

# Volunteerism Addressing Environmental Disparities in Allergy (VAEDIA): The presidential initiative to combat environmental injustice in allergy and immunology—a Work Group Report of the AAAAI VAEDIA task force



Mahboobeh Mahdavinia, MD, PhD,<sup>a</sup> Jill A. Poole, MD,<sup>b</sup> Andrea J. Apter, MD, MSc, MA,<sup>c</sup> Susan E. Pacheco, MD,<sup>d</sup> Andrea A. Pappalardo, MD,<sup>e</sup> Elizabeth C. Matsui, MD, MHC,<sup>f</sup> Carla M. Davis, MD,<sup>g</sup> and Jonathan A. Bernstein, MD<sup>h</sup>  
*Chicago, Ill; Omaha, Neb; Philadelphia, Pa; Houston and Austin, Tex; and Cincinnati, Ohio*

AAAAI Position Statements, Work Group Reports, and Systematic Reviews are not to be considered to reflect current AAAAI standards or policy after 5 years from the date of publication. The statement below is not to be construed as dictating an exclusive course of action nor is it intended to replace the medical judgment of healthcare professionals. The unique circumstances of individual patients and environments are to be taken into account in any diagnosis and treatment plan. The statement reflects clinical and scientific advances as of the date of publication and is subject to change.

**Many vulnerable people lose their health or lives each year as a result of unhealthy environmental conditions that perpetuate medical conditions within the scope of allergy and immunology specialists' expertise. While detrimental environmental factors**


**impact all humans globally, the effect is disproportionately more profound in impoverished neighborhoods. Environmental injustice is the inequitable exposure of disadvantaged populations to environmental hazards. Professional medical organizations such as the American Academy of Allergy, Asthma & Immunology (AAAAI) are well positioned to engage and encourage community outreach volunteer programs to combat environmental justice. Here we discuss how environmental injustices and climate change impacts allergic diseases among vulnerable populations. We discuss pathways allergists/immunologists can use to contribute to addressing environmental determinants by providing volunteer clinical service, education, and advocacy. Furthermore, allergists/immunologists can play a role in building trust within these communities, partnering with other patient advocacy nonprofit stakeholders, and engaging with local, state, national, and international nongovernmental organizations, faith-based organizations, and governments. The AAAAI's Volunteerism Addressing Environmental Disparities in Allergy (VAEDIA) is the presidential task force aiming to promote volunteer initiatives by creating platforms for discussion and collaboration and by funding community-based projects to address environmental injustice. (J Allergy Clin Immunol 2024;154:59-67.)**

From the <sup>a</sup>the Department of Medicine, Division of Allergy and Immunology, UT Health Houston, Houston; <sup>b</sup>the Department of Internal Medicine, Division of Allergy and Immunology, University of Nebraska Medical Center, Omaha; <sup>c</sup>the Section of Allergy & Immunology, Division of Pulmonary Allergy & Critical Care Medicine, Perelman School of Medicine, University of Pennsylvania, Philadelphia; <sup>d</sup>the Department of Pediatrics, Pulmonary Division, McGovern Medical School, University of Texas, Houston; <sup>e</sup>the Departments of Medicine and Pediatrics, Division of Pulmonary, Critical Care, Sleep & Allergy, University of Illinois, Chicago; <sup>f</sup>the departments of Pediatrics and Population Health, Division of Allergy and Immunology, Dell Medical School, University of Texas at Austin, Austin; <sup>g</sup>the Department of Pediatrics, Division of Allergy and Immunology, Baylor College of Medicine, Houston, and; <sup>h</sup>the Department of Medicine, Division of Rheumatology, Allergy and Immunology, University of Cincinnati, Cincinnati.

Received for publication February 2, 2024; revised March 22, 2024; accepted for publication April 18, 2024.

Available online May 22, 2024.

Corresponding author: Mahboobeh Mahdavinia, MD, PhD, Department of Internal Medicine, Allergy and Immunology Division, UT Health Houston, 6431 Fannin St, Houston, TX 77030. E-mail: mahboobeh.mahdavinia@uth.tmc.edu.

 The CrossMark symbol notifies online readers when updates have been made to the article such as errata or minor corrections

0091-6749/\$36.00

© 2024 American Academy of Allergy, Asthma & Immunology

<https://doi.org/10.1016/j.jaci.2024.04.012>

**Key words:** Environmental injustice, disparity, volunteerism, allergy/immunology

*Abbreviations used*

AAAAI:	American Academy of Allergy, Asthma & Immunology
CO:	Carbon monoxide
NO <sub>2</sub> :	Nitrogen dioxide
PM:	Particulate matter
PM <sub>10</sub> :	PM with aerodynamic diameter of ≤10 μm
PM <sub>2.5</sub> :	PM with aerodynamic diameter of ≤2.5 μm
SO <sub>2</sub> :	Sulfur dioxide
VAEDIA:	Volunteerism Addressing Environmental Disparities in Allergy

Everybody can be great. Because anybody can serve. You don't have to have a college degree to serve. You don't have to make your subject and your verb agree to serve. . . . You don't have to know the second theory of thermodynamics in physics to serve. You only need a heart full of grace. A soul generated by love.

—Martin Luther King Jr

An important attribute of a physician is the urge to care for those in need. Motivated by values like kindness, justice, and equity, physicians throughout history have volunteered to improve basic health and education, tackle environmental issues, reduce the risk of disasters and violent conflict, and combat social exclusion. As detailed in a joint statement by the American Board of Internal Medicine Foundation, the American College of Physicians Foundation, and the European Federation of Internal Medicine, the role of a physician in the new millennium is intertwined with fundamental principles of social justice and patient welfare.<sup>1</sup> Medical professionalism demands maintaining standards of integrity and competence, and it includes providing expert advice to society on matters of health.<sup>1</sup> As a word, “volunteer” might merely mean engaging in work that is unpaid, but volunteerism has a profound root in humanity as a basic expression of human relationships. The main motivation for most physicians to choose the medical profession is the desire to improve the health and well-being of others.<sup>2</sup> This motivation, along with the acquired knowledge and skills, makes physicians an unparalleled force to address disparities such as environmental injustice.

