



## AAP Headquarters

345 Park Blvd  
Itasca, IL 60143  
Phone: 630/626-6000  
Fax: 847/434-8000  
www.aap.org

## Reply to

### AAP Washington Office

601 13th St NW, Suite 400N  
Washington, DC 20005  
Phone: 202/347-8600  
E-mail: kids1st@aap.org

## Executive Committee

### President

Lee Savio Beers, MD, FAAP

### President-Elect

Moirra A. Szilagyi, MD, FAAP

### Immediate Past President

Sara H. Goza, MD, FAAP

### Secretary/Treasurer

Warren M. Seigel, MD, FAAP

### CEO/Executive Vice President

Mark Del Monte, JD

## Board of Directors

### District I

Wendy S. Davis, MD, FAAP

### District II

Warren M. Seigel, MD, FAAP

### District III

Margaret C. Fisher, MD, FAAP

### District IV

Michelle D. Fiscus, MD, FAAP

### District V

Jeannette "Lia" Gaggino, MD, FAAP

### District VI

Dennis M. Cooley, MD, FAAP

### District VII

Gary W. Floyd, MD, FAAP

### District VIII

Martha C. Middlemist, MD, FAAP

### District IX

Yasuko Fukuda, MD, FAAP

### District X

Madeline M. Joseph, MD, FAAP

### At Large

Charles G. Macias, MD, FAAP

### At Large

Constance S. Houck, MD, FAAP

### At Large

Joseph L. Wright, MD, FAAP

April 21, 2021

Administrator Michael S. Regan  
U.S. Environmental Protection Agency  
1200 Pennsylvania Avenue, N.W.  
Washington, DC 20460

RE: AAP Priorities for Addressing Climate Change to Improve Child Health

Dear Administrator Regan:

On behalf of the American Academy of Pediatrics (AAP), a non-profit professional organization of over 67,000 primary care pediatricians, pediatric medical sub-specialists, and pediatric surgical specialists dedicated to the health, safety, and well-being of infants, children, adolescents, and young adults, I am writing to share our congratulations for your confirmation as Administrator of the U.S. Environmental Protection Agency (EPA) and to convey the Academy's priorities for addressing climate change to improve child health.

In clinics and hospitals throughout the United States, pediatricians are witnessing the immediate harms and risks that climate change poses to the health of their patients. The AAP has long called for policies to address the global challenge of climate change and protect the health and wellbeing of children. Underpinning that work is the Academy's policy statement<sup>i</sup> dedicated to articulating the science behind the ways in which climate change impacts child health and how climate actions can improve child health and health equity. The AAP welcomes the Biden Administration's attention to addressing climate change with a whole-of-government approach and a focus on environmental justice, and we look forward to partnering with you on this important work.

## Climate Change is a Public Health Crisis that Disproportionately Harms Children

Children are uniquely vulnerable to the health impacts of climate change, and any comprehensive response to climate change must take child health into account. Children's immature physiology and metabolism; critical windows of development; higher exposure to air, food, and water per unit of body weight; unique developmentally appropriate behavior patterns; and dependence on caregivers place them at much higher risk of climate-related health burdens than adults.<sup>ii</sup> For example, outdoor air quality that is worsened by climate change can disproportionately impact children's health because they tend to spend more time outside than adults and their growing lungs are more susceptible to hazardous exposures, among other factors. Climate change impacts child health because it results in more extreme heat waves, worse air quality, and the emergence of infections. The increased severity of extreme weather, including hurricanes, wildfires, and floods, can destroy homes and communities. These events put all aspects of child health at risk, including through creating the potential for toxic stress that can compromise health into adulthood.

Children from underserved communities and communities of color are more susceptible to the health risks posed by climate change. Inadequate investments in these communities, structural racism, and proximity to other environmental hazards contribute to environmental injustice that leaves children at greater risk. A comprehensive response to climate change must promote equity for these disproportionately at-risk communities and must specifically promote policies that protect children from climate change-related harms.

