



A NATIONAL ASTHMA PUBLIC POLICY AGENDA

A set of public policy priorities for lawmakers, regulators
and advocates to reduce asthma morbidity and mortality

2022 Update



A National Asthma Public Policy Agenda 2022 Update

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Introduction

The burden of asthma in the United States is complex, multi-factorial, unequal and serious. Efforts to address asthma must be equally significant and must look at the underlying systemic causes of both the disease and the barriers to controlling it.

In 2009, the American Lung Association released the first National Asthma Public Policy Agenda by bringing together a broad, multi-disciplinary group of asthma specialists, medical professionals and public health and policy experts to agree on a set of public policy priorities that, if implemented, could have the greatest impact on asthma morbidity and mortality. The project established a blueprint for a national asthma policy on which lawmakers, regulators and advocates could act. To be successful, the policy recommendations needed to be adopted by multiple stakeholder groups at all levels.

In the subsequent decade, much has been accomplished to impact and hopefully improve the quality of life for those living with asthma—including the passage of the Affordable Care Act (ACA) in 2010, the adoption of stricter national air standards for particle pollution in 2012 and ozone in 2015, the 2018 implementation of the U.S. Department of Housing and Urban Development’s smokefree public housing policy, and the 2020 update of the National Asthma Education and Prevention Program’s clinical guidelines. These and other changes in the policy environment made it necessary to review, revise and update the National Asthma Public Policy Agenda to chart a path for the public health community to follow in this next decade.

The stakeholders brought together by the American Lung Association to update the National Asthma Public Policy Agenda met before the COVID-19 pandemic. The pandemic has exposed many of the major challenges facing the nation’s public health and health systems infrastructure, including a serious lack of robust, predictable, and sustained investments in public health at the federal, state and local levels; depleted and understaffed workforces; inadequate public health surveillance; and systemic inequities that create disparate health outcomes. The recommendations included in the National Asthma Public Policy Agenda - 2022 Update are even more timely and urgent considering this global respiratory pandemic.

The Burden of Asthma Is Unequal and the Updated Agenda Must Address These Disparities

Asthma makes breathing difficult for the 24.8 million Americans it affects, including 5.5 million children. Since 2001, asthma rates have increased 22% among adults while decreasing 34% among children. While asthma affects people of all ages, races, genders and segments of society, the burden is not equally shared across these segments. Black individuals and American Indian/Alaska Natives have the highest rates of current asthma compared with other races and ethnicities. Further, though asthma rates are relatively low for Hispanics overall, Puerto Ricans in the continental United

States have the highest current asthma rate of any racial or ethnic group (14.0%^{*}). Finally, asthma rates were significantly higher among those with a family income below the poverty threshold.¹

Of the 24.8 million Americans with a current diagnosis of asthma, 19.2 million were adults and 5.5 million were children. Over half of children and adults with asthma (52.7%) living below the federal poverty level reported an asthma attack in the past year compared to 44.6% of those living at or above double the federal poverty level,² which is an indication of poor asthma control. Children and people living below the federal poverty level are among the groups most likely to have asthma, and to suffer from severe asthma attacks, hospitalization and even death.³

Healthcare

Asthma morbidity and mortality is disproportionately burdensome for Black individuals, who are least likely to have access to adequate healthcare.⁴ There are substantial gaps between guidelines-based asthma care and coverage by state Medicaid programs. A large percentage of children with asthma receive coverage through Medicaid and the Children's Health Insurance Program (47.6%).⁵ Many Medicaid programs do not cover the recommended categories of care and have inconsistent coverage across fee-for-service and managed care plans within the same state, making it difficult for providers and patients to understand coverage of asthma treatments and services.⁶

While the ACA provides quality healthcare coverage for tens of millions more Americans, including many with asthma, gaps in states that have not expanded Medicaid and increasing challenges of affordability still leave millions more without the coverage they need. Asthma's multi-factorial and complex causes and triggers also underscore that this disease will not be addressed by treatment alone; it also requires a robust multi-sector response including public health and environmental responses.

Outdoor and Indoor Air Quality

A substantial body of evidence links asthma exacerbations to exposures to allergens and irritants from outdoor sources and from indoor pollutants found where people live⁷, go to school⁸ or work.⁹ Establishing asthma-friendly policies that eliminate or reduce exposures to indoor and outdoor allergens, irritants, and pollutants where people with asthma live, work, go to school and play is critical in the overall management of asthma. Asthma self-management education, which includes education on reducing exposure to asthma triggers, has been repeatedly shown to make a difference in patients' ability to maintain good control of the disease.

^{*} NHIS data from 2016-2018 was combined to acquire a large enough sample size to ensure an accurate estimate for this population.

Climate change brings new challenges to people with asthma, such as increased ozone pollution driven by heat; increased particle pollution from more wildfires; increased pollen levels that can trigger allergic asthma; and mold from flooding and extreme storms. Public policies focused on asthma must also recognize the importance of addressing both the causes and impacts of a warming Earth and climate.

Significant Financial Burden

People with asthma that have difficulty managing their disease can impact their community in several ways, from lost productivity in the workplace to healthcare costs to premature death. Asthma costs the nation \$81.9 billion annually, including \$50.3 billion in direct health care expenses and additional costs from loss of productivity, absenteeism and mortality.¹⁰ Contributing to the burden, asthma accounts for an estimated 10.9 million missed workdays for people over 18 years of age and 7.9 million missed school days.¹¹ Much of the overall health and economic burden of asthma is the result of asthma not being well controlled; in addition to missing work or school, people with asthma may require care in the emergency department or hospital for asthma emergencies.

Objective and Approach

The American Lung Association with support from the U.S. Centers for Disease Control and Prevention (CDC), National Center for Environmental Health reviewed the recommended policies and strategies from the 2009 National Asthma Public Policy Agenda, assessed the existing evidence for effective asthma policy interventions, convened an interdisciplinary group of asthma experts and built consensus for an updated, comprehensive and actionable national asthma public policy agenda.

About the Update

The consensus process resulted in 22 public policy recommendations grouped in six major categories. The expert stakeholders determined the categories should remain unchanged from the 2009 Agenda, but many of the policies and supporting strategies within the categories were updated to reflect the latest science.

Each policy category begins with a list of “Guiding Principles.” The participants at the May 2019 conference decided to maintain the use of the guiding principles from the original Agenda and update them to reflect changes to the policy recommendations. Each policy category includes an overview of the importance of the category, followed by the recommended policy statements and support strategies. For each policy, the authors described the existing research and evidence of effectiveness. These summaries are not intended as a comprehensive review of the issue but provide context for including policies.

Public Policy Categories

- Public Health Infrastructure and Surveillance
- Outdoor Air
- Healthcare Systems and Financing
- Homes
- Schools
- Workplaces

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Public Health Infrastructure and Surveillance

Guiding Principles

A strong public health infrastructure is essential to ensure adequate capacity and training for community-based asthma strategies. An adequate public health infrastructure should:

- Recognize that asthma is both a chronic and an environmental disease.
- Promote the establishment, maintenance or enhancement of surveillance systems to monitor trends in asthma burden.
- Provide funding for comprehensive asthma programs and services that impact morbidity and mortality.
- Identify cross-cutting risk factors that include addressing social determinants of health and asthma management for underserved, disproportionately affected populations.
- Address asthma management in multiple sectors, including health systems, housing, workplaces, schools, and childcare facilities.
- Be prepared for and resilient to the impacts of climate change (e.g., adaptation, planning, sustainable development, disaster response) to protect people with asthma.

Overview

The COVID-19 pandemic has demonstrated how essential our nation's public health infrastructure is to the country's well-being, and how important proper surveillance is to help protect the public. The same concept holds true for other public health challenges such as asthma and other chronic health conditions. Without comprehensive surveillance nationally and in all 50 states, the District of Columbia and U.S. territories, people working to reduce the burden of asthma are likely missing key information, including about which communities are disproportionately impacted. In turn, a strong public health infrastructure, including at the state and local level, is essential to delivering the programs and services necessary to reduce the burden of asthma.

Essential to helping to strengthen the public health infrastructure to address asthma is the Centers for Disease Control and Prevention's (CDC) National Asthma Control Program (NACP), created in 1999. Over the years, CDC has funded state and local health departments, national non-governmental organizations and other agencies to conduct asthma surveillance, implement evidence-based asthma interventions and evaluate their effectiveness, and develop partnerships. Through the 2019 cooperative

agreement “A Comprehensive Public Health Approach to Asthma Control through Evidence-based Interventions,” the National Asthma Control Program currently supports 25 state, local and territorial health departments in their efforts to enhance public health infrastructure and leverage partnerships. The purpose of the cooperative agreement is to reduce asthma morbidity, mortality and disparities by implementing evidence-based strategies across multiple sectors.

Since 2002, CDC has demonstrated that adequately funded health departments working on asthma can have a significant positive impact on their communities.^{12, 13, 14, 15, 16, 17} Each grant cycle, CDC-funded state asthma programs have conducted asthma surveillance and developed comprehensive state asthma plans. To have the greatest impact on asthma morbidity and mortality, these grants should be extended to all 50 states, the District of Columbia and U.S. territories.

Asthma surveillance data are collected at the national and state levels. Surveillance data are then analyzed to understand when, where and among whom asthma occurs. There are several surveys that can be used to obtain information to track the overall burden of asthma and to identify disproportionately affected populations. Grantees funded by the NACP typically use data from the Behavioral Risk Factor Surveillance System and the Asthma Call-Back Survey to track asthma prevalence, activity limitations, days of work or school lost, rescue and control medication use, asthma self-management education, and self-reported healthcare use (physician office visits, emergency department visits and hospitalizations) due to asthma. Another surveillance tool introduced in 2009, the Environmental Public Health Tracking (EPHT) network, connects environmental and health information. This information is used to target, implement and evaluate interventions.

In 2018, CDC published the EXHALE technical package.¹⁸ It represents a group of strategies based on the best available evidence that can improve asthma control and reduce health care costs. It is intended as a resource to inform decision-making in communities, organizations and states. These strategies are complementary and are intended to work in combination to reinforce each other. The hope is that multiple sectors, including public health, health care, education, social services and non-governmental organizations, will use this technical package to improve asthma control in all age groups. Commitment, collaboration and leadership from numerous sectors can maximize the impact of the strategies. As new evidence becomes available, the strategies can be refined to reflect the current state of the science.

Since the publication of the 2009 National Asthma Public Policy Agenda, changing climate patterns have increased the frequency and intensity of natural disasters and severe weather, such as wildfires, droughts, floods and extreme heat events, which can reduce both outdoor and indoor air quality.¹⁹ People living with chronic lung diseases,

such as asthma, face greater risks and need guidance and support to stay healthy.²⁰ The CDC provides planning resources for state and local governments, emergency planners and responders, healthcare facilities and providers, businesses, and individuals, families and communities.²¹ Several national organizations including the Allergy & Asthma Network,²² American Lung Association,²³ and the Asthma & Allergy Foundation of America²⁴ offer guidance and support tools for people with asthma during natural disasters.

Policy Statements and Supporting Strategies

Every state and territory should have a comprehensive statewide asthma strategic plan and adequately funded state asthma program to reduce asthma morbidity and mortality.

- Statewide asthma programs and partners should develop a strategic plan to document the problem, implement strategies and assess progress.
- Statewide asthma programs should follow best practices outlined in CDC's EXHALE Technical Package on implementing a comprehensive asthma program, including access to guidelines-based asthma care, expanded asthma self-management education in clinical and home visits, and environmental policies and practices to reduce exposure to asthma triggers.
- Statewide asthma programs should partner with multiple sectors, including health systems, housing, workplaces, schools and childcare facilities, when implementing comprehensive asthma programs.
- Statewide asthma programs should implement the activities outlined in CDC's EXHALE Guide for Public Health Professionals.
- Statewide asthma programs should identify and ensure they address asthma in underserved and disproportionately affected populations in their strategic plan and activities.

About the evidence. Strategic plans represent a coordinated approach that targets both clinical and environmental aspects of asthma. All CDC-funded state asthma programs are required to develop and maintain a strategic asthma plan to assess the burden of asthma and available asthma control services, outline major strategies and activities, and identify resources and collaborations needed to accomplish these goals.²⁵ Statewide asthma programs working in partnership with community-based

partners that work directly with communities disproportionately impacted by asthma is a strategy that is helping to improve asthma. Statewide and local partnerships increase the capacity to enhance asthma surveillance, improve asthma management, reduce exposure to environmental factors that exacerbate the risk of asthma, and ultimately reduce disparities in asthma outcomes.

Over the past decade, congressional appropriations for the NACP have vacillated between approximately \$23 million and \$30 million. The NACP received \$30.5 million for Fiscal Year (FY) 2022. This level of funding has allowed the NACP to provide grants to 23 states, Puerto Rico, and Houston, Texas. To be able to fund comprehensive asthma programs in all 50 states, the District of Columbia, and all U.S. territories, the NACP would require approximately \$65 million in funding from Congress. Federal legislation known as the Elijah E. Cummings Family Asthma Act would authorize just this amount. Ultimately, this level of funding is what is required to enable all individuals in the United States to benefit from the impactful activities of a comprehensive asthma program.

The federal government and states should institute a comprehensive, nationwide asthma surveillance system that provides timely and relevant data.

- Asthma surveillance systems should include the collection of asthma data at both the national and the state level.
- The asthma surveillance system should collect or coordinate with other agencies/organizations to obtain data and report measures that are nationally consistent by patients' age, sex, race, ethnicity, occupation, and socio-economic status.
- The asthma surveillance system should track asthma prevalence, morbidity and mortality, and coordinate with other data gathering efforts.
- The asthma surveillance system should explore obtaining data from non-traditional sources, including federally qualified health centers (FQHC), government (Medicaid or Children's Health Insurance Program [CHIP]), private insurance, hospitals, and schools.

About the evidence. National data is available on asthma prevalence, activity limitation, days of work or school lost, rescue and control medication use, asthma self-management education, physician visits, emergency department visits due to asthma, and mortality due to asthma from National Center for Health Statistics' (NCHS) National Health Interview Survey (NHIS), National Ambulatory Medical Care Survey (NAMCS),

National Hospital Ambulatory Medical Care Survey (NHAMCS) and the Vital Statistics System. In addition, national data on asthma-related hospitalizations and emergency department data for some states are from the Agency for Healthcare Research and Quality's (AHRQ) Healthcare Cost and Utilization Project survey (HCUP). At the state level, adult and child asthma prevalence is available from the Behavioral Risk Factor Surveillance System (BRFSS). BRFSS is a system of health-related telephone surveys that collects information about prevalence of major behavioral risks associated with adults ages 18 and older.²⁶ States may opt to include children in the survey. The Asthma Call-back Survey (ACBS) adds considerable depth to the existing body of asthma data. It addresses critical questions surrounding the health and experiences of children and adults with asthma and provides data at the state and local level. The 2018 ACBS survey included 31 states and Puerto Rico. Any state can apply for funds to conduct the ACBS. If more funding were available to states or territories, more states could apply and improve the data set.

Asthma surveillance should also be able to track environmental and social factors related to health disparities that contribute to high rates of poorly controlled asthma. Some of the environmental factors associated with asthma exacerbations include particulate pollution, pollen, mold, secondhand tobacco smoke, dust mites and cleaning chemicals²⁷ as well as inhaling dusts, gases, fumes from chemicals or other substances while at work.²⁸ Other factors that are attributed to health disparities in asthma include social drivers such as poverty, where people live, age and quality of housing, and access to quality healthcare services.

Federal, state and local governments' natural disaster response plans and climate resilience plans should address the needs of people with asthma.

- Federal, state and local governments should consider the current and future impacts of natural disasters and climate change on air quality in their natural disaster response plans and climate resilience plans.
- Federal, state and local governments should include air quality experts and asthma control programs in their stakeholder engagement efforts when planning and implementing natural disaster response plans and climate resilience plans.
- Federal, state and local governments should ensure that natural disaster response plans and climate resilience plans address populations with chronic lung conditions that may be disproportionately impacted by poor air quality.

About the evidence. Asthma and other chronic conditions can be worsened during natural disasters as a result of disrupted access to asthma medicines and healthcare, stress, or exposures to pollutants such as wildfire smoke or mold after flooding. Acute respiratory infections and exacerbations of chronic lung conditions are common after natural disasters, and preparedness and response efforts should be aware of and plan for associated healthcare needs.²⁹ An increased focus on personal preparedness for individuals, improvements in informatics and availability of healthcare records, and increased capacity via standardized post-disaster treatment plans and first responder training can help reduce the demand for care of chronic respiratory diseases in the wake of a hurricane, wildfire or other disaster.³⁰

CDC is using its public health expertise to help state, tribal, local and territorial health departments prepare for and respond to the health effects that a changing climate may bring to their communities. CDC's Climate-Ready States and Cities Initiative (CRSCI) is helping grant recipients use the five-step Building Resilience Against Climate Effects (BRACE) framework to identify likely climate impacts in their communities, potential health effects associated with these impacts and their most at-risk populations and locations.³¹ The BRACE framework then helps these jurisdictions develop and implement health adaptation plans and address gaps in critical public health functions and services.³²

CDC's Climate and Health Program recently released a new approach to climate change-related health effects that expands CDC's climate and health activities to build capacity in communities to prepare for and respond to health impacts of climate change.³³ Air quality is a key concern with preparing for and responding to the impacts of climate change, as climate change may cause increased frequency and intensity of wildfire events, high smog days, flooding events and extended pollen seasons, all of which can have impacts on respiratory health.³⁴

For personal preparedness, CDC provides guidance on asthma management during hurricanes and includes a guide on safe asthma medication use after natural disasters.³⁵ This guidance emphasizes the need for a three-month supply of medications, related equipment and documentation—such as an asthma action plan—as well as getting the flu vaccine. Several national non-governmental organizations also provide asthma-specific information to help individuals prepare for and recover from hurricanes, wildfires and other disaster events.^{36, 37, 38, 39}

Outdoor Air

Guiding Principles

The following principles should be considered in implementing asthma policy recommendations relating to outdoor air:

- Equitable protection from breathing outdoor air pollution should exist for people with asthma throughout the country.
- Actions taken to reduce outdoor air pollution should include strategies that reduce air and climate pollution caused by building infrastructure and emissions from the energy and transportation sectors.
- Mitigating climate change by reducing greenhouse gases is critical to protecting people with asthma.
- Many people face higher exposure to pollution because of pollution sources near their residence or community, furthering health disparities. Communities may face multiple sources of pollution that contribute to greater cumulative harm. Stronger and/or targeted measures and investments will be needed to reduce exposure and pollution levels.

Overview

Outdoor air pollution poses a wide range of public health challenges, especially for people with asthma who face greater risks of negative health effects. Additional groups who are at higher risk of health harm from air pollutants include children, older adults, people of color, low-income populations, people with cardiovascular disease or diabetes, people who work or exercise outdoors and people who live or work near busy highways. Communities of color and low-income communities may be more susceptible to air pollution because they are more likely to have power plants, industrial facilities, major roads and other sources of air pollution nearby. Much of this inequity is rooted in the long history of systemic racism in the United States, including the practice of redlining, wherein discriminatory policies and practices around real estate have, in practice, led to racially segregated neighborhoods. When people with asthma fall into one or more of these additional at-risk groups, the potential for health impacts is even greater.

The year 2020 marked the 50th anniversary of the federal Clean Air Act, which aims to protect human health from dirty air by requiring the U.S. Environmental Protection Agency (EPA) to set limits, called National Ambient Air Quality Standards (NAAQS), on

certain air pollutants. Thanks to this law, the nation enjoys much cleaner air overall today, but challenges remain. First, too many communities located near polluting sources are still awaiting cleanup. And second, climate change is already adding to the challenges of achieving clean, healthy outdoor air for all people. Rising temperatures are leading to higher levels of ozone (“smog”) formation; hotter, drier conditions are contributing to drought and wildfires that add to existing particle pollution; and the changing climate is leading to longer, more intense allergy seasons. The health impacts of climate change, driven in part by these impacts on air quality, are projected to dramatically worsen without decisive action to reduce greenhouse gas emissions.

Climate change is driven by many of the same sources that emit other harmful air pollution, including fossil fuel-fired power plants and gasoline- and diesel-powered vehicles and equipment. A nationwide transition to zero-emission vehicles and clean, non-combustion renewable electricity can reduce air pollutants that cause immediate harm and reduce greenhouse gases at the same time, improving air quality for people with asthma in both the short- and long-term.

Policy Statements and Supporting Strategies

Federal, state and local governments should support and implement the Clean Air Act to reduce asthma risk from outdoor air pollution.

- U.S. Environmental Protection Agency (EPA) should adopt and implement strong national measures to reduce emissions of outdoor air pollutants that cause or worsen asthma and contribute to climate change.
- EPA should adopt strong, science-based National Ambient Air Quality Standards (NAAQS) that provide an adequate margin of safety for people with asthma and other more vulnerable populations.
- EPA, states and local governments should ensure reductions in emissions, so air quality meets the NAAQS, and so that more local, community-level sources of harmful pollution are addressed.
- Federal, state and local agencies should use Clean Air Act tools and other steps to reduce air and climate pollution.

About the evidence. The Clean Air Act provides a suite of proven tools to improve air quality. From 1980 to 2020, emissions of common air pollutants declined 73% while the

nation's gross domestic product (GDP) grew 173%.⁴⁰ However, there is still much work to do to fully implement the law.

The NAAQS process laid out in the law requires that EPA set the national limits on ozone, particulate matter and four other criteria pollutants at the level requisite to protect the public health, with an adequate margin of safety, and that the agency review the science regularly and update the NAAQS, if necessary. The evidence has shown that ozone and particulate matter are more harmful than previously realized and the current standards do not adequately protect people with asthma.^{41, 42} Updated NAAQS for these pollutants that reflect the current science would drive reductions in emissions nationwide as states with unhealthy levels of these pollutants work to meet the standards.

EPA also has the authority to require greater reductions in emissions for power plants, the oil and natural gas industry and vehicles, including greenhouse gas emissions. Stronger rules covering these sources are critical to driving a nationwide transition to zero-emission electricity and transportation. The regulations resulting from the Clean Air Act have the potential to improve health equity for people with asthma if they not only drive down overall greenhouse gas emissions, but also maximize reductions in localized sources of air pollution. EPA must also enforce regulations currently in place to ensure that communities see the promised benefits of air pollution cleanup.

States and communities should reduce greenhouse gases to minimize climate change, and prepare communities for hotter temperatures, more high-ozone days, extreme weather, flooding, drought, wildfires and smoke to reduce risk for people with lung disease.

- States and communities should minimize climate change by cleaning up major sources of carbon pollution and other greenhouse gases, including power plants, industrial facilities, cars, trucks, and other mobile sources. These policies must:
 - Adopt science-based targets to prevent global warming above 1.5° C.
 - Maximize benefits to health by reducing carbon and methane pollution while reducing other dangerous emissions from polluting sources.
 - Ensure pollution is cleaned up in all communities, prioritizing those near polluting sources who have historically borne a disproportionate burden from air pollution.

- Leave the Clean Air Act fully in place. Any policy to address climate change must not weaken or delay the Clean Air Act or the authority that it gives EPA to reduce carbon emissions.

About the evidence. Action on climate change is needed at every level of society, including from state, Tribal, local and community governments. Strong federal action must be paired with additional actions at the state and local level to protect people with asthma from the impacts of the changing climate. At the state level, most states have adopted Renewable Electricity Standard or Clean Electricity Standard policies designed to transition electricity production from fossil-fuel-powered to more clean or renewable sources.⁴³ However, of these states, only 12 plus the District of Columbia require 100% clean electricity by 2050 or earlier. The Clean Air Act also allows California to set stronger motor vehicle emissions standards than the federal government and other states to opt into California's standards. As a result, 16 states have adopted California's vehicle regulations.⁴⁴ Opportunities abound for additional states to set or strengthen policies to drive their transitions to zero-emission electricity and transportation.

Actions at the local level can also provide reductions of both greenhouse gases and other dangerous air pollutants, and cities nationwide are taking steps to do so. For example, the Climate Mayors coalition, a network of more than 470 mayors nationwide, has compiled city-level climate actions, including city solar installations, bike share programs, renewable energy purchases, energy efficiency measures in city facilities, building codes that will require new construction be net-zero energy, and installation of electric vehicle charging stations.⁴⁵

In addition, states and communities must address the health impacts of climate change that cannot be avoided. CDC's BRACE framework helps communities project the health burden of climate impacts, assess interventions, and develop and implement plans to protect the public.⁴⁶ The American Public Health Association offers additional informational resources for local health departments on understanding and addressing the inequitable health impacts of climate change, including air quality issues that disproportionately affect people with asthma.⁴⁷

State and local governments should prioritize environmental justice through community-informed and directed healthy air protections and investments in disproportionately impacted communities.

- Implement environmental policies and best practices such as those outlined in CDC's "EXHALE Fact Sheet on Environmental Policies and Best Practices to Reduce Asthma Triggers."

- Enhance publicly available air quality and health data through expanded monitoring networks to identify major sources of pollution burdens at the community level and inform targeted clean-up efforts in areas disproportionately impacted by asthma.
- Reduce burdens caused by the fossil fuel industry through increased investment in energy efficiency and zero-emission alternatives for transportation, energy, home heating and cooking and other end uses to reduce asthma exacerbations.
- Make public funding for transportation projects conditional on verifiable emission reductions and providing alternatives to driving by increasing pedestrian, bicycle and transit infrastructure and service).
- Reduce harmful industrial and commercial practices that can exacerbate asthma, including agricultural burning, oil and gas flaring and broadcast applications of toxic pesticides.
- Transition to zero-emission technologies for on- and off-road vehicles and equipment (cars, school buses, transit, trucks, port equipment), such as by purchasing zero-emission school buses to replace diesel buses.
- Transition to zero-emission appliances for home heating and cooking to reduce and eliminate health impacts caused by combustion.
- Reduce emissions of pollutants from fossil fuel-fired power plants, especially sulfur dioxide and nitrogen oxide emissions, and transition to clean, non-combustion renewable electricity.
- Prohibit or restrict outdoor wood boilers (outdoor hydronic heaters) and require cleanup or retirement of existing units.
- Reduce agricultural sources of emissions, such as agricultural burning and diesel trucks, tractors, pumps and other equipment.
- Adopt policies that reduce the use of motor vehicles, promote more compact and walkable community development, and encourage transit use, bicycling and walking that is safe and accessible to all communities, especially those that have been historically under-invested in and impacted negatively by transportation investments.
- Adopt or expand mass transit and other shared mobility options that reduce emissions from motor vehicles and expand the benefits of healthier, less polluting forms of travel.
- Adopt policies to transition to zero-emission vehicles, including investment in infrastructure and programs that ensure equitable distribution of the health

benefits of zero-emission cars, school and transit buses, trucks and other transportation sources.

- Implement policies and programs to reduce exposure to air pollution in disproportionately burdened communities.

About the evidence. EPA defines environmental justice as “the fair treatment and meaningful involvement of all people regardless of race, color, national origin or income with respect to the development, implementation and enforcement of environmental laws, regulations and policies,” and further says that fair treatment “means no group of people should bear a disproportionate share of the negative environmental consequences from industrial, governmental and commercial operations and policies.”⁴⁸ Of course, the nation has much work to do before people in all communities experience fair treatment. Currently, people of color, low-income and indigenous communities experience disproportionate harms from pollution, including health harms, which puts people with asthma in these communities at additional risk.⁴⁹

EPA offers states and communities resources to identify environmental justice concerns, including EJSCREEN, a tool that overlays data on low-income populations and people of color with several environmental health indicators, including outdoor ozone and particle pollution levels. However, additional monitoring is critical to capture specific and timely air quality concerns that affect people with asthma in communities with environmental justice concerns. The White House Environmental Justice Advisory Council (WHEJAC) issued recommendations for the federal government in 2021 that include ensuring that each state adequately monitors pollution in frontline and fence-line communities, including hyperlocal measurements in communities that lack these data.⁵⁰

The use of combustion—whether of coal or natural gas at a power plant, of wood in an outdoor boiler or residential woodstove, or of gasoline or diesel in vehicles and equipment—creates harmful emissions and puts people with asthma at risk. Programs that transition away from combustion and reduce demand for combustion-based energy are critical for cleaning up air pollution at the community level. The WHEJAC recommendations also include policies to incentivize community solar projects; invest in battery storage; transition to clean energy; invest in transit hubs; electrify school buses and sanitation trucks and provide job training in the renewable energy industry.⁵¹

The agriculture industry is another source of local pollution and greenhouse gases due to fossil-fuel powered equipment, erosion and tilling of soil, agricultural burning and fertilizer use. EPA offers guides to understand the agricultural best practices to reduce these impacts.⁵² Pesticides have additional health risks associated with them, including asthma and other lung problems, and pose a danger to the workers who apply them.⁵³

The National Pesticide Information Center offers guides to understand the risks and reduce exposure.⁵⁴

The above steps to reduce emissions can be paired with additional measures that help mitigate the harm of existing air pollution. For example, in areas prone to exposure to wildfire smoke, residents may benefit from programs that provide access to mechanical air filtration devices (air cleaners) to help them create a space in their home in which it is safer to breathe during smoke events.⁵⁵ Important considerations include focusing on effective devices that do not produce ozone or other additive technologies and informing the public about key considerations for their use, including sizing of the device relative to the room.

Healthcare Systems and Financing

Guiding Principles

The following principles should be considered in implementing asthma policy recommendations relating to healthcare systems and financing:

- The healthcare system, in partnership with other sectors, should work to address the medical needs and social determinants of health for people with asthma, and communities with the highest burden.
- All patients should receive high-quality, culturally competent, guidelines-based asthma care regardless of race, ethnicity, sex, sexual orientation and gender identity, age, disability, immigration status, socioeconomic status or geographic location.

Overview

Access to high-quality, affordable healthcare coverage is critical to improving the health of people with asthma and reducing health disparities. Since the passage of the Affordable Care Act (ACA) in 2010, historic progress has been made. Patients with pre-existing conditions like asthma can no longer be denied coverage or charged more because of their health status. The ACA also provides subsidies to purchase health insurance, enables states to expand Medicaid coverage, and allows young adults to stay covered by their families' health insurance until age 26. As a result of these changes, the number of uninsured individuals dropped from 46.5 million in 2010 to 26.7 million in 2016, with some of the largest coverage gains among low-income individuals and people of color.⁵⁶

The past decade has also seen significant changes in where patients can access healthcare services. In 2014, the Centers for Medicare and Medicaid Services (CMS) reversed its free care policy, expanding the ability of school-based health programs to provide services for individuals with Medicaid coverage.⁵⁷ This policy change, for example, expands the ability of school health professionals to provide, and be reimbursed for, self-management education for students with asthma. Additionally, as a result of the COVID-19 pandemic, federal and state lawmakers have made temporary and permanent policy changes to increase the number of patients who can access healthcare services via telehealth, including care needed to manage asthma.

Despite this progress, many patients with asthma are still not getting the care that they need from our nation's healthcare system. Twelve states have failed to expand Medicaid, leaving the most vulnerable people in those states without access to healthcare.⁵⁸ The number of uninsured individuals has also increased from 2016 to

2019, and disparities in coverage still remain, with people of color more likely to be uninsured than white individuals.⁵⁹ The passage of expanded financial assistance for coverage through the American Rescue Plan Act, as well as new investments in outreach and enrollment, appear to be helping to reverse this trend, with the number of uninsured individuals once again falling in both 2020 and 2021.⁶⁰

Policy Statements and Supporting Strategies

All people with asthma should have comprehensive, affordable, and accessible healthcare coverage to improve overall health and quality of life.

- Maintain and expand access to Medicaid, CHIP and other affordable health insurance coverage options for eligible populations.
- Ensure that Medicaid and other payers include all asthma treatments and home-based asthma services that reduce or eliminate environmental asthma triggers recommended by national evidence-based guidelines in coverage policies.
- End policies that require patients to change medications when they are already well controlled (non-medical switching) and other practices that interfere with patients' ability to control their asthma.
- Limit out of pocket costs for patients to support adherence to medications and other treatments.

About the evidence. Medicaid remains an important source of coverage for patients with asthma; for example, nearly half of children with asthma receive their coverage through Medicaid or CHIP.⁶¹ Research on the ACA's Medicaid expansion highlights the beneficial impact of Medicaid coverage on patients with asthma. For example, Medicaid expansion is associated with a reduction in preventable hospitalizations for asthma and other chronic conditions.⁶² Another study found that Medicaid expansion is associated with improvements in quality measures related to asthma management at federally qualified health centers, an important source of care for patients with lower incomes.⁶³

Recognizing the burden of asthma in the Medicaid population, with the support of CDC, the American Lung Association launched the Asthma Guidelines-Based Care Coverage Project in 2015 to track asthma guidelines-based care in state Medicaid programs. The first peer-reviewed study from this project, published in *Preventing Chronic Disease* in September 2018, found a lack of consistent and comprehensive coverage of guidelines-based asthma care across state Medicaid programs as well as multiple

barriers to care.⁶⁴ Project data are updated annually and continue to show much room for improvement in this area.⁶⁵

The 2009 National Asthma Public Policy Agenda recognized the burden that restrictive formularies and high costs for care have on patients with asthma, problems that unfortunately remain a decade later. Non-medical switching—where health plans require patients to change their asthma medication to one that has preferred status on their formulary, sometimes repeatedly—can have a long-term negative impact on patients’ asthma control.⁶⁶ Additionally, high deductible health plans have grown significantly over the past decade, and while the Internal Revenue Service updated guidance in 2019 to clarify that inhaled corticosteroids for asthma management should be covered by these plans as preventive care before patients hit their deductibles,⁶⁷ many medications, devices and other treatments to manage asthma are not subject to this policy, leaving patients at risk for high costs.⁶⁸

According to a poll conducted by the Kaiser Family Foundation in 2021, 26% of individuals report having trouble affording their prescription medications, and three in 10 adults report having not taken medications at some point in the previous year due to cost.⁶⁹ Research has shown that higher cost-sharing is associated with reduced treatment for patients with asthma,⁷⁰ and even copayments as low as one to five dollars can result in reduced use of necessary healthcare services by individuals with lower incomes.⁷¹

Private health insurance, Medicare and Medicaid should develop and implement policies and payment systems to support the delivery of guidelines-based asthma care, address social determinants of health and eliminate disparities.

- Implement activities such as those outlined in CDC’s EXHALE Guide for Medicaid and Children’s Health Insurance Program (CHIP) Leaders or CDC’s EXHALE Guide for Managed Care Leaders and Staff.
- Ensure that prescription formularies include a full range of medication options for quick-relief and long-term control of asthma in accordance with the National Asthma Education and Prevention Program (NAEPP) guidelines for diagnosing and managing asthma.
- Develop and test innovative payment models that incentivize providers and cover treatments and services to support the needs of people with asthma.
- Develop and implement coding, coverage and reimbursement policies for payment for home-based asthma services, including environmental remediation.

- Develop and implement sustainable financing mechanisms to better integrate services provided by community health workers into the healthcare delivery system.
- Expand access to telehealth services.

About the evidence. The ACA expanded opportunities related to payment reform to test new models that can decrease costs and improve patient care, a potential pathway to translate innovations in clinical practice into public health advancements.⁷² Institutions like the Medicaid and CHIP Payment and Access Commission (MACPAC) are studying the implementation of value-based payment models in state Medicaid programs, which will be important to ensure the innovations in this area reach the underserved populations enrolled in these programs.⁷³

With regard to asthma specifically, stakeholders have increasingly focused on achieving coverage and reimbursement for home-based asthma interventions that have a strong record of improving asthma control as well as a positive return on investment.⁷⁴ While the Asthma Guidelines-Based Care Coverage Project has shown low uptake of these interventions by state Medicaid programs, many state asthma programs are working to expand coverage in this area.⁷⁵ In 2021, the Centers for Medicare and Medicaid Services (CMS) released guidance on opportunities in Medicaid and CHIP to address social determinants of health, including interventions to address triggers in the home environment for patients with asthma.⁷⁶ Efforts to expand coverage and reimbursement for community health workers in state Medicaid programs are closely related to efforts to expand coverage of home-based asthma interventions, and a recent review found emerging evidence of a positive return on investment from home-based asthma interventions led by community health workers (CHW).^{77, 78} Because of the critical role of CHWs in providing culturally competent care in their communities, expanding and integrating their services into the healthcare system could also be an important component of efforts to eliminate health disparities among patients with asthma.⁷⁹

The COVID-19 pandemic has dramatically expanded the adoption of telehealth. Some states have already moved to make temporary changes to expand access to telehealth visits with providers permanent.⁸⁰ Some state asthma programs have worked to make interventions like in-home environmental assessments for patients with asthma available virtually or using hybrid models (in-person plus virtual visits).⁸¹ Evaluations of transitions to virtual implementation of home visit programs that include home environmental assessments and self-management education will be key to building the evidence-base for longer-term policy change related to the delivery of asthma services via telehealth.

Provider teams should deliver services and treatments consistent with the National Asthma Education and Prevention Program guidelines for the diagnosis and management of asthma with appropriate care coordination.

- Implement the activities outlined in CDC’s EXHALE Guide for Healthcare Professionals.
- Provide self-management education using evidence-based interventions by trained professionals as a standard of care.
- Develop and use asthma action plans for all patients.
- Provide case management and care coordination, including home-based asthma education, environmental assessment, remediation, and referrals to other social supports or resources, for high-risk patients and those whose asthma is not well controlled.
- Provide tobacco dependence treatment and pharmacological therapy to smokers who have asthma or who have family members with asthma.
- Recruit and train a diverse workforce to care for patients with asthma, including community health workers (CHW), pharmacists and other members of patients’ care teams.

About the evidence. Many of the strategies in this section were included in the 2009 National Asthma Public Policy Agenda and remain relevant today. In 2020, the National Heart, Lung and Blood Institute released the *2020 Focused Updates to the Asthma Management Guidelines: A Report from the National Asthma Education and Prevention Program Expert Panel working group*.⁸² These updates have important implications for asthma management, and it will be important to track their implementation to determine whether additional strategies are needed to ensure providers teams are equipped to deliver guidelines-based care.

The strategy about recruiting and training a diverse workforce recognizes the increased focus on reducing health disparities in asthma policy work over the past decade. Research has shown that patients benefit when receiving care from diverse teams, with diversity defined by race, age, educational status, and other similar factors.⁸³ CHWs have been well-documented in the literature to provide asthma home environmental assessments and asthma education. Since the publication of the 2009 Agenda, CHWs delivered a range of home-based asthma services including home environmental assessments, trigger reduction education, and asthma self-management management education⁸⁴ and have improved outcomes (e.g., reduced

emergency department visits, hospitalization, and asthma symptoms) in underserved communities.^{85, 86}

The healthcare system should develop and meet quality improvement goals that improve outcomes for patients with asthma.

- Implement the activities outlined in CDC’s EXHALE Guide for Healthcare System Executive Leaders.
- Revise, expand or develop national performance measures aligned with national standards to better measure asthma control and quality of care.
- Provide comprehensive and consistent data that is reported across healthcare systems, including through electronic health records, to improve asthma surveillance and tracking of asthma outcomes and disparities.

About the evidence. There are multiple quality measures related to asthma, including the asthma medication ratio (AMR), which measures level of control and, by extension, the quality of the asthma care patients receive based on their medication use.⁸⁷ The AMR is included in both the Child Core Set and Adult Core Set, measures that CMS recommends state Medicaid programs report on. Beginning in 2024, all states will be required to report on the Child Core Set of measures to CMS, including the AMR.⁸⁸ Moving to mandatory reporting will make the federal quality data set more robust and should drive providers to deliver evidence-based care. However, some stakeholders believe these measures are insufficient and have begun discussing other possible measures that better capture the quality of patients’ asthma care.⁸⁹ For example, Green & Healthy Homes Initiative collaborated with stakeholders to develop a standard set of measures for the reimbursement of in-home environmental health services as part of comprehensive asthma care.⁹⁰

Accessing and analyzing claims data and other sources of data are vital to evaluating progress in asthma care. Without high-quality data, ineffective programs may be difficult to identify and even harder to improve. Limitations and challenges exist with respect to accessing or acquiring large administrative data files, data management, data integration and, most importantly, data quality issues. Alternative sources of asthma-related data (such as surveys) rely on patient self-reporting, which can be unreliable. The need for high-quality, accessible data remains a significant challenge.

Homes

Guiding Principles

The following principles should be considered in implementing asthma policy recommendations relating to homes:

- Policies for homes include all residential settings, including single and multi-unit housing, group homes, shelters, institutionalized settings, etc.
- Housing codes are public health tools that can and should be used to improve indoor environmental quality in homes of residents who have asthma.
- Harmful pollutants generated from the use of e-cigarettes and the combustion of tobacco products, wood and fossil fuels for heating and cooking should be eliminated from homes.
- “Green building” guidelines do not necessarily provide adequate protection from asthma health concerns.
- People with asthma should have access to affordable, safe, healthy and climate-resilient homes and neighborhoods.

Overview

The home is where most people spend much of their time, from infancy through old age. There are many factors that affect the quality of the home environment and the health of its residents, including the age and physical condition of the structure, the materials used in the building and furnishings and the activities of the occupants.

Homes of all types often contain known triggers for asthma exacerbations, including dampness and mold, dust mites, pests, secondhand smoke, cleaning chemicals, pesticides, disinfectants and fragrances. Numerous studies have linked the indoor environment with the development and exacerbation of asthma. Measures recommended to reduce asthma triggers in the home include controlling humidity levels and fixing water leaks, removing carpeting/rugs in bedrooms, vacuuming carpets, area rugs and floors regularly using a vacuum with a HEPA filter, eliminating cockroaches and rats, not using cleaning compounds or disinfectant that can aggravate asthma, using special covers on mattresses and pillows, and reducing indoor combustion, including smoking.

Since there are few policy approaches available that apply to private residences, most control strategies for asthma triggers in homes are voluntary. Even in rental and multi-unit housing, building owners and managers have a lot of autonomy when establishing

rules and practices for maintaining their properties. The three main types of state and local laws that address the indoor environment in rental and multi-unit housing are housing codes, landlord-tenant laws and laws or rules regulating specific indoor pollutants, such as secondhand smoke.

The policy recommendations in this section have remained much the same as in the original 2009 National Asthma Public Policy Agenda. One important addition is the recognition that healthy housing will need to be made resilient to the effects of climate change, including increasing temperatures, wildfires and flooding. Progress on policy change in housing over the last 10 years has been for the most part slow, incremental and localized. One significant exception has been the increase in the number of smoke free laws and policies, especially in public housing.

Secondhand smoke is a serious health hazard causing or making worse a wide range of diseases and conditions, including asthma. Children are particularly at risk as, according to the U.S. Surgeon General, exposure to secondhand smoke causes more frequent and more severe asthma episodes.⁹¹ In the decade since this agenda was last updated, the U.S. Department of Housing and Urban Development took a major step forward when it finalized and implemented a rule requiring public housing agencies to prohibit smoking in all public housing. This rule is expected to significantly reduce exposure to secondhand smoke among public housing residents who are disproportionately exposed.

Policy Statements and Supporting Strategies

Housing agencies should adopt housing codes that protect people with asthma from exposure to indoor air pollutants, irritants and allergens.

- Adopt and proactively enforce healthy housing standards in state and local housing codes.
- Use integrated pest management (IPM) techniques in multi-unit housing.

About the evidence. Housing codes are a set of tools used by states and municipalities to set minimum standards for the maintenance of residential buildings. Most U.S. cities, counties and states that adopt and enforce housing codes opt to base them on model codes developed by the International Code Council. The purpose of housing codes is to preserve a building's structural and weather-resistant performance and ensure a minimum level of safety and sanitation for residents and the community.

Many of the standard housing codes touch on issues that affect occupant health, including peeling paint, mold and moisture and cockroach and rat control, but health is not usually the primary focus. To better connect the housing and public health sectors, the American Public Health Association and the National Center for Healthy Housing published the National Healthy Housing Standard in 2014.⁹² This evidence-based Standard includes many provisions for maintaining healthy indoor air quality and facilitating the environmental management of asthma. The Standard is written in housing code language to complement the International Property Maintenance Code. It is intended for use by housing advocates, public health professionals, elected officials, code agency staff and community members interested in strengthening their local codes.

As the evidence for the impact of housing on health has grown over time, more states and municipalities have taken steps to address the problem of substandard housing through code changes. In 2018, for example, the New York City Council passed a law to amend the city's housing maintenance code to require private landlords to prevent and remediate indoor asthma triggers in their multi-unit residential buildings. The law lays out detailed provisions for addressing mold and pests and is notable for its mandate to use IPM practices to minimize the use of chemicals in controlling pests. IPM as defined by the EPA is "an effective and environmentally sensitive approach to pest management that relies on a combination of common-sense practices."⁹³ However, there is a need for additional state and federal funding opportunities for housing agencies to address indoor environmental quality conditions in subsidized and public housing.

State and local health departments and housing agencies should enforce housing codes to protect people with asthma from exposure to indoor air pollutants, irritants and allergens.

- Provide training for housing code enforcement officials on applying codes to address indoor environmental quality problems.
- Provide proactive inspections of rental housing.
- Provide authority and capacity for local health departments to take legal action to enforce indoor environmental quality-related codes and laws (including nuisance laws).
- Provide capacity within state and local housing inspection agencies to offer specialized services to identify and remedy indoor environmental quality problems where families with asthma reside.

- Improve legal and other recourse for tenants to ensure enforcement of local laws (including judicial education, increasing legal services and tenant education) without risk of displacement.
- Provide capacity for state and local health departments to offer guidance to property owners on identifying and remediating indoor environmental quality problems, including information on smokefree policies.

About the evidence. Enforcement of housing codes has the potential to be a powerful tool in the environmental management of asthma, but there are many challenges to implementing it effectively. Just as housing codes are most often focused on basic safety and sanitation, rather than health, so too are most code enforcement efforts. In most places, inspection by code enforcement officers is based on complaints, rather than being done systematically, so serious health and safety problems can be missed until they become a crisis. Complaints about housing code violations are frequently based on exterior conditions such as trash and peeling paint, rather than conditions inside the home that affect occupant health. Tenants can be fearful of being displaced if they complain about their living conditions. Therefore, enforcement of laws should not put tenants at risk of displacement (e.g., raised rent, eviction).

To ensure that housing is safe and healthy, municipalities need a range of enforcement tools, including detailed, enforceable health-based code language, financial support to hire and train enforcement officers and community support for and cooperation with the program. Cross-agency collaboration is critical to ensure that all the various government agencies with enforcement authority in residential buildings are coordinating their efforts and services. The health department managing a home asthma program, for example, should be able to share information with housing inspectors to address a mold problem.

Making code enforcement less punitive and more collaborative has been shown to increase community support and compliance.⁹⁴ Alameda County in California adopted a cooperative compliance model, in which code enforcement officers work cooperatively with property owners to help them understand the elements of healthy housing, the importance of code compliance and how to bring the property into compliance. The code enforcement officer is also able to provide information about available resources to improve housing conditions and promote health. The Boston Public Health Commission's Breathe Easy at Home program is a web-based referral system that allows healthcare professionals to refer patients to receive a home inspection that is conducted by the Boston Inspectional Services Department (ISD). The ISD inspectors work with property owners to address poor housing conditions for people with asthma.⁹⁵

Multi-unit housing, including public and other federally supported housing, should be smokefree.

- Pass state and local laws and regulations to require smokefree multi-unit housing, including e-cigarettes and marijuana.
- Expand policy with the U.S. Department of Housing and Urban Development (HUD) to require all federally supported multi-family housing to be smokefree.
- Develop and disseminate guidance on best practices for enforcement of smokefree policies while minimizing displacement and eviction.
- Provide resources and services to support smokers wishing to quit.
- Collaborate with tenants' rights and other community-based organizations to develop and implement policies and best practices.

About the evidence. According to the U.S. Surgeon General, secondhand smoke has been causally linked to a number of diseases and conditions, including lung cancer, heart disease and stroke in adults and respiratory symptoms, including impaired lung function, lower respiratory illness, and sudden infant death syndrome among children. Children with asthma exposed to secondhand smoke have more severe and more frequent asthma attacks.⁹⁶ The Surgeon General has also declared that aerosol coming from e-cigarettes is “not harmless.”⁹⁷ In addition, secondhand marijuana smoke contains many of the same toxins and carcinogens found in directly inhaled marijuana smoke, in similar amounts if not more.⁹⁸ Therefore, e-cigarettes, marijuana smoking and vaping can be harmful to lung health.

Children have a higher prevalence of secondhand smoke exposure than adults, especially children age 3 to 11, and most exposure among children occurs in the home.⁹⁹ In 2019, an estimated 25.3% of middle and high school students reported secondhand smoke exposure in the home. Exposure is even higher for children living in multi-unit housing. Among children who live in homes in which no one smokes indoors, those children living in multi-unit housing such as apartments or condos have 45% higher cotinine levels than children living in single-family homes.¹⁰⁰

Disparities in secondhand smoke exposure also persist despite overall declines in the number of people exposed to secondhand smoke, especially for Black individuals and people who live below the federal poverty level.¹⁰¹ The disparities for Black people are particularly stark—50.3% of Black people who do not smoke are exposed compared to approximately 20% of white people and individuals of Mexican descent.¹⁰² In addition, while secondhand smoke exposure among U.S. youth in homes and vehicles significantly declined from 2011 to 2018, exposure among Black youth did not change.¹⁰³

On July 31, 2018, an important rule from HUD took effect that required public housing agencies to prohibit smoking in all public housing. Specifically, the rule prohibited the smoking of most tobacco products in all public housing living units and interior areas, including but not limited to hallways, rental and administrative offices, community centers, day care centers, laundry centers, and similar structures, as well as in outdoor areas within 25 feet of public housing and administrative office buildings.¹⁰⁴ The rule, unfortunately, does not include e-cigarettes, but individual public housing authorities can extend their policies to include them.

This rule is expected to reduce exposure to secondhand smoke for close to 2 million public housing residents and reduce episodes of asthma accordingly. Although not the main intent of the rule, it is also expected to reduce cigarette consumption and increase smoking cessation rates. One study of public housing residents in Milwaukee, Wisconsin, showed a decrease in secondhand smoke exposure after implementation of the rule.¹⁰⁵ Another study measuring air quality in Norfolk, Virginia, found that secondhand smoke exposure initially dropped one month after the rule's implementation, then increased relative to the previous year's exposure level several months later.¹⁰⁶ Both studies point to the need for ongoing implementation support, including ongoing education of public housing authority residents and staff, and thoughtful enforcement for the benefits of the rule to be fully realized. HUD, the American Lung Association, and many other organizations assembled implementation and smoking cessation resources based in part on previous voluntary adoption of smokefree housing policies by public housing authorities, and some organizations provided direct implementation support in the 18-month period between when the rule was finalized and implemented.^{107, 108}

At present, no efforts are underway to extend the smokefree policy to other federally subsidized housing, but that could be considered in the future to further reduce exposure to secondhand smoke among populations disproportionately exposed to secondhand smoke and e-cigarette aerosol.

Uptake of state or local laws prohibiting smoking in multi-unit housing has been much less widespread, with only a few communities in California adopting such laws. Over 10 states do explicitly prohibit smoking in the common areas of multi-unit housing as part of their laws prohibiting smoking in public places and workplaces. Efforts in certain communities to encourage voluntary adoption of smokefree multi-unit housing policies have been much more widespread, with programs existing or having existed in the majority of states.

State and local agencies should incorporate best practices for healthy and climate-resilient homes through construction, rehabilitation and repair of housing, including public and other federally supported housing.

- Identify substandard public and other federally assisted housing buildings and renovate according to best practices for healthy indoor environmental quality.
- Green building guidelines should incorporate healthy housing standards.
- Housing authorities should incorporate financing tools, including grants, loans and tax credits, to ensure safe and healthy properties.
- Ensure that federal policies for the funding of housing rehabilitation encourage following best practices for improving indoor environmental quality for housing rehabilitation and weatherization.
- Housing authorities should incorporate climate resilience into building construction, rehabilitation and repair with considerations of siting of residential buildings and flood protection; materials; heating, cooling and ventilation; energy sources; and zero-emission vehicle fueling infrastructure.

About the evidence. Much progress has been made in the last 10 years in identifying best practices in building and maintaining healthy and climate resilient homes. Research has shown that applying these practices can reduce asthma morbidity, including in public and federally subsidized housing.^{109, 110}

Climate change is affecting buildings and indoor environments as well as outdoor environments. Wildfires and extreme storms can cause extensive structural damage and leave toxic residue behind. Buildings can be modified not only to reduce their contributions to the fossil fuel use that drives climate change, but also to enhance their resilience in the face of climate impacts.¹¹¹

Changes made to homes to improve their energy efficiency are important to reduce demand for electricity that comes from polluting sources. Indoor air quality considerations must be incorporated into green building practices to ensure that measures that reduce airflow between the indoors and outdoors to reduce heating and cooling costs, for example, do not contribute to air quality problems.¹¹² EPA offers guidelines for energy upgrades in multi-unit and single family homes designed to inform contractors and environmental professionals for voluntary adoption by state, Tribal and local weatherization assistance programs, federally funded housing renovation programs and others.¹¹³ Initial considerations in single-family homes, for example, include ensuring that combustion appliances are properly vented, that exposure to building materials that may contain volatile organic compounds is

minimized, that flooring is water-resistant in areas prone to moisture, and that mold problems are remediated before buildings are upgraded.^{114, 115}

Additionally, EPA offers a compendium of green building codes and identifies which include indoor environmental quality factors.¹¹⁶ The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) offers a guide to ensuring healthy indoor air quality in design, construction and commissioning, including adequate air filtration.¹¹⁷

Federal, state and municipal governments and nonprofit organizations offer a patchwork of funding programs to help landlords and low-income homeowners with home repairs. HUD has several loan and grant programs to address housing-related health hazards, including asthma. USDA Single Family Housing Repair Loans and Grants provide funds to elderly and very-low-income homeowners to remove health and safety hazards, perform necessary repairs and make homes more energy efficient. Some communities use their HUD-funded Community Development Block Grants for housing code enforcement programs and housing rehabilitation efforts. Unfortunately, these funding programs are not available consistently across the country, and can be difficult to find and apply for, which limits the accessibility of proven best practices, especially for the most vulnerable populations.

Schools

Guiding Principles

- Closer coordination between schools and the healthcare system is critical to improve health outcomes for children with asthma.
- Provision of adequate health services requires creative solutions including private/public partnerships, use of health technicians, etc. Links between schools, private/public partnerships and other community services should be aggressively pursued and used.
- Although these policy recommendations focus on schools, children with asthma in all institutional settings, including childcare and residential programs, should receive similar protections.

Overview

Asthma is one of the most common chronic childhood illnesses in the United States, affecting 5.5 million children. Although common, asthma can be difficult to manage, and its impact on the well-being of children and families ripples through communities nationwide. In 2018, 44% of children with asthma reported missing at least one day of school due to asthma.¹¹⁸ Additionally, the average annual rate of children visiting the emergency room for asthma in 2016–2018 was 88.1 per 10,000, much higher than the rate for adults at 41.1 per 10,000.¹¹⁹ A student's health status can directly affect their attendance and academic achievement and may impact a parent's ability to go to work. For example, asthma is linked with chronic absenteeism, and students that miss fifteen or more school days a year are at an increased risk of dropping out of school.¹²⁰

Schools face several issues directly related to asthma—providing a healthy school environment, potential asthma emergencies, absenteeism, student and teacher productivity, health office visits, and access to life-saving asthma medications. Often, schools are not prepared to manage these issues, resulting in a school environment that may cause or worsen asthma symptoms and impede a student's learning.

In 2014, the Association of Supervision and Curriculum Development (ASCD) and the CDC launched the Whole School, Whole Community, Whole Child (WSCC) model. WSCC is an expansion of the CDC's Coordinated School Health model. The WSCC model does not replace the Coordinated School Health model, but rather expands on it and builds on the lessons learned through its implementation. It uses a collaborative approach to improve learning and health in schools across the country. The model

encourages engagement of the community, creating opportunities for schools to facilitate linkages to healthcare providers and other social services.

Over the last 10 years, some of the biggest advancements in school districts and schools that directly impact children with asthma have come from the adoption of policies that allow schools to stock quick-relief asthma medication, the use of Every Student Succeeds Act (ESSA) funds to improve school buildings, and opportunities through the reversal of the free-care rule for schools to receive Medicaid reimbursement to manage chronic conditions.^{121, 122, 123, 124, 125} In 2015, Congress passed the *School-Based Allergies and Asthma Management Program Act*. This law incentivizes states to require schools to have trained nursing or other personnel on staff, as well as require each student with asthma or allergies to have a personalized action plan.

ESSA replaced the “No Child Left Behind Act” in December 2015. ESSA is a law that governs school and school districts’ education policy for K-12. ESSA includes several provisions that support student health, such as: adding chronic absenteeism as a required indicator to school report cards for Title I schools; supporting school nursing services as a part of the Title I Schoolwide Program Plans; restructuring Title IV, Safe and Healthy Students, to require that eligible school districts conduct a needs assessment to identify the health and safety needs of their students; and recognizing both health education and physical education as part of a well-rounded education.¹²⁶ ESSA also requires states to include a measure of school quality or student engagement and over 30 states use chronic absence as that measure.¹²⁷ Schools eligible for ESSA funds could apply financial resources to develop school asthma management plans. An optimal asthma management plan for schools is one that supports a healthy school environment and implements appropriate policies and procedures to manage the medical aspects of students with asthma.

The opportunities presented by ESSA implementation for supporting healthy schools and student health and wellness can help to transform education to better support healthy schools and student health and wellness and address key health issues, such as asthma, that impact students’ ability to learn.

School health services are delivered primarily by the school nurse. School nurses play a pivotal role in the health and well-being of students with asthma. The school nurse is responsible for many critical components, including ensuring that quick-relief medication is at school for each student with asthma; implementing a student’s asthma action plan; administering medication or supervising the administration of medications; monitoring the student’s condition, and often providing asthma education to the rest of the school staff. School nurses are uniquely able to identify students whose asthma is not well controlled and to work with the family and the student’s asthma care clinician

to identify and implement the right control measures. Since the publication of the 2009 Agenda, there has been an increase in the number of School-based Health Centers (SBHCs) with over 2,500 now available in underserved communities.¹²⁸ In August 2015, the Community Preventative Services Task Force recommended “the implementation and maintenance of SBHCs in low-income communities to improve education and health outcomes.”¹²⁹ Communities with SBHCs have demonstrated decreases in asthma morbidity, emergency room visits and hospitalizations for asthma.¹³⁰ The National Association of State Boards of Education (NASBE), through its State Policy Database, tracks state health policies. NASBE tracks several state policies related to school-based health services, including policies that address on-campus health centers or clinics. Eighteen states and the District of Columbia have policies that address on-campus health centers or clinics.¹³¹

Policy Statements and Supporting Strategies

Every state should put in place laws and regulations to improve asthma management in schools.

- Establish laws to authorize stocking of asthma medication in schools.
- Provide funding to support school nurses in every school.
- Expand Medicaid programs to allow school districts to bill Medicaid for all Medicaid eligible services delivered to Medicaid enrolled students.
- State Boards of Education should create and disseminate standards or recommendations for healthcare services and alternative methods for providing care in schools in the absence of school nurses.
- State Departments of Health and State Departments of Education should coordinate activities to support asthma policies and practices in schools.
- States should use funding from and implement procedures recommended by ESSA to improve school buildings.

About the Evidence. When children with asthma go off to school, their safety and the management of their condition becomes the shared responsibility of the family, their healthcare providers and school personnel. Every state and the District of Columbia has passed a law allowing students with asthma to self-carry their asthma inhalers. However, there is still a range of policies and practices in place that create barriers to appropriate access to these potentially lifesaving medicines during the school day. In a 2014 issue brief, “Improving Access to Asthma Medications in Schools: Laws, policies,

practices and recommendations,” the American Lung Association identified six barriers to optimal access to asthma medications in schools, including local control, parental engagement, assessing a student’s readiness to self-carry, availability of back-up medication, protection from liability, and penalties that limit access to life-saving medication.¹³² Currently, 15 states have laws or state administrative guidelines allowing schools to stock quick-relief medications.¹³³ However, there is still much work that needs to be done in communities to fully implement the law. Once a law has been established, it is important for school districts and schools to put protective policies and practices into place, such as obtaining medication and supplies, training designated school staff in administering stock quick-relief asthma medication, and implementing a communication strategy to inform students, parents, staff, and the larger community. An American Thoracic Society policy statement, published in September 2021, provides a comprehensive guide for passing and implementing laws pertaining to stock asthma medication in schools.¹³⁴

Every state should provide funding for school nurses in every school. CDC estimates that 40% of school-aged children and adolescents have at least one chronic health condition.¹³⁵ The National Association of School Nurses and the American Academy of Pediatrics recommends at least one full-time school nurse per school.^{136, 137} However, there are no federal laws regulating school nurse staffing, and the Department of Education does not monitor the number of school nurses at the state or local level. For schools without a school nurse, state boards of education should intervene by providing guidance for schools to address health. ESSA funds could help to support school nursing services.

School nurses serve an important role in asthma treatment, including monitoring asthma, medication delivery and care coordination.^{138, 139} Studies have demonstrated that full-time school nurses reduce illness-related absenteeism. All states have a school Medicaid program that allows school districts to bill for certain Medicaid-eligible services, including nursing services. As of March 2022, 16 states have expanded their school Medicaid programs through the free care policy reversal to allow school districts to bill for additional services delivered to Medicaid enrolled students.¹⁴⁰ More than half of public schools (51.1%) bill for Medicaid reimbursement; however, reimbursements differ by state.¹⁴¹

Schools eligible for ESSA funds could also apply financial resources to develop school asthma management plans. An optimal asthma management plan for schools is one that not only manages the medical aspects of students with asthma but also implements appropriate policies and procedures to support a healthy school environment. A number of policies, programs and maintenance activities to ensure healthy indoor air at school can also help to protect students with asthma.

Approximately 87% of districts use integrated pest management, defined as an approach to pest control that seeks to minimize the use of pesticides. Integrated pest management uses methods that focus on preventing pests by eliminating pest access to food, water, and shelter in and around the school.

All educational facilities should adopt and implement policies and procedures for the medical management of asthma that are based on current research and best practices.

- Implement recommended strategies such as those outlined in CDC’s EXHALE Guide for Schools on coordination of care and educate all students with asthma and their caregivers on asthma self-management.
- Ensure that all students with asthma who are not well controlled are provided case management by a school nurse or other designated school personnel.
- Educate all educational personnel (especially health services, physical education teachers, coaches and athletic trainers) about asthma, including how to identify and respond to students at risk for a respiratory emergency.
- Establish and implement emergency protocols for students in respiratory distress.
- Designated school health staff should identify and track all students with a healthcare provider diagnosis of asthma and assess and refer students who may be at risk for asthma or have asthma that is not well controlled based on a nurse assessment for clinical diagnosis and treatment.
- Obtain and ensure the use of an asthma action plan for all students with asthma in all settings.
- Ensure students with asthma have immediate access to quick-relief medications by establishing protocols to define students’ assessment of readiness for self-carry and by stocking medication in school.
- Schools should identify alternative options for care when school nurses are not present, such as School-based Health Centers (SBHCs), community health workers or telehealth.

About the evidence. Children with asthma can experience symptoms that can lead to a life-threatening scenario while at school. School health services policies should ensure that the school nurse or other designated school personnel (for schools without

a school nurse or school nurses with limited availability) has a list of students with asthma; has an asthma action plan on file for each student; documents each visit to the school health office for medication use; and can quickly intervene when a child is in respiratory distress. In 2016, 76.2% of school districts reported having policies or practices in place for a school-based management program to manage chronic conditions. In addition, 66% of schools had procedures in place to provide instruction on self-management of chronic conditions, such as asthma.¹⁴²

School nurses play a critical role in the management of asthma in schools. According to the 2016 School Health Policies and Programs Survey (SHPPS), from 2000 to 2016, school nurses employed by the school district have decreased from 93.7% to 79.7%, and only 33.7% of school districts have a policy stating that each school will have at least one full-time school nurse.¹⁴³ Furthermore, the National Association of State Boards of Education (NASBE) state policy database identifies only two states (Delaware and Vermont) that require a full-time nurse in every school. School nurse availability in school buildings across campus and at all grade levels is addressed in policies in the remaining states but school nurse availability is limited.¹⁴⁴ In the absence of a school nurse, schools and school districts should consider alternate sources of care. School-based health centers can serve as an important source of asthma care particularly in schools that are in low-income communities.¹⁴⁵

Regardless of the availability of a school nurse, students with asthma need immediate access to quick-relief asthma medication. Even though every state and the District of Columbia have passed a law allowing students with asthma to self-carry their asthma inhalers, only 91.2% of districts had adopted policies that some students may carry and self-administer a prescribed quick-relief inhaler.¹⁴⁶ More can be done to educate schools and school districts to ensure that all children have immediate access to life-saving quick-relief asthma medication. Schools can add permissions to asthma action plans allowing students to self-carry, which becomes a shared decision between the child, parents, healthcare provider and school. In addition, schools can adopt policies to stock back-up quick-relief asthma medication to prevent emergencies for children that do not have medication available. Adopting standardized emergency procedures can benefit both diagnosed and undiagnosed students with asthma during unexpected respiratory distress.

After-school programs, youth serving organizations and licensed childcare systems should adopt and implement policies and procedures for the management of asthma that are based on current research and best practices.

- Communities should educate and train personnel from after-school programs, youth serving organizations and licensed childcare systems about effective asthma friendly policies and practices to improve childhood asthma.
- After-school programs, youth serving organizations and licensed childcare systems should implement emergency protocols for students in respiratory distress.

About the evidence. Over 10 million children participate in after-school programs.¹⁴⁷ Like schools, staff employed by licensed childcare centers, Head Start programs and out-of-school time programs (e.g., before- and after-school care, camps) should adopt asthma-friendly policies and practices. These out-of-school time programs often serve low-income, minority populations that have high rates of asthma. Additionally, CDC reports that about one in 10 preschool-aged children have an asthma diagnosis and this age group is twice as likely to end up in the emergency room or hospitalized because of their asthma.¹⁴⁸ Licensed childcare providers can implement effective interventions like the “Asthma Basics for Children” program which educates families and daycare providers to reduce asthma episodes including medication management and steps to improve the environment by removing asthma triggers.¹⁴⁹ These programs can educate parents and children about asthma, require asthma action plans on file for each child with asthma, conduct training about asthma to enable staff to recognize symptoms of asthma and respond to a child in respiratory distress, and implement policies and practices that improve the physical environment. Research has demonstrated that educating preschool staff in asthma while simultaneously providing at-home asthma education to parents can significantly improve asthma control, reduce hospitalizations and reduce oral corticosteroid use.¹⁵⁰

Similar to schools, after-school programs, youth-serving organizations and licensed childcare providers need to be trained to recognize a child in respiratory distress, have access to asthma medication, be able to assist the child in administering quick-relief asthma medication and call emergency services if necessary.

All educational systems should adopt and implement environmental assessment and management protocols that are based on current research and best practices.

- Develop, implement and sustain an indoor air quality program as detailed in U.S. Environmental Protection Agency’s Indoor Air Quality Tools for Schools.

- Educational systems should strive to have ventilation systems that meet the minimum guidelines of American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE).
- Educational systems should follow work practices to reduce exposure to cleaning agents and disinfectants that cause or aggravate asthma as recommended by EPA’s “Safer Choice” program.
- Require schools, grounds, facilities, vehicles and sponsored events to be 100% tobacco-free, including e-cigarettes.
- Schools should minimize students’ exposure to outdoor air pollutants on days with unhealthy levels of air pollution, including using ventilation/filtration and other strategies to reduce exposures while inside school buildings.
- Schools should adopt zero-emission technology for school buses, and policies to prevent school bus and personal car idling on school grounds.
- Schools should develop and implement a disaster response plan that addresses exposure to indoor and outdoor pollutants (e.g., mold, wildfires), access to asthma medication and cleaning up schools.

About the evidence. For more than three decades, the U.S. Environmental Protection Agency (EPA) has been working with school districts to create asthma management plans. IAQ management plans address dampness problems, mold contamination, maintenance and repairs, cleaning, integrated pest management and other factors. An asthma management plan includes four components: using EPA’s indoor air quality (IAQ) Tools for Schools, identifying students with asthma, providing school-based asthma education programs, and communicating with parents. Through years of implementation, EPA’s IAQ Tools for Schools program addresses six common issues that schools face: maintaining Heating, Ventilation and Air Conditioning (HVAC) systems for proper ventilation and filtration; inspecting and mitigating for mold and moisture; implementing integrated pest management (IPM) techniques; cleaning and maintenance practices; selecting low-emitting products; and eliminating sources of indoor pollutants by using and storing chemicals properly. School districts from urban, suburban and rural districts that have implemented the IAQ Tools for Schools program have demonstrated strategies to overcome barriers and improve student health.¹⁵¹

School environments can expose both children and staff to indoor and outdoor air pollution. The health effects of indoor and outdoor air pollutants, including asthma, are well established. Schools should choose asthma-friendlier cleaning products that clean and disinfect without serving as a respiratory irritant. The EPA’s “Safer Choice” program¹⁵² or the Cleaning for Asthma Safe School project by the California

Department of Public Health¹⁵³ helps consumers, businesses, and institutional buyers identify cleaning and other products that perform well, are cost-effective and are safer for the environment. On the positive side, IAQ management programs in schools increased in 2006-2016. Specifically, the percentage of districts that had a specific policy or practice related to indoor and outdoor air quality increased from 35.4% to 48.9%.¹⁵⁴ However, less than half of school districts implementing policies and practices to protect the school community is not sufficient. In addition, only 39.3% of districts had an IAQ program based on best practices provided in the EPA's IAQ Tools for Schools program.

Research has shown that schools can reduce tobacco use among school-aged youth when school tobacco-free policies are clearly and consistently communicated, applied and enforced. The Public Health Law Center identified that, "while smoking is prohibited within school buildings under the clean indoor air laws of most states, local school policies vary as to whether all tobacco use, or just smoking, is prohibited on school property; whether tobacco use is also prohibited in outdoor areas on school grounds; and whether tobacco use is prohibited at off-campus school functions."¹⁵⁵

Comprehensive tobacco-free policies not only prohibit tobacco products on school property, including school-sponsored events, but they also include practices to educate students and staff about the dangers of tobacco products. While many schools have adopted tobacco-free campus policies, with the surge of e-cigarette use among youth, schools need to update tobacco-free campus policies to include e-cigarettes. E-cigarettes are being used by teens more than any other tobacco product, which led to the U.S. Surgeon General declaring e-cigarette use among youth an epidemic.¹⁵⁶ In addition, state departments of education and school districts should adopt comprehensive tobacco-free policies. Close to 15 states require tobacco-free campus policies, including e-cigarettes, by state law or regulation.

Indoor air is not the only source of pollution in a school setting. Children playing outside on high pollution days can be exposed to unhealthy levels of outdoor air pollution, which is an established asthma trigger. School buses are frequently used to transport children to school, but diesel exhaust, a known cause of asthma episodes, from buses can concentrate in the bus cabin, exposing children to a hazardous lung irritant. Idling diesel school buses also increase the exposure to children, and the exhaust can infiltrate the school building itself. Fewer than half (49.2%) of districts implement a school bus anti-idling program.¹⁵⁷ Modifying older diesel engines of school buses to run more cleanly reduces air pollution and has been shown to reduce airway inflammation, improve lung growth over time and reduce absenteeism.^{158, 159} Zero-emission, electric school buses present an additional opportunity for health benefits for students and staff. The Infrastructure Investment and Jobs Act's passage made available \$2.5 billion

in funding for the transition to electric school buses, which will help schools clean up diesel pollution.

Over the last decade, the United States has seen an increase in the frequency of wildfires, hurricanes and flooding. Because these natural events can occur at any time, even when children and staff are in school, schools need to develop a disaster management plan. Disaster management plans may be especially important to children with asthma and should take into consideration access to quick-relief asthma medication and cleaning practices after the disaster to minimize exposure to asthma triggers. SchoolSafety.gov offers emergency planning resources for schools.¹⁶⁰

Workplaces

Guiding Principles

Workplaces should reduce or eliminate conditions that cause or exacerbate asthma. Many people work in situations that place them at risk of developing work-related asthma, but also may be discouraged from seeking assistance. Policies to identify and manage asthma in the workplace should recognize that critical issues must be addressed, including:

- Every worker has the right to a safe workplace. Immigrants, people of color and low-wage earners are especially vulnerable and should not face discrimination nor denial of these rights.
- Every worker should have access to comprehensive, affordable healthcare coverage for themselves and their family members to manage asthma.
- Every worker should be eligible for workplace accommodations to minimize the effect of the workplace on their asthma symptoms.
- Every worker is eligible to receive workers' compensation for asthma caused or aggravated by work.

Overview

The 2009 Agenda called for establishment of surveillance mechanisms to document levels of work-related asthma (WRA) and to establish national guidelines for the management of WRA. CDC's National Institute for Occupational Safety and Health (NIOSH) funds states "to assess the extent and severity of workplace injury, illness, disability, and death and identify worker populations and occupations at greater risk."¹⁶¹ Massachusetts and Michigan have consistently monitored work-related asthma since the program began in 1988, with California following in 1993. Additional states have conducted surveillance and developed resources related to work-related asthma, including New Jersey, New York, Washington and Wisconsin. However, more studies are needed to evaluate the effectiveness of approaches to prevent and manage work-related asthma. Also, national guidelines do not exist for states to prevent and manage WRA.

Consensus documents from the American Thoracic Society conclude that 16% of asthma in adults is caused by exposures at work¹⁶² and that 21.5% of adults with asthma have aggravation of their asthma by work.^{163, 164} There are three types of work-related asthma (WRA): 1) asthma caused by an immunological reaction to a wide variety of substances such as animals (e.g., veterinarians or workers handling mice/rats in

research labs), plants (e.g., bakery workers, or workers in grain mills), or chemicals (e.g., workers making car seats from isocyanate foam, or construction workers using epoxy glues); 2) asthma caused by a marked exposure to an irritant (e.g., janitorial workers exposed to a mixture of bleach and acid or bleach and ammonia); 3) aggravation of pre-existing asthma (e.g., workers in offices with poor ventilation and/or housekeeping). Moreover, a large proportion of new onset cases in surveillance data are associated with chronic irritant exposures, as opposed to Reactive Airways Dysfunction Syndrome (RADS).¹⁶⁵

The diagnosis of WRA is based on the presence of asthma symptoms that occur/increase in relationship to work, history of exposure to substances that cause work-related asthma, and medical tests (e.g., breathing tests that show worsening in relationship to work and sometimes allergy testing). CDC's National Institute for Occupational Safety and Health (NIOSH) guidelines include questions to be asked and recommended medical tests to be undertaken to diagnose WRA.¹⁶⁶

There are approximately 300 substances present in the workplace that have been shown to cause WRA from an immunological reaction. There are thousands more substances in the workplace that can aggravate pre-existing asthma or cause new asthma from an irritant exposure. Consultation with an occupational medicine specialist, pulmonary specialist or allergist may be useful to assist in both diagnosis and identification of the causal agent.

Early diagnosis of WRA along with removal from exposure to the causal agent(s) is extremely important. Early diagnosis and together with cessation of exposure to the agent(s) causing WRA increases the likelihood of complete resolution of symptoms or at least the reduction of the severity of symptoms.

The importance of early diagnosis has led to recommendations that individuals who work with known causes of WRA be provided medical surveillance, to promptly recognize individuals who develop asthma from their work. Surveillance should, at the minimum, include a respiratory questionnaire about breathing symptoms.

Many organizations have developed recommendations for health care providers and approaches to reduce use/exposure to workplace causes of asthma (e.g., OSHA Fact Sheet or the Cleaning for Asthma Safe School project by the California Department of Public Health).^{167, 168}

Policy Statements and Supporting Strategies

The federal government should update Occupational, Safety, and Health Administration (OSHA) standards to make them comprehensive standards that include air levels set low enough to prevent work-related asthma and provide education and medical surveillance to exposed workers.

About the evidence. Agents that are known to cause work-related asthma do not have comprehensive standards, so there are no requirements to educate workers about the risks nor requirements for medical surveillance to ensure early diagnosis. OSHA standards have not been promulgated to prevent work-related asthma. Examples include flour, which is regulated as a nuisance dust, or disinfectants, which have no regulatory air standard. Additionally, exposure to some causes of work-related asthma such as isocyanates can occur after skin exposure, and OSHA regulations do not require skin protection.

Even in the absence of changes in OSHA regulations, employers who use substances known to cause work-related asthma should undertake voluntary efforts to lower exposure to known causes of work-related asthma, educate their employees and provide periodic medical testing.

Employers should identify and eliminate exposures to hazards that put workers at risk for developing asthma or causing asthma symptoms.

- Identify work processes that expose workers to substances that cause or make asthma worse and control these exposures by eliminating their use, substituting safer substances and employing engineering controls (such as ventilation).
- Establish 100 percent tobacco-free workplaces, including e-cigarettes.
- Implement fragrance-free policies.
- Provide tobacco cessation programs.
- Adopt cleaner equipment (e.g., loaders, tractors) or vehicle technology (e.g., transition to zero-emissions technology).

About the evidence. Employers should use the National Institute for Occupational Safety and Health (NIOSH) “Hierarchy of Controls” as a basic method to protect workers from risk of illness or injury. The hierarchy includes five stages of effectiveness: elimination (physically remove the hazard), substitution (replace the hazard), engineering controls (isolate people from the hazard), administrative controls (change the way people work) and personal protective equipment (Figure 1).¹⁶⁹

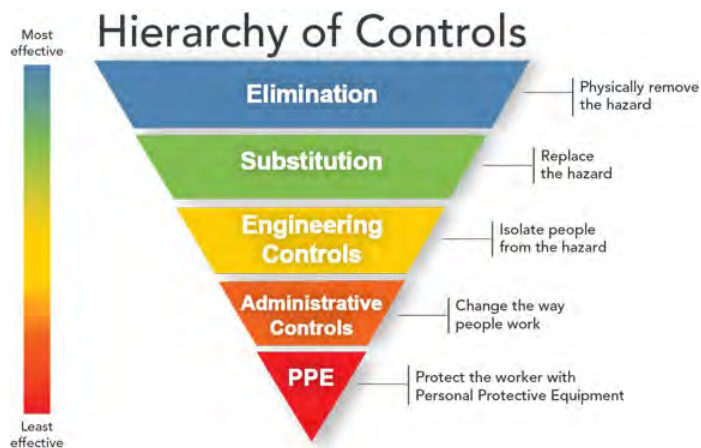


Figure 1. Hierarchy of Controls (NIOSH, 2015)

While elimination and substitution of the agent are the preferred preventative methods, they may also be the most difficult. A good example of the substitution method is healthcare professional use of powdered latex gloves. By substituting powder-free latex gloves, hospitals and health systems were able to reduce occupational allergy and asthma in healthcare.¹⁷⁰

Sometimes elimination and substitution are not feasible, and employers have to resort to less effective methods. Ventilation is a good example of an engineering controls method. All employers should ensure that ventilation in their facilities meets the minimum guidelines of American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) specific for their type of workplace (e.g., office, laboratory, retail store).¹⁷¹ In addition, all employers can address issues related to cleaning agents/disinfectants, tobacco smoking, fragrances and other allergens.