Environmental injustice is the inequitable exposure of disadvantaged populations to environmental hazards such as contaminated soil and water, air pollutants, unsafe workplaces, and toxins.<sup>3,4</sup> Environmental hazards are a real threat to human health and life. A massive global study found independent associations between short-term exposure to inhalable particulate matter (PM) with an aerodynamic diameter of 10 μm or less (PM<sub>10</sub>) and fine PM with an aerodynamic diameter of 2.5 μm or less (PM<sub>2.5</sub>) and daily all-cause, cardiovascular, and respiratory mortality in more than 600 cities across the globe.<sup>5</sup> While detrimental environmental factors impact all humans globally, the effect is disproportionately more profound in impoverished neighborhoods inhabited largely by historically marginalized populations. Individuals living in disadvantaged neighborhoods have poor housing quality, less green space, and high exposure to vehicular exhaust, ambient air pollution, and hazardous waste.<sup>6-9</sup> The communities from these neighborhoods also experience other risk

factors for impaired health, including lack of access to nutritious food, absence of safe jobs or living environments as a result of the higher rates of crime and violence, and lack of green space for children to play.<sup>4</sup> This is the product of historical (and present day) housing discrimination, economic disparities, and other forces that have created disadvantaged and segregated neighborhoods.<sup>10,11</sup> These disparities predominantly affecting marginalized, racialized, and/or minoritized patients in our specialty with asthma, eczema, food allergy, and immunodeficiencies are frequently associated with poor health outcomes.<sup>12-16</sup>

As physicians, we might not be able to solve environmental injustice or easily ameliorate its detrimental impact on underserved groups, but volunteerism can be impactful. The emphasis on volunteerism is especially timely and relevant to the US Department of Health and Human Service's Office of Disease Prevention and Health Promotion Healthy People 2030 campaign, the mission of which is to “promote, strengthen, and evaluate the nation's efforts to improve the health and well-being of all people.” One of the main overarching goals of Healthy People 2030 is to “eliminate health disparities, achieve health equity, and attain health literacy.”<sup>17,18</sup> It is noteworthy that several objectives of Healthy People 2030 closely align with the expertise of allergists/immunologists and with the current American Academy of Allergy, Asthma & Immunology (AAAAI) strategic plan. Examples are objectives related to respiratory diseases, such as “Reduce emergency department visits and hospitalization for children under 5 years with asthma—RD-02 and RD-D01” and “Reduce hospitalizations for asthma in people aged 5 to 64 years—RD-D02.” More than 12 million people around the world die each year because they live or work in unhealthy environments. Most of these individuals are from vulnerable populations living under poor socioeconomic conditions. To achieve its goals, one of the fundamental missions of Healthy People 2030 is to promote healthier environments to improve health by reducing people's exposure to harmful pollutants in air, water, soil, food, and materials in homes and workplaces.<sup>17</sup> The allergy/immunology community can also play an integral role by volunteering efforts in line with the Healthy People 2030's objective of improving environmental health.<sup>19</sup>

The 2023 AAAAI presidential task force Volunteerism Addressing Environmental Disparities in Allergy (VAEDIA) aims to develop a structural plan for implementation of a community volunteer program to address environmental disparities. Here we discuss how environmental injustice impacts our patients struggling with allergic diseases, and we propose pathways we can all use to contribute to address environmental determinants in underserved populations through volunteerism advancing health equity.

## ENVIRONMENTAL AND AGRICULTURE-RELATED FACTORS AND THEIR IMPACT ON ALLERGIC AND INFLAMMATORY LUNG DISEASE

Environmental factors strongly impact the development and severity of allergic and nonallergic lung diseases and are associated with new onset or exacerbation of existing lung disease. These exposures to criteria air pollutants, which include particulate matter pollutants, ground-level ozone, carbon monoxide (CO), sulfur dioxide (SO<sub>2</sub>), nitrogen dioxide (NO<sub>2</sub>), lead, and other heavy metals, have been demonstrated to increase free radicals and reduce antioxidants, leading to airway

inflammation, inflammatory cytokine release, oxidative stress, cellular damage, and airway epithelial barrier dysregulation.<sup>20,21</sup> These respiratory effects have been predominately demonstrated by short-term air pollution studies, with effects generally greatest on the day of the exposure, with a recent meta-analysis demonstrating significant associations (20 of 26 studies) with various air pollutants and self-reported asthma.<sup>22</sup> In an evaluation of early-life exposure to ambient air pollution components in Denmark, there was also an increase in risk of asthma development.<sup>23</sup> A recent Australian study found a positive association of long-term exposure to NO<sub>2</sub> and PM<sub>2.5</sub> with asthma hospitalizations. These results are in line with findings of the Southern California Children's Health Study showing an increased risk of the development of asthma associated with traffic-related pollution exposure at school and homes.<sup>24</sup> However, the causal relationship between long-term exposure to outdoor air pollution and prevalence of asthma remains unclear in adults and requires more investigation.

Attributes defining the social determinants of health are associated with disproportionate exposures to environmental hazards and differential health outcomes, including asthma among various diverse communities.<sup>25-28</sup> In Douglas County, Nebraska, non-Hispanic Black and Hispanic/Latino children experienced disproportionately higher exposure to criteria air pollutant concentrations (CO, PM<sub>2.5</sub>, NO<sub>2</sub>, SO<sub>2</sub>).<sup>29</sup> This study also found positive associations between higher rates of pediatric asthma emergency department visits and neighborhoods with more non-Hispanic Black children, children without health insurance coverage, and households without access to a vehicle. In addition to criteria air pollutants, indoor exposure, including exposure to outdoor pollutants and allergens entering through open windows, ozone emanating from electrical appliances, NO<sub>2</sub> emanating from poorly ventilated gas stoves or kerosene heaters, burning wood as a source of heat, and secondary or tertiary tobacco smoke exposure are other important factors impacting respiratory health that are linked to social determinants of health.<sup>30-32</sup> Communities with a higher burden of social needs are also more likely to experience these exposures and have higher concentrations of these exposures in their homes.

There is also a complex network of environmental and occupational factors including exposure to pesticides, animal production facilities, agricultural dusts, endotoxins, and burning of biomass and crops that is associated with adverse respiratory health effects in nonallergic asthma, chronic bronchitis, chronic obstructive pulmonary disease, and hypersensitivity pneumonitis.<sup>33</sup> These agriculture-related exposures enriched in a diversity of microbial components typically elicit innate immune responses to induce migration of inflammatory cells into the airways, leading to airway hyperresponsiveness.<sup>33-35</sup>