### **Federal Policy Opportunities to Address the Child Health Impact of Climate Change**

While the child health harms of climate change are many, climate actions can benefit child health in the short- and long-term, especially for poorer children and children of color. We have adequate scientific and economic evidence to justify decisive action to advance climate change mitigation that promotes child health. The following are our recommendations across several policy sectors.

#### **De-Carbonizing the Electricity Sector**

According to EPA, power plant emissions generate over one-quarter of all U.S. greenhouse gas pollution. To decarbonize the electricity sector, comprehensive climate legislation and regulations should promote energy efficiency and renewable energy production at the federal, state, and local levels while decreasing incentives for continued production and consumption of carbon-intensive fuels such as coal, oil, and gas.

The AAP supported the Clean Power Plan (CPP) in 2015, and in 2018 and 2019 opposed the EPA's proposed attempts to undermine its effectiveness. The CPP would have limited carbon pollution from both new and existing fossil fuel-fired power plants. This policy would also have decreased air pollutants from power plants, such as particulate matter, and saved as many as 4,600 lives. In addition, it would have resulted in up to 90,000 fewer asthma attacks in children, and 180,000 fewer missed school days in the year 2030.<sup>iii</sup> EPA has clear authority to regulate carbon pollution from power plants, and we urge the administration to promulgate comprehensive regulations to rapidly reduce carbon emissions in the energy sector.

In addition, the AAP supports terminating federal subsidies and tax incentives for the production and transport of coal, oil, and gas, and increasing federal subsidies for clean, renewable energy sources such as wind, solar, and hydropower. The AAP also supports the implementation of an effective and equitable carbon fee and dividend regime to accurately reflect the true health costs of fossil fuel pollution. A recent analysis found that more than 300,000 Americans die each year from air pollution generated from fossil fuel use.<sup>iv</sup> It is critical that any such policy regime not undermine essential public health protections in the Clean Air Act, including the EPA's authority to regulate carbon pollution under section 111(d). EPA's proven authority to regulate hazardous air pollutants under the Clean Air Act, twice affirmed by the U.S. Supreme Court<sup>v,vi</sup>, is a vital tool to address climate change and protect health.

Due to the urgency of addressing climate change, comprehensive climate legislation must not weaken existing avenues of reducing carbon pollution, such as EPA's Clean Air Act authority. The AAP would oppose decarbonization legislation that eliminates these essential public health protections.

#### **Reducing Carbon Pollution from Transportation**

Transportation emissions already account for more than one-quarter of U.S. greenhouse gas emissions and are expected to rise, making transportation a key priority for climate action. Decarbonizing transportation can also directly benefit child health through improved safety and increased opportunities for physical activity.<sup>vii</sup> The best available science suggests that tailpipe emissions may be responsible for 1 in 5 children who develop

asthma.<sup>viii</sup> Via reduced emissions alone, clean transportation is estimated to prevent 120,000 premature deaths by 2030 and 14,000 annually thereafter in the U.S.<sup>ix</sup>

Other studies have shown that the health benefits of lower-emission motor vehicles are increased when combined with the promotion of active travel such as walking or biking, which reduces the prevalence of chronic diseases such as diabetes, dementia, ischemic heart disease, and cancer.<sup>x,xi</sup> The overall health benefits of such transportation strategies have been shown to save billions in public health spending.<sup>xii</sup> Comprehensive climate legislation and regulations should include expanding public transportation and increasing construction of safe bikeways and walkways, which, reduce greenhouse gas emissions, promote healthy childhood weight through active transportation, and support social cohesion. We encourage the EPA to work closely with the U.S. Department of Transportation on shared priorities for safer and more sustainable transportation and infrastructure.

