

Reducing Environmental Allergic Triggers: Policy Issues



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The implementation of policies to reduce environmental allergic triggers can be an important adjunct to optimal patient care for allergic rhinitis and allergic asthma. Policies at the local level in schools and other public as well as private buildings can make an impact on disease morbidity. Occupational exposures for allergens have not yet been met with the same rigorous policy standards applied for exposures to toxicants by Occupational Safety and Health Administration. Further benefit may be obtained through policies by local, county, state, and national governments, and possibly through international cooperative agreements. The reduction of allergenic exposures can and should be affected by policies with strong scientific, evidence-based derivation. However, a judicious application of the precautionary principle may be needed in circumstances where the health effect of inaction could lead to more serious threats to vulnerable populations with allergic disease. This commentary covers the scientific basis, current implementation, knowledge gaps, and pro/con views on policy issues in reducing environmental allergic triggers. © 2017 American Academy of Allergy, Asthma & Immunology (J Allergy Clin Immunol Pract 2018;6:32-5)

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Exposure to environmental allergens is a regular occurrence. The amount, timing, and presence of various cofactors all contribute to potential sensitization and allergic responses thereafter. Environmental policies can have a major effect on these issues. Policies that are germane to reducing environmental allergen exposures include those that affect indoor air quality (IAQ) in the workplace, public and private buildings, including schools, as well as outdoor air quality. In addition, policies that address indoor environmental allergens such as mold and pests in public housing and rental properties can impact health. Allergic rhinitis and asthma affect approximately 15% to 40% of various components of the US population when added together and both are on the rise in many parts of the world.¹ This review will summarize the scientific

evidence for, and in some cases, lacking for implementing policies that address reducing environmental allergen triggers and will review current policy issues and recommendations needed.

SCIENTIFIC BASIS FOR POLICY IMPLEMENTATION

Common environmental allergen triggers include pollen aeroallergens, molds, house dust mite, cockroach, mouse, pets, and certain inhaled or topical chemicals. In keeping with the journal's theme of allergic respiratory disease, this commentary will focus on inhalant triggers. Clear evidence for the role of environmental exposures in allergic rhinitis and asthma has been recently summarized.² Multiple studies have shown benefits of indoor environmental control measures in reducing morbidity in allergic rhinitis and asthma.³⁻⁵ In childhood asthma, the benefit of a multifaceted approach to environmental control was illustrated with a multicenter Inner City Asthma Study.⁶ Such data can be used to influence policy by insurers regarding coverage for environmental control measures. Studies that address cost/benefit in health outcomes are of particular interest to insurers. Allergists presenting a case-by-case clinical justification to third-party payers for the need and benefit of high-efficiency particulate air filtration, pest management, and other specific environmental control measures can be successful in obtaining reimbursement for patients (S. L. Abramson, personal oral communication with AAAAI members, March 2017).

New data and scientific conclusions are coming forth continuously. The application of the "precautionary principle" has been used to support public policy action to protect health where information may be incomplete but precaution is taken in weighing the consequences of both action and inaction. A definition provided by the European Environment Agency is as follows: the precautionary principle provides justification for public policy actions in situations of scientific complexity, uncertainty, and ignorance, where there may be a need to act to avoid, or reduce, potentially serious or irreversible threat to health or the environment, using an appropriate level of scientific evidence, and taking into account the likely pros and cons of action or inaction.⁷ The application of this concept has some controversy that has led to pushback by those strongly advocating quantitative risk assessment that puts more emphasis on proof of harm first.⁸ Both of the above considerations lead further to an analysis of levels of scientific evidence (I-V) and grades of recommendations (A-D).^{9,10}

A laissez-faire attitude toward environmental health is fraught with potential danger. Ignoring allergen triggers for asthma and allergic rhinitis can lead to uncontrolled symptoms that most assuredly can affect quality of life.^{11,12} There are economic impacts as well that may be substantial.^{13,14} Total costs (direct and

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Abbreviations used

ADA- Americans with Disabilities Act

EPA- Environmental Protection Agency

IAQ- Indoor air quality

indirect) associated with asthma in the United States are estimated to rank as one of the highest among chronic diseases with hospitalization and medications topping the direct costs and work and school loss accounting for the greatest percentage of indirect costs.¹⁴ Annual total costs in the past decade each for allergic rhinitis and asthma have been estimated to reach more than 10 billion dollars.^{13,14} Such costs highlight the need for policies to reduce morbidity.