Climate change has already affected, and will continue to affect, environmental conditions that are tied to adverse allergic and respiratory health. Aeroallergens (ie, trees, grass, weeds, pollens, and mold) are well-recognized drivers of allergic asthma development and exacerbations. One of the most significant consequences of climate change over the past 30 years is the lengthening of pollen seasons and the increased pollen burden, due in large part to rising CO<sub>2</sub> levels in the air and a warming climate.<sup>36-40</sup> Climate change may also increase air pollution events through wildfires; plumes of wildfire fumes can travel thousands of miles, affecting remote populations. Climate change has also led to increases in severe thunderstorms, causing

flooding, which can cause land erosion and runoff of animal waste and other toxins into the oceans or nearby aquifers.<sup>41</sup> Thunderstorms can impact respiratory system and cause asthma exacerbation.<sup>42</sup> The impact of these events is unfortunately (and unsurprisingly) worse among vulnerable populations. Texas Health Care Information Collection database analyses showed that during the year of Hurricane Harvey, Black residents of the state were 2.78 times more likely to have an asthma-related hospitalization compared to White residents.<sup>43</sup> Extreme precipitation can potentially damage buildings, allowing moisture to enter the living area that may provide an opportunity for mold and dampness that may trigger asthma and rhinitis.<sup>44,45</sup> Special considerations may also be warranted for postdisaster workers, who are often from vulnerable populations: over one third of a post-Hurricane Sandy cohort of cleanup and reconstruction workers reported lower respiratory symptoms.<sup>46</sup>

## POVERTY AND ITS LINK TO POLLUTION

Environmental justice is the right for all people to live in a healthy environment. A recent large study showed that the effect of air pollution on mortality is significantly linked to race and economic conditions, highlighting the complex and intertwined link of environmental injustice and poor health.<sup>47</sup> Worldwide, poverty is perpetuated by political and societal economic practices that are frequently exploitative and not easily or rapidly corrected. The current economic system is structured to reward success often leading to wealth, but it is geared toward leaving behind those less fortunate, who either do not have access to similar opportunities or do not know how to take advantage of available opportunities as a result of complex social and environmental factors. Living in poverty exposes individuals to air, water, and soil pollution. For example, those living in poverty in urban settings are more likely to live near heavy traffic and be exposed to ambient pollutants like ozone, NO<sub>2</sub>, and particulate matter from motor vehicle exhaust.<sup>48</sup> The issue is even more complex and devastating when it concerns children. A recent study showed that living in a high-poverty neighborhood that directly increases exposure to many different air toxins during infancy might have a more prolonged effect into childhood, as cognitive abilities measured at age 4 years of age were reduced.<sup>49</sup> Communities impacted by poverty may not have clean water, as was experienced by Flint, Michigan, residents in 2014.<sup>50</sup> This town could not maintain its clean water supply, and the state government would not support its upkeep. Another recent example of how poverty unequally affects health is the coronavirus disease 2019 pandemic, which more severely affected people in poverty.<sup>51</sup> Poorer communities had fewer health resources, more crowding, and therefore more exposure to the virus.

## A PROPOSED APPROACH TO COMBAT THE PROBLEM: VOLUNTEERISM

The allergy/immunology specialty concentrates on exposure to the environment. Therefore, we and the AAAAI are in a unique position to find ways to address health inequity and inadequate access to health. Specialists in allergy/immunology are also in a unique position to find ways to address environmental disparities and environmental injustice, which impact health and disease. Recently AAAAI committees on diversity, equity, and inclusion; environmental exposure; and respiratory health reviewed

poverty's link to pollution.<sup>16</sup> This comprehensive review presented evidence on the relationship between exposure to environmental hazards and the disproportionately poor outcomes from allergic diseases in marginalized populations, and called for action.<sup>16</sup> Many socioeconomic factors and structural society behaviors such as racism have kept marginalized groups poor. Poverty and historical and present-day structural racism are directly linked to lack of access to resources to ensure clean air, water, and soil. As allergists, we study the environment, and as students of the environment, we can be helpful in addressing housing, air and water pollution, and climate change. We can address poverty at the patient, practice, policy, and community level through volunteerism. Volunteerism can be through our engagement with local, state, national, and international nongovernmental organizations, faith-based organizations, and governments. Furthermore, our volunteer efforts need to be invested in building trust within these communities and partnering with other patient advocacy nonprofit stakeholders. It is also important to acknowledge and join forces with existing programs within financial institutions in addressing health disparities.<sup>20,52</sup> It is noteworthy that our joint efforts can further assist and empower National Institutes of Health investigators with expertise in identifying, analyzing, and addressing poor health outcomes in underserved populations. Perhaps most important is that the ultimate solution to environmental health disparities, which are born out of a history of structural racism, is implementation of policy solutions at the local, state, and federal level. Volunteerism can serve as a means to advocate for these solutions and support grassroots efforts to advance environmental justice and health equity.

### **Volunteer to provide care and advocate for those impacted by environmental injustice**

One valuable contribution we can make as allergists is by volunteering our time to care for patients who otherwise do not have access to specialty care. Specifically, millions of people worldwide are in need of allergy/immunology specialty management but do not have access to such care.<sup>53</sup> This need is disproportionately increased among those impacted by environmental disparities. In addition to directly volunteering in free clinics that serve marginalized populations, we can contribute in a variety of other settings that would benefit from our unique expertise. Empowering community clinicians and their staff, schools, communities, and families through education on the health effects of environmental exposures is a critical first step in mitigating their impact. One such example is helping communities understand that air pollution directly affects health by providing lectures to advocacy groups or serving as a consultant for communities. After the Hilco incident in the Little Village neighborhood of Chicago, when the implosion of the Crawford coal plant in a heavily populated area created a huge cloud of toxic dust and debris over the neighborhood, it would have been highly beneficial to empower residents with knowledge about the impact of this event on respiratory health.<sup>54,55</sup> This may be through an open discussion on these effects within a patient encounter or at an educational seminar to a group. Community members are the most knowledgeable on the sources of air pollution in their area as well as other environmental factors that may be impacting their health. There might be modifiable solutions within a specific community that, with our combined knowledge and experiences,

can help mitigate these problems by implementing one or more impactful interventions to ensure the air they breathe is clean.

There are countless numbers of volunteer opportunities that can help improve the lives of underserved populations, some of which are listed in [Table I](#). Participation in sports during childhood has a positive and long-lasting impact on a child's cardiovascular and respiratory health and well-being.<sup>56</sup> This has also been studied and proven to be the case in pediatric patients with asthma.<sup>57</sup> However, youth populations impacted by poverty are often unable to participate and benefit from regular sports activities.<sup>58</sup> In fact, access to sports in impoverished communities is disproportionately impacted by climate change, creating another unfortunate situation of environmental injustice.<sup>59</sup> Volunteering of specialists such as allergists/immunologists for athletic organizations that work to improve healthy lifestyles through exercise and eating healthier could be another way to impact well-being of many children and adults. Examples of existing opportunities are nonprofit organizations that are focused on the well-being of children at international and national levels such as the American Academy of Pediatrics, with an extensive national presence; PLAY International; and SportAndDev, as well as local organizations such as the Cincinnati Squash Academy, Civic Heart, and Harlem Children's Zone ([Table I](#)). Many such organizations rely on volunteerism and are focused on youth development by providing academic mentorship, financial resources, and athletic training. Our contribution can include educating these youth groups on the importance and impact of environmental factors that contribute to allergies and asthma and health problems. We can also provide counseling to these athletes related to respiratory health and growth. Another example of such collaboration is engagement with food allergy patient advocacy groups to help develop nutritional programs and to volunteer at food banks to educate patrons about nutrition and food allergies. Simply volunteering to help individuals in grocery stores or food banks by educating them about healthy eating options could be an impactful initiative.