### **Modernizing the Food System to Reduce its Carbon Footprint**

Strategies aimed at shifting food systems to decrease greenhouse gas emissions offer further potential to address environmental concerns while dramatically promoting child health.<sup>xiii</sup> The adoption of more plant-based diets in line with current dietary guidelines could reduce global mortality by 6–10% and food-related greenhouse gas emissions by 29–70% by 2050 with global net health benefits from diseases like diabetes, heart disease, stroke, and cancer valued between US\$1-31 trillion.<sup>xiv</sup> In order to realize the full health benefits of such dietary change, evidence suggests that special attention must be given to reducing red meat consumption<sup>xv</sup> and controlling sugar levels in more sustainable diets.<sup>xvi</sup> In addition, it is important to support efforts to improve the adaptability and resilience of our food system, through research, development, and implementation of technologies and strategies that promote crop resilience, support regenerative agriculture, and reduce the greenhouse gas contributions of animal agriculture. We encourage the EPA to collaborate with the U.S. Department of Agriculture to support sustainable agriculture and dietary practices that promote human health and environmental health.

### **Promoting Sustainable Community Development**

Climate change policies that preserve, create, and expand natural green environments directly impact the mental health of populations, with the strongest benefits occurring during childhood. For example, an abundance of evidence suggests the relationship of public green spaces with greater mental wellbeing in a dose-dependent relationship.<sup>xvii xviii</sup> Prolonged exposure to green space specifically during childhood has been shown to decrease independently the risk of a wide range of mental illness later in life.<sup>xix xx</sup> While the exact mechanisms are still being studied, research has shown that exposure to the natural environment decreases harmful thought patterns<sup>xxi</sup> and can even impact brain structure and development.<sup>xxii</sup> The importance of natural environments early in life has been substantiated with studies showing improved cognitive development and function with increased green space exposure.<sup>xxiii</sup> In urban areas, green spaces and foliage can also mitigate the health harms from excessive heat. Adopting urban planning designs that incorporate open green spaces, walkability, reduced dependence on automobile transit, and climate change resilience while minimizing sprawl will decrease emissions while promoting child health. These should include remediation of historically underinvested communities that suffer from higher temperatures associated with high concentration of impermeable surface and lack of tree canopy.<sup>xxiv</sup>

### **Prioritizing Health Care Sector Mitigation and Adaptation**

The U.S. health care sector is a major contributor to climate change, producing as much as 10% of US greenhouse gas emissions.<sup>xxv</sup> At the same time, health care systems are contending with consequences of

climate change on patients and communities, and health care institutions also play an important role in communities' resilience in the face of climate change related events.

To address the broad array of negative child health effects from climate change, it is essential that federal policies promote energy efficiency and the adoption of clean energy in the health care sector, as well as the adaptation, preparedness, and resilience of hospitals and health systems. Energy efficiency and clean energy can be important components of reducing the cost of health care delivery. We also encourage the development of essential adaptation strategies, and assisting state and local governments, public health agencies, and health professionals in implementation of these strategies. Disaster preparedness and response efforts should include the specific needs of children. National and international policymaking efforts should include extensive input from stakeholders in the health sector, as today's hearing demonstrates. In addition, health students and practicing professionals must receive education about climate change and health, including climate-associated effects on clinical practice such as management of chronic diseases during periods of extreme heat or poor air quality and alterations in the safety and efficacy of prescription medications to adequately protect patients.

### **Pursuing Additional Adaptation Strategies**

In addition to mitigation efforts such as achieving net-zero carbon emissions, comprehensive climate legislation must include additional adaptation measures to protect children and their families from the effects of climate change that inevitably will occur and are already occurring. These include developing and implementing effective early-warning systems for extreme weather events, and physical protection against those events. Federal policy should also support improved surveillance of climate-associated infectious diseases, including new and emerging pathogens. Finally, we encourage federal policy to promote enhanced community resilience, and an emphasis on redressing the environmental justice concerns climate change presents. Children's safety from climate change should not depend on the color of their skin, their parents' income, or the zip code in which they were born.

### **Making Global Progress through Effective International Diplomacy**

Another crucial tool is the use of diplomacy and international cooperation to support global action in response to the climate crisis. The AAP supported the Paris Agreement to engage the global community in emissions reduction targets and welcomes the administration's decision to re-enter the agreement. We encourage a focus on setting bold U.S. commitments under that agreement as part of any comprehensive legislative response to climate change. In addition, we urge you to underscore the health imperative for taking decisive and coordinated global action in ongoing diplomacy around this vital issue.