CLIMATE CHANGE

The scientific evidence for global warming in the 21st century has become more persuasive and alarming. Although the proportional contribution of various man-made activities to this pattern and how effective various interventions may be to slow this process are still being debated, the effects of warming on allergen exposure may be dramatic. Predictions include that increases in temperature, carbon dioxide, and precipitation will stimulate the growth of some allergenic plants and that would lead to higher pollen counts for a more prolonged time period due to longer and more robust pollination.^{15,16} Policies that address greenhouse gas pollution have been recommended and supported by many countries,¹⁷ but implementation of such policies in a rigorous enough manner may still be ineffective and difficult to accomplish at this point.

POLLEN ORDINANCES

Some cities have had pollen ordinances since the 1990s that prohibit the planting of high pollinating male species of trees.¹⁸⁻²⁰ These include Albuquerque, Phoenix, and Las Vegas. Empirically, these measures make sense. However, there are no data yet to prove the clinical benefit of such ordinances. In fact, because they have been applied only to new plantings, the effects of higher pollinating species may be evident still for some time. Having a balance between male and female plants as a strategy seems reasonable as male plants produce the high amounts of pollen responsible for allergy symptoms. Common separate-sexed trees include cedar, juniper, cottonwood, mulberry, ash, poplar, box elder, and willow.²¹ Fifty years ago, city trees were roughly half male, similar to trees in nonurban areas. However, because of nursery and government preference for "litter-free" (no nuts or fruit) trees, more highly allergenic male clones were then planted in cities.²²

OCCUPATIONAL EXPOSURES

It is clear that a variety of irritants, whether they are toxicants or not, can affect the severity and control of asthma and may have a causal role in augmenting aeroallergen sensitization as well as dermal chemical sensitization and subsequent elicitation of allergic responses.²³⁻²⁵ Occupational asthma and exacerbation of rhinitis have been observed related to allergen exposures.

The allergist/immunologist can have a valuable role when an allergic employee has sought care for exacerbation of symptoms

in the workplace. This could involve working with employers and those involved directly with workplace environmental safety regarding the identification of allergens and review of practices in working areas with allergens and irritants that can reduce environmental exposures. Americans with Disabilities Act (ADA) policy requires employers to accommodate employees with disabilities, including allergies.²⁶ A variety of chemicals are known to be associated with occupational asthma and clearly require intervention to protect employees from substantial exposure.²⁷ However, the definition of substantial (ie, the exposure limit) may vary among those with allergies due to variable sensitivities. Occupational Safety and Health Administration guidelines are clear for toxic exposures but not set for allergenic exposures. Nonetheless, ADA policy comes into effect to protect all workers who may be affected by occupational exposure to allergens to which they are sensitive.

School is the occupational environment for many children, and attention needs to be given to how well environmental control measures are implemented there. This effort should help provide an optimal learning and working environment for students and staff who have allergic rhinitis and asthma. Studies have shown the exposure to indoor allergens can be substantial in schools.^{28,29} However, there have been limited randomized, controlled prospective studies to address specifically school environmental interventions and results can be affected by various home exposures.^{30,31} ADA policy and Section 504 of the Rehabilitation Act require schools to accommodate children with disabilities, including allergies. Written and/or in-person communication by the allergist/immunologist with school administrators and nurses can facilitate an action plan for the school to deal with allergy issues. In some instances, this may involve mold remediation; better air ventilation and tune-up of heating, ventilating, and air conditioning systems; and proper cleaning of carpeting to reduce mold and dust mite contamination. In addition, students participating in outdoor activities during times of high pollen/mold counts with or without high air pollution can be subject to exacerbation of allergic rhinitis and asthma symptoms.³² Some school districts have implemented policies that address curtailing outdoor activities on very high air pollution days^{33,34} but do not have policies regarding very high pollen/mold count days that could affect a substantial subset of students. A champion/advocate for such policy could lead to a better understanding of this issue by school personnel and better health outcomes for students with asthma affected by such exposures.

The Environmental Protection Agency's (EPA) IAQ Tools for Schools program includes a component that addresses allergens and asthma. Effective implementation of the policies recommended in this program along with innovations in environmental control is recognized by several types of EPA awards to schools.³⁵ Guidance by an allergist/immunologist in this effort could be helpful in promoting best practices for reducing allergenic exposures.