### **Volunteer to improve the environment or at times of environmental disaster**

Allergists/immunologists are uniquely positioned to lead environment-related volunteering activities, either by working strategically with groups that directly or indirectly address aspects relevant to our subspecialty or by engaging directly in advocacy activities. We are equipped with sound knowledge to provide advice about avoidance measures and treatment to help mitigate the negative effect of many environmental exposures. An example of such knowledge is a recent article demonstrating an inverse relationship between increasing green space and decreasing asthma risk in children.<sup>60</sup> Opportunities exist to collaborate with patient advocacy organizations such as the American Lung Association, Clean Air Now, and the Allergy and Asthma Network. As detailed above, the Healthy People 2030 initiative also focuses on improving health through healthy air, as evidenced by their objectives on respiratory health.<sup>61</sup> In addition, organizations such as Habitat for Humanity have volunteering and advocacy opportunities to improve home safety and resilience.<sup>62</sup> Medicolegal partnerships can also be helpful in advocacy efforts to improve the school and home environment. This could be through volunteering at large organization with widespread



**TABLE I.** Potential volunteer opportunities for allergists/immunologists to address environmental disparities

Category	Description	Example
Provide care	Volunteer to take care of the allergy/immunology need of patients who can't afford it and are impacted by environmental injustice	<ul style="list-style-type: none"> <li>● Volunteer at community clinics to provide allergy/immunology care.</li> <li>● International and national organizations: <ul style="list-style-type: none"> <li>● Doctors without Borders USA climate change and health call to action (<a href="https://www.doctorswithoutborders.org/latest/climate-emergency-humanitarian-call-action">https://www.doctorswithoutborders.org/latest/climate-emergency-humanitarian-call-action</a>).</li> <li>● American Red Cross disaster action teams (<a href="https://www.redcross.org/volunteer/become-a-volunteer/urgent-need-for-volunteers.html">https://www.redcross.org/volunteer/become-a-volunteer/urgent-need-for-volunteers.html</a>).</li> <li>● Medical Reserve Corps (MRC, <a href="https://aspr.hhs.gov/MRC/Pages/index.aspx">https://aspr.hhs.gov/MRC/Pages/index.aspx</a>).</li> </ul> </li> </ul>
Education	Educate community clinicians and their staff on the health effects of hazardous environmental exposure	<ul style="list-style-type: none"> <li>● Provide lectures to empower staff at community clinics about the impact of the environment.</li> <li>● Hands-on training of community health care staff.</li> <li>● Volunteer supervision of medical students or residents in community clinics.</li> </ul>
	Educate advocacy groups	<ul style="list-style-type: none"> <li>● Provide educational talks or seminars.</li> <li>● Serve as a consultant.</li> <li>● Consult Yale Law Clinic and Communities call for action on environmental injustice at Yale Law School (<a href="https://law.yale.edu/yls-today/news/yale-law-clinic-and-communities-call-action-environmental-injustice">https://law.yale.edu/yls-today/news/yale-law-clinic-and-communities-call-action-environmental-injustice</a>).</li> </ul>
Preventive care and well-being promotion	For sports, volunteer at athletic organizations that provide opportunities for those impacted by disparities	<ul style="list-style-type: none"> <li>● Volunteer at national and international organizations such as: <ul style="list-style-type: none"> <li>● American Academy of Pediatrics initiatives (<a href="https://aap.org/">https://aap.org/</a>).</li> <li>● PLAY International sports nongovernmental organization (<a href="https://play-international.org/">https://play-international.org/</a>).</li> <li>● SportAndDev, supporting children around the world through sport (<a href="https://www.sportanddev.org/">https://www.sportanddev.org/</a>).</li> </ul> </li> <li>● Volunteer at local organizations such as: <ul style="list-style-type: none"> <li>● Cincinnati Squash Academy (<a href="https://www.squashacademy.org/squash-academy-vision">https://www.squashacademy.org/squash-academy-vision</a>).</li> <li>● Civic Heart (<a href="https://civicheart.org/">https://civicheart.org/</a>).</li> <li>● Harlem Children's Zone (<a href="https://hcz.org/">https://hcz.org/</a>).</li> </ul> </li> </ul>
Preventive care and well-being promotion	For diet, engage with advocacy groups addressing healthy food for communities, or volunteer at food banks to educate about nutrition and food allergies	<ul style="list-style-type: none"> <li>● Volunteer at food allergy advocacy groups such as: <ul style="list-style-type: none"> <li>● Food Equality Initiative (<a href="https://www.foodequalityinitiative.org/">https://www.foodequalityinitiative.org/</a>).</li> <li>● Free from Market (<a href="https://freefrommarket.com/">https://freefrommarket.com/</a>).</li> <li>● FARE initiatives for healthy foods (<a href="https://www.foodallergy.org/take-action/volunteer-fare">https://www.foodallergy.org/take-action/volunteer-fare</a>).</li> </ul> </li> </ul>
Improve the environment	Join efforts at medical and advocacy organizations focused on improving the living environment	<ul style="list-style-type: none"> <li>● Volunteer at national and international organizations such as: <ul style="list-style-type: none"> <li>● Habitat for Humanity (<a href="https://www.habitat.org/volunteer">https://www.habitat.org/volunteer</a>).</li> <li>● American Lung Association (<a href="https://www.lung.org/get-involved/volunteer">https://www.lung.org/get-involved/volunteer</a>).</li> <li>● Clean Air Now (<a href="https://www.clean-air-now.org/home">https://www.clean-air-now.org/home</a>).</li> <li>● Allergy and Asthma Network (<a href="https://allergyasthmanetwork.org/news/become-a-community-asthma-copd-expert-volunteer">https://allergyasthmanetwork.org/news/become-a-community-asthma-copd-expert-volunteer</a>).</li> <li>● Healthy People 2030 (<a href="https://health.gov/healthypeople/objectives-and-data/browse-objectives/respiratory-disease">https://health.gov/healthypeople/objectives-and-data/browse-objectives/respiratory-disease</a>).</li> </ul> </li> </ul>

(Continued)

TABLE I. (Continued)

Category	Description	Example
	Build medicolegal partnerships to improve the environment	<ul style="list-style-type: none"> <li>● Volunteer at national and international organizations such as: <ul style="list-style-type: none"> <li>● United Nations physician volunteering (<a href="https://www.unv.org/">https://www.unv.org/</a>).</li> <li>● Save the Children International (<a href="https://www.savethechildren.net/">https://www.savethechildren.net/</a>).</li> </ul> </li> <li>● Volunteer at location organizations such as: <ul style="list-style-type: none"> <li>● Cincinnati Child Health–Law Partnership (Child HeLP).</li> <li>● MRC.</li> </ul> </li> </ul>

international and national presence, such as programs led by the United Nations (the United Nations Volunteers program or Save the Children International), or at the local level, such as the Cincinnati Child Health–Law Partnership (Child HeLP).<sup>63</sup> Volunteering with a American Red Cross disaster action team or the Medical Reserve Corps, a national network of volunteer medical professionals and public health experts focusing on medical preparedness, can provide expertise to mitigate health impacts and improve recovery after natural disasters.<sup>64</sup> Some groups offer a more flexible platform for volunteerism tailored to the needs of a community in moments of crisis, such as hurricanes and wildfires. Our physician volunteer workforce can work via community groups or local medical societies to address local needs.

Engagement in advocacy to protect the environment can be an impactful strategy at the local, state, and national level. Both the AAAAI and the American Medical Association have tools for physicians interested in this type of activity.<sup>65</sup> Likewise, the US Environmental Protection Agency has public hearings and opportunities for submission of written comments pertaining to changes in environmental regulations, such as the National Ambient Air Quality Standards for specific pollutants.<sup>66</sup> One example is the recent passage of the Climate and Equitable Jobs Act in Illinois, which included provisions to phase out carbon emissions from the energy and transportation sectors.<sup>67</sup>

### Volunteer to teach, and teach to volunteer

Studies indicate that most clinicians believe many patients have social needs, but clinicians commonly fail to assess related contextual information, such as transportation needs, economic situations, or caretaker responsibilities when planning these management strategies.<sup>62</sup> Inattention to contextual information can lead to related errors, which are not currently measured in assessments of physician performance.<sup>68-70</sup> To improve this major gap, it is important to integrate health equity and methodologies for measuring physician performance at contextualizing care into medical training so it can be more effectively translated into standard medical practice (Fig 1).<sup>71</sup>

Understanding the barriers to integrating health equity in clinical practice, why people volunteer, and the factors that motivate health professionals to work with vulnerable and underserved populations are all instructive factors for developing an effective voluntarism program for professional organizations like the AAAAI. Volunteer service learning activities such as free clinics have been shown to improve health professional

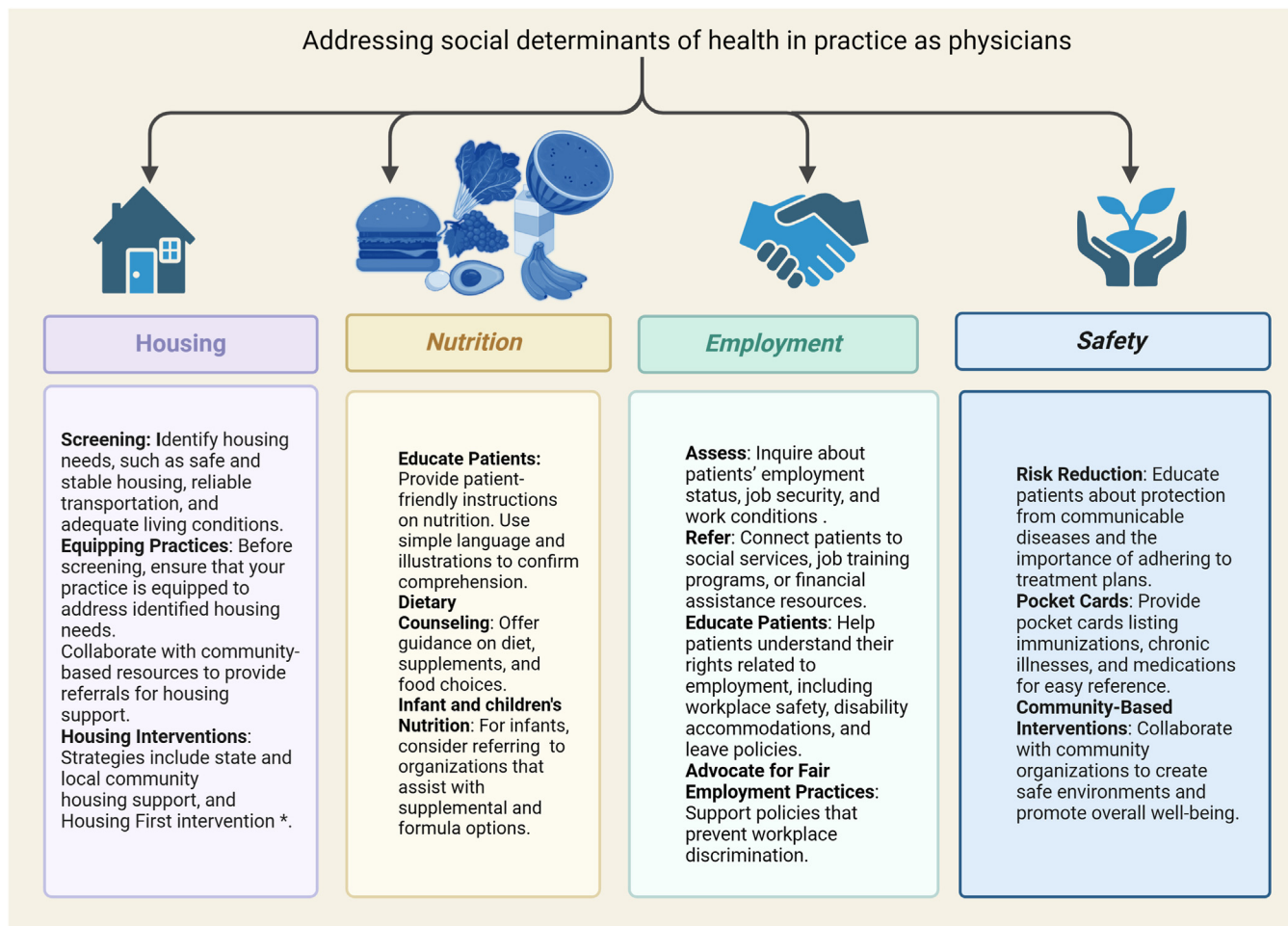
engagement and attitudes toward caring for underserved populations<sup>72</sup> while supplementing medical education.<sup>73,74</sup> Formal elective courses for educating and promoting service-based practice have also been successful in promoting this innate desire for volunteerism among younger generations.<sup>75,76</sup> Volunteer supervision of medical students or residents in community clinics can provide an opportunity for specialists to care for underserved populations and act as a role model for the development of young physicians.