### **Promoting Response Strategies with Assessment of Health Benefits**

Every day, pediatricians confront a massive burden of chronic disease in children. Asthma, obesity, mental health, and long-term health effects related to premature birth are issues that we see in clinics across the nation. We have made tremendous progress in addressing these and other threats to children's health, and climate solutions are a way to further prevent some of these conditions or mitigate their severity. Plans for climate change mitigation present a tremendous opportunity to improve child health by maximizing the health benefits of environmental policies. Policies to promote cleaner air, facilitate active transportation, encourage more sustainable diets, and develop more connected communities can lead to enormous child health gains while preserving a healthy, sustainable environment in which generations of children can thrive.

Reducing the carbon footprint of other sectors can also yield important child health co-benefits. For example, accessible public and active transportation, plant-based food availability, and green spaces can directly contribute to child health and wellbeing through increased physical activity and improved nutrition while at the same time reducing carbon pollution. Additional research into the health benefits of various decarbonization strategies could help policymakers choose the smartest investments to maximize co-benefits. The federal government currently provides no funding for such research, so directing funding for the research, surveillance, reporting, and tracking of climate-associated health effects would strengthen future comprehensive climate legislation.

While climate change disproportionately impacts child health, decarbonization efforts also present an enormous opportunity to improve child health by maximizing the co-benefits of carbon pollution reduction. Reducing emissions of hazardous traditional air pollutants such as particulate matter, sulfur oxides, and air toxics along with carbon dioxide can yield greater health outcomes for children. Child exposure to hazardous air pollutants can cause direct health impacts such as neurologic deficits, respiratory tract illness, asthma exacerbations, and decreased lung function,<sup>xxvi,xxvii</sup> leading to downstream effects including increased school absences, emergency department visits, and hospitalizations.<sup>xxviii,xxix,xxx,xxxi</sup> Studies have also found associations between ambient air pollution and post-neonatal infant mortality,<sup>xxxii,xxxiii</sup> low birth weight,<sup>xxxiv,xxxv,xxxvi,xxxvii</sup> and preterm birth.<sup>xxxviii,xxxix,xl,xli</sup>

Future decarbonization efforts should prioritize this potential for drastic improvements in child health outcomes through leveraged reductions of multiple pollutants within efforts to reduce greenhouse gas emissions. The AAP also urges the EPA to strengthen the National Ambient Air Quality Standards (NAAQS) for ozone and particulate matter pollution to address the child health impacts of exposure to these pollutants, which are exacerbated by climate change. Decisions to maintain inadequate NAAQS under the previous administration leave children at risk. In addition, the history of racial inequities and environmental racism means that the negative health effects from NAAQS that are insufficiently protective disproportionately burden low-income communities of color. This is a significant environmental justice issue, and we urge you to take decisive action to remedy it.

In order to maximize the child health benefits of the policy response to climate change, EPA and other agencies should fully account for child health benefits in rulemaking and sub-regulatory decisions. The administration should elevate children's health concerns in regulatory decision making through Executive Order and through the Office of Information and Regulatory Affairs. It is critical for child health benefits to be accounted for in any comprehensive climate policymaking because children are disproportionately impacted by climate change and fossil fuel extraction and combustion now, and policy interventions to improve child health have sustained and cumulative benefits.

## **Conclusion**

We appreciate the Administration's efforts to protect children and future generations from the health impacts of climate change. We hope that child health will be a key consideration as you develop any comprehensive response, and we would welcome opportunities to further support and contribute to your work. If you have any questions, please contact Zach Laris in our Washington, D.C. office at 202/347-8600 or [zlaris@aap.org](mailto:zlaris@aap.org).