PUBLIC ACCOMMODATIONS

Public housing and rental properties both require landlord and tenant cooperative efforts to maintain a healthy environment for occupants. Integrated pest management programs have been shown to be effective for reducing cockroaches and

rodents, but recent studies have shown mixed results with respect to asthma symptoms³⁶⁻³⁸; both can be significant triggers for asthma.³⁹ However, the landlord may leave it up to the tenant to deal with the problem and not be receptive to paying for a comprehensive approach. If necessary, a medical-legal partnership may be pursued. This may be obtained with pro bono assistance via the National Center for Medical Legal Partnership that serves vulnerable patients in need.⁴⁰ Water leaks and flooding and even poorly maintained air conditioning can lead to substantial mold growth that requires remediation.⁴¹ The fervor over toxic mold has substantially subsided with scientific data showing limited airborne sporulation and thus limited inhaled exposure by surface black mold (*Stachybotrys*) and mycotoxins.⁴² Nevertheless, any mold is a marker for potential other allergenic molds and that may indicate a need for remediation. Expert consultation with a certified mold inspector may be warranted for cases with evidence of contamination and symptomatic residents.

ADDITIONAL ISSUES IN POLICY IMPLEMENTATION

Although there is still uncertainty regarding the timing and amount of various allergenic exposures that can lead to sensitization versus tolerance in any given individual very early in life (eg, the hygiene hypothesis),^{43,44} this should not preclude efforts to reduce allergen exposure for those already sensitized.

An analysis of cost-benefit is a difficult undertaking when dealing with the complexities of human health effects related to allergen exposures. Multisystem health effects have been observed that can have significant impacts on quality of life. The most evident include symptoms in upper and lower respiratory tracts, ears and eyes, skin, and with headaches. Some or all of the above can contribute more or less in any individual patient in a spectrum of severity.

The US Congress, although much involved in past legislation to protect the public from toxicants, has been largely absent in addressing policies to reduce environmental allergen exposures. However, the ADA and Section 504 of the Rehabilitation Act can be applied to help vulnerable populations with allergic disease in dealing with such exposures as previously discussed. Policies that address environmental justice initiatives within poor communities, in particular with regard to the indoor allergens noted above in housing, could be strengthened by county and/or city ordinances. Governmental entities at the local, state, national, and international areas as well as nongovernmental organizations can have a role in addressing environmental health concerns that extend to allergic diseases and some have taken action.^{45,46} One example of an activity in the federal government area is the United States Department of Housing and Urban Development Healthy Homes Program, a plan of action which has been utilized in many communities to address asthma triggers along with other environmental issues.⁴⁷ Similar programs have been developed and implemented by state and local governments.^{48,49}

POTENTIAL POLICIES AND CONCLUDING RECOMMENDATIONS

Table I provides examples to consider for policy support and implementation based on the preceding discussion.

TABLE I. Policy intervention considerations

Policy Area	Policy Focus
Climate change	Reduction of greenhouse gas emissions and other contributing pollutants; support for environmental education and research in this area (2017-2018 AAAAI Presidential Initiative)
Air pollution	Reduction of pollutants known to directly impact allergic rhinitis and asthma (eg, ozone, particulate matter, diesel exhaust); support for an alert system and policies regarding outdoor activity precautions during times of high outdoor pollution
Pollen ordinances	Reduction of new planting of high pollinating allergenic plant species
Indoor allergens	Initiatives to support healthy homes, schools, and other buildings (2015-2016 AAAAI Presidential Initiative related to asthma and schools—The SAMPRO project)

AAAAI, American Academy of Allergy, Asthma and Immunology.

Effective policies require strong scientific foundations, and scientific data require continued funding for competitive projects. Further support through National Institute of Allergy and Infectious Diseases, National Institute of Environmental Health Sciences, EPA, and other public and private entities is needed and should be advocated by the allergist/immunologist. Sharing of scientific and clinical knowledge are key components to building efforts that improve health outcomes. Policies can and should be developed based on studies that examine the health effects of allergenic exposures, that address outcomes of interventions that reduce such exposures and are the most cost-effective in reducing morbidity of allergic rhinitis and asthma, and also, that should consider, as previously alluded to, judicious applications of the precautionary principle.

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