NIOSH provides guidelines on work-related asthma, including useful information that can help employers and employees develop and maintain a worksite safe from asthma triggers.¹⁷² Similarly, the American Lung Association’s “Guide to Control Asthma at Work” details a set of measures to eliminate sources of unhealthy air in the workplace by using safer disinfectant and cleaning products whenever possible, using chemicals and machinery according to manufacturer instructions, and establishing tobacco-free policies eliminating smoking, secondhand smoke and e-cigarette aerosols.¹⁷³

The COVID pandemic has increased the use of disinfectants, many of which are known causes of work-related asthma (e.g., bleach and quaternary ammonium chloride compounds). EPA’s “Safer Choice” program helps consumers, businesses and institutional buyers identify cleaning and other products that perform well, are cost-effective and are safer for the environment.¹⁷⁴ A list of cleaners that meet EPA standards can be found by searching for SAFER Choice Products. The American Lung Association has a sample fragrance-free policy that employers can use to help reduce asthma that is exacerbated by exposure to personal care and cleaning products.¹⁷⁵

While reducing exposures to hazards in the workplace is critical to prevent WRA, there are several strategies that employers can implement to make workplaces safer. For example, all employers should make sure their health insurance includes a comprehensive tobacco cessation benefit for all employees. The Affordable Care Act

(ACA) requires employee-sponsored health insurance to cover smoking cessation. A benefit that covers all treatments recommended in the 2008 U.S. Public Health Service Guideline, including all seven medications and three forms of counseling, would give smokers the best chance to become tobacco-free.¹⁷⁶

The critical part to prevent WRA is making workplaces safe. When establishing workplace wellness programs, employers should consider a comprehensive approach that includes smoking cessation. One such program is the American Lung Association's Freedom From Smoking® program, which has over 35 years of experience helping hundreds of thousands of people quit smoking for good.

Outdoor workers or construction workers may be exposed to air pollutants and diesel exhaust from heavy equipment. Mobile sources are major contributors to air pollution because they emit air pollutants including nitrogen oxides (NOx), hydrocarbons (HC), particulate matter (PM), toxics and greenhouse gases. Diesel exhaust from on-road vehicles (cars, trucks buses), farm and construction equipment, locomotives, marine vessels and aircraft is a major contributor to air pollution. The California Air Resources Board (CARB) 2020 Mobile Source Strategy promotes advancing the use of zero-emission technologies.¹⁷⁷

States should adopt and implement surveillance mechanisms to track work-related asthma, identify asthma hazards, follow trends and facilitate interventions.

- Establish a surveillance system for work-related asthma using data from healthcare providers, clinics, emergency departments, hospitals, workers' compensation databases and poison control centers.
- Promote interventions that investigate and reduce exposures associated with work-related asthma.

About the evidence. NIOSH maintains a clearinghouse for work-related lung disease data, including State-Based Occupational Respiratory Disease Surveillance asthma data that contributes to NIOSH epidemiological research.^{178, 179} Since 1988, NIOSH has funded several states to collect surveillance data on WRA including Massachusetts, Michigan, New Jersey, California, Washington, Wisconsin and New York. These surveillance projects have identified new causes of work-related asthma and, more importantly, have shown that follow-up with the workplaces identified through the surveillance programs can prevent work-related asthma in fellow workers of the index case, as well as in other similar workplaces.¹⁸⁰ State health departments should encourage healthcare professionals to report all diagnosed or suspected cases of asthma that are caused by or exacerbated by workplace exposures or conditions, and/or use existing data sources such as emergency or hospital discharge data,

workers' compensation data, and poison control center data for case-finding. Expansion of surveillance systems in additional states would increase reported cases and help to report trends in WRA.

National clinical guidelines on the diagnosis and management of work-related asthma, including primary and secondary prevention, should be adopted by healthcare providers and healthcare systems.

- National guidelines should be implemented by healthcare providers to assess work-related asthma and should include education and clinical decision support tools.
- Healthcare providers should ask their adult asthma patients about their workplace, positions and job tasks, including associated exposures and timing of symptoms.

About the evidence. The American College of Chest Physicians published a consensus statement on work-related asthma in 2008.¹⁸¹ Early diagnosis is extremely important in work-related asthma, because the sooner work-related asthma is diagnosed after the onset of symptoms and measures are taken to eliminate/reduce causal exposures, the greater the likelihood that the disease will be halted from further progression.

The most common reason for missing the diagnosis of work-related asthma is failure of the healthcare provider to ask about work exposures among their adult patients with asthma. OSHA produced a fact sheet that healthcare providers and adults can use to assess for work-related asthma.¹⁸² The fact sheet outlines the key questions and process that healthcare providers may use in the diagnosis of WRA. A study from Michigan, Minnesota and Oregon reported that only 21% to 25% of adults who thought their asthma was caused by a job had discussed with their doctor the possibility their asthma was work-related.¹⁸³ Healthcare providers and employers can play a key role in raising awareness about WRA and use tools like the OSHA Fact Sheet in addition to others.

Prevention and control of WRA starts with a workplace assessment, followed by a discussion between the employer, employee and workplace health and safety professional on appropriate strategies to minimize or eliminate exposure. Industrial hygienists play a critical role in identifying workplace hazards and helping to mitigate or control them through appropriate measures. When WRA is suspected, the healthcare system including healthcare providers can engage with industrial hygienists to further

investigate the exposure and help develop exposure control plans to prevent additional exposures.

Conclusions and Call to Action

Public policy has the potential to make a tremendous impact on the health and quality of life of those living with asthma. The evidence detailed throughout this Agenda demonstrates that tools such as disease surveillance and smokefree multi-unit housing can help reduce the burden of asthma. The policy recommendations and priorities addressed in this Agenda reflect the consensus of a broad, multi-disciplinary group of leaders and experts. These public policy priorities, if implemented, could greatly improve asthma morbidity and mortality. As such, this Agenda establishes a blueprint for national asthma policy that lawmakers, regulators, and advocates can use to guide policy development and enact positive change at the federal, state and local levels.

APPENDIX A. The Consensus Process

Below is a description of the consensus process.

Small Group Orientation Call

In April 2019, the Lung Association convened Advisory Group members to help prepare for the one-day conference. During the call, Lung Association project staff provided an overview of the expectations of advisory group members, the asthma policies in the 2009 National Asthma Public Policy Agenda, the review process, and the planned agenda for the May 16, 2019, meeting.

Online Assessment of Existing Policies

The Lung Association team distributed a feedback form to Advisory Group members to assess the National Asthma Public Policy Agenda on what is currently being done, what policy approaches appear to be most successful, and where gaps exist. Participants were asked to rate the policy statements and supporting strategy in topic areas where they had the most expertise. The categories included Keep, Edit, Delete, Don't Know and Unsure. Participants were then asked to recommend additional supporting strategies for each policy statement, new policy statements and to include evidence to support the new policy statements or supporting strategies.

In-Person Meeting with Experts

A nationwide group of asthma stakeholders gathered in Arlington, Virginia, on May 16, 2019, to discuss policies and strategies to improve asthma morbidity and mortality. This meeting was made possible by a grant from the U.S. Centers for Disease Control and Prevention, National Center for Environmental Health.

Capitalizing on the unique opportunity to have so many esteemed asthma stakeholders gathered, a robust agenda was crafted to accomplish one clear and direct objective—to review, discuss and reach consensus on policies and supporting strategies that will improve asthma morbidity and mortality.

In addition, meeting attendees were charged with challenging past assumptions and exploring new pathways while seeking to identify policies that were achievable and based on evidence. Attendees were also asked to consider how outcomes will be tracked and measured along with who should be charged with accomplishing specific policies and strategies.

The day began with an opportunity for meeting attendees to network and get acquainted with one another before each was tasked with identifying three things, either positive or negative, that have made the most significant changes on the burden of asthma this past decade. Answers to these questions were placed on charts labeled

with each policy area—outdoor air, healthcare systems and financing, public health infrastructure and surveillance, homes, schools, and workplaces.

Topic area table facilitators then grouped responses to identify trends and key themes to anchor table discussions scheduled later in the morning. Following this exercise, Barbara Kaplan, MPH, presented the group with an overview of the assessment results gathered from pre-meeting feedback provided by meeting attendees to begin identifying which current policies should be revised, deleted or expanded. This presentation was followed by a robust, moderated discussion before each attendee was assigned to their respective topic breakout table.

Breakout Groups

Each attendee was assigned to a group charged with focusing on a specific policy section of the agenda, which as noted earlier are:

- Public Health Infrastructure and Surveillance
- Outdoor Air
- Healthcare Systems and Financing
- Homes
- Schools
- Workplaces

Initially, each group was assigned an ice breaker activity to build cohesion and acquaint those who may not have had the opportunity to meet before this gathering. Each group was also asked to identify a notetaker and presenter. The Lung Association also provided a staff member with subject matter expertise to moderate table discussions.

First Consensus Exercise

Before diving into their specific topic areas, the larger group was challenged to agree upon definitions for the terms *policy* and *strategy*. In its simplest terms, policy was agreed to mean specific goals and transformative actions while strategies would serve as the tools to implement stated policies.

Table Brainstorming

With clarity on the aforementioned key terms, each group was asked to begin by discussing their topic area's findings identified during the charting success exercise where everyone was asked to identify positive or negative actions or influences that have most impacted the burden of asthma this past decade. Building on this exercise, each group was asked to determine which current policies still effectively address

these issues while also identifying new policies or strategies that need to be considered in light of this initial feedback.

Each group was then asked to move the discussion forward by determining whether any current policy statements need to be revised or combined. Groups were then charged with beginning to fine-tune language and modify for clarity or conciseness based on the instructions and format examples noted below.

Think in terms of what should be done to impact asthma morbidity and mortality. Begin by identifying who should take the recommended action and follow with a clear statement of what must be done and conclude with a clear statement of how the implementation is to occur when applicable.

Sample: Every county in every state should attain the national ambient air quality standards as expeditiously as possible.

Sample: All school systems should adopt and implement a comprehensive plan for the management of asthma based on current research and best practices.

Each group worked on fine-tuning their respective topic area policies through lunch and then presented their working drafts for feedback and discussion with the larger group. With the larger group's feedback, the group members reconvened and spent the remainder of the afternoon preparing their policy statements and brainstorming strategies.

While no policies were finalized, most groups made significant progress and noted that they would only need one or two more meetings to reach consensus.

Small Group Expert Follow-up Calls

Following the May 16 meeting, each group reconvened again for a 90-minute phone conversation to continue to finetune guiding principles, policies and supporting strategies. Asthma experts who were unable to attend the in-person meeting or who had a desire to provide feedback in other topic areas were assigned accordingly.

Each facilitated call lasted 90 minutes allowing each of the six groups to further narrow and refine their recommendations while also taking time to consider if the recommended actions adhered to the proof check listed below.

1. Have we recommended policies that are clear, actionable and measurable?
2. Is what we've recommended feasible?
3. Who will be in charge of implementing each recommended policy and tactic?
4. How will we know success has been achieved?
5. Do the policies address social determinants of health or health equity?

6. Are the policies evidence based? Do you know where the data comes from to support each policy statement? If not, can you cite who knows where to find this information?

Following this series of calls, each table facilitator then incorporated the group's comments into the revised strategy and policy documents providing one last round of feedback and review to occur through email.

Following the development of the National Asthma Policy Agenda, each participant will have the opportunity to review the document in its entirety and provide final feedback, ensuring that the revised policy guidance is a clear and transparent reflection of 26 leading public health organizations and more than 30 nationally recognized asthma and public health policy experts that participated in the convening process.

APPENDIX B: Advisory Group Participants & Reviewers

This list includes Advisory Group members and reviewers, all of whom made invaluable contributions to the project. Individuals with a [P] by their names participated in the May 16, 2019, meeting and those with an [R] by their names participated after the meeting as external reviewers. The participation of an individual does not imply the support of their institution, organization or agency for the policy recommendations as stated in this report, nor should such support be inferred.

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