Sincerely,



Lee Savio Beers, MD, FAAP  
President  
LSB/zml

CC: Gina McCarthy, White House National Climate Advisor

- 
- <sup>i</sup> Ahdoot S., Pacheco S.E., AAP Council on Environmental Health. Global Climate Change and Children's Health. *Pediatrics*. Nov 2015, 136 (5) e1468-e1484. Available at: [www.pediatrics.org/cgi/doi/10.1542/peds.2015-3233](http://www.pediatrics.org/cgi/doi/10.1542/peds.2015-3233)
- <sup>ii</sup> Sheffield PE, Landrigan PJ. Global climate change and children's health: threats and strategies for prevention. *Environ Health Perspect*. 2011;119(3): 291–298.
- <sup>iii</sup> U.S. EPA. Regulatory Impact Analysis for the Proposed Carbon Pollution Guidelines for Existing Power Plants and Emission Standards for Modified and Reconstructed Power Plants. June 2014. EPA-542/R-14-002.
- <sup>iv</sup> Vohra K, Vodonos A, Schwartz J, Marais EA, Sulprizio MP, Mickley LJ. Global mortality from outdoor fine particle pollution generated by fossil fuel combustion: Results from GEOS-Chem. *Environmental Research*. 2021 Apr 195:110754. <https://doi.org/10.1016/j.envres.2021.110754>.
- <sup>v</sup> Massachusetts et al. v Environmental Protection Agency, 549 U.S. 497 (2007).
- <sup>vi</sup> Utility Air Regulatory Group v Environmental Protection Agency, 573 U.S. 302 (2014).
- <sup>vii</sup> Chang KM, Hess JJ, Balbus JM, Buonocore JJ, Cleveland DA, Grabow ML, Neff R, Saari RK, Tessum CW, Wilkinson P, Woodward A. Ancillary health effects of climate mitigation scenarios as drivers of policy uptake: a review of air quality, transportation and diet co-benefits modeling studies. *Environmental research letters*. 2017 Oct 27;12(11):113001.
- <sup>viii</sup> Achakulwisut P, Brauer M, Hystad P, Anenburg SC. Global, national, and urban burdens of paediatric asthma incidence attributable to ambient NO<sub>2</sub> pollution: estimates from global datasets. *Lancet Planetary Health*. 2019;3(4). doi:10.1016/s2542-5196(19)30046-4.
- <sup>ix</sup> Shindell DT, Lee Y, Faluvegi G. Climate and health impacts of US emissions reductions consistent with 2 C. *Nature Climate Change*. 2016 May;6(5):503.
- <sup>x</sup> Woodcock J, Edwards P, Tonne C, Armstrong BG, Ashiru O, Banister D, Beevers S, Chalabi Z, Chowdhury Z, Cohen A, Franco OH. Public health benefits of strategies to reduce greenhouse-gas emissions: urban land transport. *The Lancet*. 2009 Dec 5;374(9705):1930-43.
- <sup>xi</sup> Jarrett J, Woodcock J, Griffiths UK, Chalabi Z, Edwards P, Roberts I, Haines A. Effect of increasing active travel in urban England and Wales on costs to the National Health Service. *The Lancet*. 2012 Jun 9;379(9832):2198-205.
- <sup>xii</sup> Jarrett J, Woodcock J, Griffiths UK, Chalabi Z, Edwards P, Roberts I, Haines A. Effect of increasing active travel in urban England and Wales on costs to the National Health Service. *The Lancet*. 2012 Jun 9;379(9832):2198-205.
- <sup>xiii</sup> Chang KM, Hess JJ, Balbus JM, Buonocore JJ, Cleveland DA, Grabow ML, Neff R, Saari RK, Tessum CW, Wilkinson P, Woodward A. Ancillary health effects of climate mitigation scenarios as drivers of policy uptake: a review of air quality, transportation and diet co-benefits modeling studies. *Environmental research letters*. 2017 Oct 27;12(11):113001.
- <sup>xiv</sup> Springmann M, Godfray HC, Rayner M, Scarborough P. Analysis and valuation of the health and climate change cobenefits of dietary change. *Proceedings of the National Academy of Sciences*. 2016 Apr 12;113(15):4146-51.
- <sup>xv</sup> Springmann M, Godfray HC, Rayner M, Scarborough P. Analysis and valuation of the health and climate change cobenefits of dietary change. *Proceedings of the National Academy of Sciences*. 2016 Apr 12;113(15):4146-51.
- <sup>xvi</sup> