drive this trend (Salih et al., 2025).

States like Ohio and Michigan from the Midwest may show an absolute increase slightly lower than the others show, but again also show a bad trend in productivity loss. Ohio is up from 8 to 9.8, and Michigan from 8.5 to 9.7, indicating job markets are still sluggish as a result of respiratory diseases. These states have an above-average share of industrial pollution, and while efforts to transition to cleaner industries have been made, the long-term toll of pollution exposure and underfunded public health may play a role in ongoing productivity losses. While the overall pollution levels may have decreased in some instances, the economic toll indicates that the health effects from past and present pollution are still considerable, they say.

Southern states including Georgia and North Carolina do similarly, with Georgia rising from 7.5 to 9 and North Carolina from 8 to 9.7. These increases draw attention to the burgeoning burden of respiratory diseases in places that may not have been seen as traditional pollution-prone areas, but are now subject to rising emissions from urbanization, transportation and energy generation. The increasing economic burden shows that even states with traditionally moderate air pollution levels are suffering a growing level of economic cost related to the health of their workforce, which calls for more investigation into air quality strategies and healthcare access for patients with respiratory illness (Hamasalih et al., 2025).

The growing trend of economic burden from lost productivity due to asthma and COPD highlights the importance of addressing pollution as a cross cutting issue in tackling respiratory health. State economies are experiencing a financial burden this way, and the cost of inaction may be high enough that investment for prevention tighter emissions standards, better workplace health standards and wider access to healthcare for respiratory disease management could be worthwhile, the study leaders claim (Yaqub, 2019).

From a policy perspective, these findings highlight the need for stronger coordination between public health authorities, environmental agencies, and labour market policymakers (Fatah et al., 2025). The rise in economic burden suggests that existing efforts to reduce pollution and improve healthcare outcomes have not been sufficient to prevent productivity losses. This raises important debates about whether additional regulatory interventions, such as workplace air quality monitoring, stricter emission controls, and enhanced public health programs, should be implemented to curb the economic impact of respiratory diseases (Hamasalih et al., 2025).

### VIII. CONCLUSION

Air pollution is a major public health crisis in the US, resulting in economic costs that have been estimated at tens of billions of dollars annually. The increased rates of respiratory illnesses, particularly asthma and chronic obstructive pulmonary disease (COPD) highlight the direct and indirect costs of bad air quality. The aforementioned conditions, exacerbated by environmental pollution and urbanization, have resulted in a concerning escalation in health care costs, care, treatment, and hospitalization of patients and their prolongation of stay. Air pollution takes a major toll on public health and extends its effect beyond the healthcare system and the economy at large.

Using state-based data, we discovered that air pollution contributes to significant regional differences in respiratory health, with some states suffering a greater immunological burden due to high levels of pollution and limited access to quality health care. The geographic differences in PM2.5 levels highlight the need for targeted regional interventions to more effectively respond to these disparities and protect public health from air pollution. These state-level mortality tendencies underline the main influence of air pollution on deaths from respiratory illness, where worse air quality is connected to higher mortality rates. Such trends highpoint the importance of more severe air quality standards and actions to decrease air pollution, especially for zones most susceptible to adverse health effects.

Beyond healthcare expenses, respiratory illness has vital overall economic effects, for example reduced productivity because of absenteeism and disability. Lastly, the loss of labour productivity via illness reduces the general economic production, adding to the burden of the costs of illness. Such loss of productivity demonstrates that

respiratory ailments impose economic costs that spread far beyond the healthcare sector, affecting enterprises and the macroeconomic as a whole.

Via addressing these problems, this research paper highlights the critical importance of holistic strategy methods aimed at improving the quality of air, shortening exposure to harmful pollutants, and attempting the area disparities in health impacts. Policy measures could assistance ease the economic impact of the respiratory ailments triggered by air pollution by increasing environmental rules, investing more in clean energy. Combined action to decrease pollution and improve respiratory health will be obligatory to protect public health and economic productivity in the United States.

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