### VAEDIA: A 2023 AAAAI PRESIDENTIAL INITIATIVE

The 2023 AAAAI presidential task force aims to promote volunteerism to address environmental disparities in underserved populations. VAEDIA comprises a diverse representation of our organization, with members with experience in volunteerism, public health, community service, organizational and advocacy work, research, and clinical care. They are charged with developing a structural plan for implementation of a AAAAI community volunteer program to address public health environmental disparities. AAAAI has also created a new grant mechanism to empower such collaborative studies, with information on the AAAAI website ([www.aaaai.org](http://www.aaaai.org)). Other stakeholders from nonprofit organizations, industry, and government that have strong interests related to environmental issues are also being invited to help develop a sustainable framework for this program.

Proposed initiatives include funding of community-based projects that address a spectrum of environmental issues that disproportionately affect underserved populations. The task force will promote, support, and advocate for allergists/immunologists at a grassroots level by increasing awareness of how allergists can impact the care of their patients through community service with respect to housing, nutrition, employment, and safety. Plans are being implemented to connect allergists with other local and regional allergy/immunology health care professionals who can jointly develop volunteerism strategies for serving their local community.

Millions of vulnerable people lose their lives each year as a result of unhealthy environmental conditions worldwide. These environmental determinants play a role in initiating, exacerbating, and perpetuating conditions that are within the scope of expertise for those with allergist and clinical immunology expertise. Volunteer initiatives have been demonstrated to be impactful in bettering humanity, and professional medical organizations like the AAAAI are perfectly positioned to engage in these important community outreach volunteer programs. The



**FIG 1.** Addressing social determinants of health is crucial for improving patient care in the community. Here are some practical guidelines and best practices related to housing, nutrition, employment, and safety. Addressing social determinants of health requires a holistic approach involving not only health care providers but also community resources and policy changes. By integrating these guidelines into practice, we can positively impact patient care and overall health in the community. \*Data from "Housing Interventions to Improve Health Outcomes," Healthcare Value Hub, Research Brief 36, April 2019 (<https://www.healthcarevaluehub.org/advocate-resources/publications/housing-interventions-improve-health-outcomes>).

AAAAI's VAEDIA task force is the first of what we hope will be many professional organizational programs that will demonstrate it is possible to have a broad impact on the patients we treat through volunteerism.

### DISCLOSURE STATEMENT

Disclosure of potential conflict of interest: M. Mahdavinia reports research support from the National Institutes of Health (NIH), Food Allergy Research and Education (FARE), Optinose Foundation, Brinson Foundation, and Institute for Translation Medicine in Chicago. J. A. Poole receives funding from the Department of Defense and the National Institute of Occupational Safety and Health; has received research regents from AstraZeneca; and acts as site principal investigator (PI) for clinical studies for asthma, sinus disease, and urticaria involving GlaxoSmithKline, AstraZeneca, Regeneron Pharmaceuticals, and CellDex Therapeutics. A. J. Apter receives research support from the NIH and the Patient-Centered Outcomes Research Institute. A. A. Pappalardo has served on the medical advisory board for

Takeda, Eli Lilly, and Sanofi Regeneron; has received grant funding from the NIH, Agency for Health Research and Quality, and FARE; and has acted as a consultant for Optum/United Health Group. E. C. Matsui has received research support from the NIH. J. A. Bernstein is site PI and consultant for Sanofi Regeneron, AstraZeneca, GSK, Novartis, Genentech, Biocryst, Pharming, Takeda, CSL Behring, Ionis, Biomarin, Blueprint Medicine, Cogent, Celldex, Escient, Jasper Pharmaceuticals, Amgen, Kalvista, and Pharvaris; is president of American Academy of Allergy, Asthma & Immunology (AAAAI), World Allergy Organization, and Interasma; and Hereditary Angioedema medical advisory board. The rest of the authors declare that they have no relevant conflicts of interest.

### REFERENCES

1. ABIM Foundation; ACP-ASIM Foundation; European Federation of Internal Medicine. Medical professionalism in the new millennium: a physician charter. *Ann Intern Med* 2002;136:243-6.
2. Darves B. Physician volunteer work. *NEJM Career Center* October 16, 2011. Available at: <https://resources.nejmcareercenter.org/article/physician-volunteer-work/>.

3. Birnbaum LS, Zenick H, Branche CM. Environmental justice: a continuing commitment to an evolving concept. *Am J Public Health* 2009;99(suppl 3):S487-9.
4. Brulle RJ, Pellow DN. Environmental justice: human health and environmental inequalities. *Annu Rev Public Health* 2006;27:103-24.
5. Liu C, Chen R, Sera F, Vicedo-Cabrera AM, Guo Y, Tong S, et al. Ambient particulate air pollution and daily mortality in 652 cities. *N Engl J Med* 2019;381:705-15.
6. Mohai P, Lantz PM, Morenoff J, House JS, Mero RP. Racial and socioeconomic disparities in residential proximity to polluting industrial facilities: evidence from the Americans' Changing Lives Study. *Am J Public Health* 2009;99(suppl 3):S649-56.
7. Chakraborty J, Zandbergen PA. Children at risk: measuring racial/ethnic disparities in potential exposure to air pollution at school and home. *J Epidemiol Community Health* 2007;61:1074-9.
8. Faber DR, Krieg EJ. Unequal exposure to ecological hazards: environmental injustices in the commonwealth of Massachusetts. *Environ Health Perspect* 2002;110(suppl 2):277-88.
9. McEntee JC, Ogneva-Himmelberger Y. Diesel particulate matter, lung cancer, and asthma incidences along major traffic corridors in MA, USA: a GIS analysis. *Health Place* 2008;14:817-28.
10. Poulston M, Neufeld MY, Dechert T, Allee L, Kenzik KM. Historic redlining, structural racism, and firearm violence: a structural equation modeling approach. *Lancet Reg Health Am* 2021;3:100052.
11. Mehdipanah R, McVay KR, Schulz AJ. Historic redlining practices and contemporary determinants of health in the Detroit metropolitan area. *Am J Public Health* 2023;113(S1):S49-57.
12. Cheng BT, Silverberg JI. Depression and psychological distress in US adults with atopic dermatitis. *Ann Allergy Asthma Immunol* 2019;123:179-85.
13. Mahdavinia M, Fox SR, Smith BM, James C, Palmisano EL, Mohammed A, et al. Racial differences in food allergy phenotype and health care utilization among US children. *J Allergy Clin Immunol Pract* 2017;5:352-7.e1.
14. DInur-Schejter Y, Stepensky P. Social determinants of health and primary immunodeficiency. *Ann Allergy Asthma Immunol* 2022;128:12-8.
15. Bukstein DA, Friedman A, Gonzalez Reyes E, Hart M, Jones BL, Winders T. Impact of social determinants on the burden of asthma and eczema: results from a US patient survey. *Adv Ther* 2022;39:1341-58.
16. Burbank AJ, Hernandez ML, Jefferson A, Perry TT, Phipatanakul W, Poole J, et al. Environmental justice and allergic disease: a work group report of the AAAAI Environmental Exposure and Respiratory Health Committee and the Diversity, Equity and Inclusion Committee. *J Allergy Clin Immunol* 2023;151:656-70.
17. Healthy People campaign. Available at: <https://health.gov/healthypeople>.
18. Healthy People 2030 framework. Available at: <https://health.gov/healthypeople/about/healthy-people-2030-framework>.
19. Healthy People 2030. Environmental health. Available at: <https://health.gov/healthypeople/objectives-and-data/browse-objectives/environmental-health>.
20. Southerlan E, Heese F. Pharma's opportunity to impact health equity. *Oliver Wyman Health*; October 2022. Available at: <https://www.oliverwyman.com/our-expertise/perspectives/health/2022/oct/pharmas-opportunity-to-impact-health-equity.html>.
21. Nanda A, Mustafa SS, Castillo M, Bernstein JA. Air pollution effects in allergies and asthma. *Immunol Allergy Clin North Am* 2022;42:801-15.
22. Walter CM, Schneider-Futschik EK, Lansbury NL, Sly PD, Head BW, Knibbs LD. The health impacts of ambient air pollution in Australia: a systematic literature review. *Intern Med J* 2021;51:1567-79.
23. Pedersen M, Liu S, Zhang J, Jovanovic Andersen Z, Brandt J, Budtz-Jorgensen E, et al. Early-life exposure to ambient air pollution from multiple sources and asthma incidence in children: a nationwide birth cohort study from Denmark. *Environ Health Perspect* 2023;131:57003.
24. McConnell R, Islam T, Shankardass K, Jerrett M, Lurmann F, Gilliland F, et al. Childhood incident asthma and traffic-related air pollution at home and school. *Environ Health Perspect* 2010;118:1021-6.
25. Bryant-Stephens TC, Strane D, Robinson EK, Bhambhani S, Kenyon CC. Housing and asthma disparities. *J Allergy Clin Immunol* 2021;148:1121-9.
26. Lynch EE, Malcoe LH, Laurent SE, Richardson J, Mitchell BC, Meier HCS. The legacy of structural racism: associations between historic redlining, current mortgage lending, and health. *SSM Popul Health* 2021;14:100793.
27. Riley AR. Neighborhood disadvantage, residential segregation, and beyond—lessons for studying structural racism and health. *J Racial Ethn Health Disparities* 2018;5:357-65.
28. Nardone A, Casey JA, Morello-Frosch R, Mujahid M, Balmes JR, Thakur N. Associations between historical residential redlining and current age-adjusted rates of emergency department visits due to asthma across eight cities in California: an ecological study. *Lancet Planet Health* 2020;4:e24-31.
29. Puvvula J, Poole JA, Gwon Y, Rogan EG, Bell JE. Role of social determinants of health in differential respiratory exposure and health outcomes among children. *BMC Public Health* 2023;23:119.
30. Gordon SB, Bruce NG, Grigg J, Hibberd PL, Kurmi OP, Lam KB, et al. Respiratory risks from household air pollution in low and middle income countries. *Lancet Respir Med* 2014;2:823-60.
31. Lee KK, Bing R, Kiang J, Bashir S, Spath N, Stelzle D, et al. Adverse health effects associated with household air pollution: a systematic review, meta-analysis, and burden estimation study. *Lancet Glob Health* 2020;8:e1427-34.
32. Local Burden of Disease Household Air Pollution Collaborators. Mapping development and health effects of cooking with solid fuels in low-income and middle-income countries, 2000-18: a geospatial modelling study. *Lancet Glob Health* 2022;10:e1395-411.
33. Luedders J, Poole JA. Influence of rural environmental factors in asthma. *Immunol Allergy Clin North Am* 2022;42:817-30.
34. Johnson AN, Harkema JR, Nelson AJ, Dickinson JD, Kalil J, Duryee MJ, et al. MyD88 regulates a prolonged adaptation response to environmental dust exposure-induced lung disease. *Respir Res* 2020;21:97.
35. Poole JA, Wyatt TA, Romberger DJ, Staab E, Simet S, Reynolds SJ, et al. MyD88 in lung resident cells governs airway inflammatory and pulmonary function responses to organic dust treatment. *Respir Res* 2015;16:111.
36. Bicakci A, Akyalcin H. Analysis of airborne pollen fall in Balikesir, Turkey, 1996-1997. *Ann Agric Environ Med* 2000;7:5-10.
37. Rorie A. Climate change factors and the aerobiology effect. *Immunol Allergy Clin North Am* 2022;42:771-86.
38. Ziska L, Knowlton K, Rogers C, Dalan D, Tierney N, Elder MA, et al. Recent warming by latitude associated with increased length of ragweed pollen season in central North America. *Proc Natl Acad Sci U S A* 2011;108:4248-51.
39. Zhang Y, Bielory L, Georgopoulos PG. Climate change effect on *Betula* (birch) and *Quercus* (oak) pollen seasons in the United States. *Int J Biometeorol* 2014;58:909-19.
40. Subiza J, Cabrera M, Cárdenas-Rebollo JM, Craciunescu JC, Narganes MJ. Influence of climate change on airborne pollen concentrations in Madrid, 1979-2018. *Clin Exp Allergy* 2022;52:574-7.
41. Estrada F, Perron P, Yamamoto Y. Anthropogenic influence on extremes and risk hotspots. *Sci Rep* 2023;13:35.
42. Harun NS, Lachapelle P, Douglass J. Thunderstorm-triggered asthma: what we know so far. *J Asthma Allergy* 2019;12:101-8.
43. Li Y, Buendia J, Sears S, Ibrahimovic M, Bertero H, Wiseman R, et al. Impact of Hurricane Harvey on inpatient asthma hospitalization visits within Southeast Texas, 2016-2019. *J Occup Environ Med* 2023;65:924-30.
44. Jaakkola MS, Quansah R, Hugg TT, Heikkinen SA, Jaakkola JJ. Association of indoor dampness and molds with rhinitis risk: a systematic review and meta-analysis. *J Allergy Clin Immunol* 2013;132:1099-110.e18.
45. Mendell MJ, Mirer AG, Cheung K, Tong M, Douwes J. Respiratory and allergic health effects of dampness, mold, and dampness-related agents: a review of the epidemiologic evidence. *Environ Health Perspect* 2011;119:748-56.
46. Gargano LM, Locke S, Jordan HT, Brackbill RM. Lower respiratory symptoms associated with environmental and reconstruction exposures after Hurricane Sandy. *Disaster Med Public Health Prep* 2018;12:697-702.
47. Josey KP, Delaney SW, Wu X, Nethery RC, DeSouza P, Braun D, et al. Air pollution and mortality at the intersection of race and social class. *N Engl J Med* 2023;388:1396-404.
48. Cook Q, Argenio K, Lovinsky-Desir S. The impact of environmental injustice and social determinants of health on the role of air pollution in asthma and allergic disease in the United States. *J Allergy Clin Immunol* 2021;148:1089-101.e5.
49. Wodtke GT, Ard K, Bullock C, White K, Priem B. Concentrated poverty, ambient air pollution, and child cognitive development. *Sci Adv* 2022;8:eadd0285.
50. Natural Resources Defense Council (NRDC). Flint water crisis: everything you need to know. November 8, 2018. Available at: <https://www.nrdc.org/stories/flint-water-crisis-everything-you-need-know>.
51. Human Rights Watch (HRW). United States: pandemic impact on people in poverty. March 2, 2021. Available at: <https://www.hrw.org/news/2021/03/02/united-states-pandemic-impact-people-poverty>.
52. Pharmaceutical Research and Manufacturers of America (PhRMA). PhRMA's equity initiative. Available at: <https://phrma.org/Equity>.
53. Sanchez-Borges M, Martin BL, Muraro AM, Wood RA, Agache IO, Ansotegui JJ, et al. The importance of allergic disease in public health: an iCAALL statement. *World Allergy Organ J* 2018;11:8.
54. Chase B. City was "negligent," showed "incompetence" protecting Little Village from pollution, report finds. *Chicago Sun Times*, February 15, 2023.
55. Santoyo B, Muhammed J. Three lessons on how communities can support the struggle for water justice. Blog post, Robert Wood Johnson Foundation. September 29, 2022. Available at: <https://www.rwjf.org/en/insights/blog/2022/09/three-lessons-on-how-communities-can-support-the-struggle-for-water-justice.html>.



56. Landry BW, Driscoll SW. Physical activity in children and adolescents. *PM R* 2012;4:826-32.
57. Wanrooij VH, Willeboordse M, Dompeling E, van de Kant KD. Exercise training in children with asthma: a systematic review. *Br J Sports Med* 2014;48:1024-31.
58. Kuhn AW, Grusky AZ, Cash CR, Churchwell AL, Diamond AB. Disparities and inequities in youth sports. *Curr Sports Med Rep* 2021;20:494-8.
59. Murfree J. Why the impact of climate change on sport is an environmental justice problem. *Global Sport Matters*, Global Sport Institute, Arizona State University, April 21, 2022. Available at: <https://globalsportmatters.com/health/2022/04/21/climate-change-sport-environmental-justice-problem/>.
60. Hu Y, Chen Y, Liu S, Tan J, Yu G, Yan C, et al. Higher greenspace exposure is associated with a decreased risk of childhood asthma in Shanghai—a megacity in China. *Ecotoxicol Environ Saf* 2023;256:114868.
61. Healthy People 2030. Objective: respiratory disease. Available at: <https://health.gov/healthypeople/objectives-and-data/browse-objectives/respiratory-disease>.
62. Vanjani R, Reddy N, Giron N, Bai E, Martino S, Smith M, et al. The social determinants of health—moving beyond screen-and-refer to intervention. *N Engl J Med* 2023;389:569-73.
63. Beck AF, Henize AW, Qiu T, Huang B, Zhang Y, Klein MD, et al. Reductions in hospitalizations among children referred to a primary care-based medical-legal partnership. *Health Aff (Millwood)* 2022;41:341-9.
64. Administration for Strategic Preparedness and Response (ASPR); US Department of Health and Human Services. Become a volunteer: local health, safety, and preparedness begins with you. Available at: <https://aspr.hhs.gov/MRC/Pages/Become-a-Volunteer.aspx>.
65. American Medical Association (AMA). Ways to get involved with AMA advocacy. Available at: <https://www.ama-assn.org/health-care-advocacy/federal-advocacy/ways-get-involved-ama-advocacy>.
66. United States Environmental Protection Agency (EPA). Reviewing national ambient air quality standards (NAAQS): scientific and technical information. Available at: <https://www.epa.gov/naaqs>.
67. Roslund MI, Parajuli A, Hui N, Puhakka R, Gronroos M, Soininen L, et al. A placebo-controlled double-blinded test of the biodiversity hypothesis of immune-mediated diseases: environmental microbial diversity elicits changes in cytokines and increase in T regulatory cells in young children. *Ecotoxicol Environ Saf* 2022;242:113900.
68. Weiner SJ, Schwartz A, Yudkowsky R, Schiff GD, Weaver FM, Goldberg J, et al. Evaluating physician performance at individualizing care: a pilot study tracking contextual errors in medical decision making. *Med Decis Making* 2007;27:726-34.
69. Weiner SJ, Schwartz A, Weaver F, Goldberg J, Yudkowsky R, Sharma G, et al. Contextual errors and failures in individualizing patient care: a multicenter study. *Ann Intern Med* 2010;153:69-75.
70. Johnson CB, Luther B, Wallace AS, Kulesa MG. Social determinants of health: what are they and how do we screen. *Orthop Nurs* 2022;41:88-100.
71. Weiner SJ, Schwartz A. Contextual errors in medical decision making: overlooked and understudied. *Acad Med* 2016;91:657-62.
72. Smith SD, Johnson ML, Rodriguez N, Moutier C, Beck E. Medical student perceptions of the educational value of a student-run free clinic. *Fam Med* 2012;44:646-9.
73. Meah YS, Smith EL, Thomas DC. Student-run health clinic: novel arena to educate medical students on systems-based practice. *Mt Sinai J Med* 2009;76:344-56.
74. Simpson SA, Long JA. Medical student-run health clinics: important contributors to patient care and medical education. *J Gen Intern Med* 2007;22:352-6.
75. Jones K, Blinkhorn LM, Schumann SA, Reddy ST. Promoting sustainable community service in the 4th year of medical school: a longitudinal service-learning elective. *Teach Learn Med* 2014;26:296-303.
76. Pennington K, Harwood E, Sick B. Characterizing the community collaborations of a community-based student-run clinic. *J Prim Care Community Health* 2020;11:2150132720984400.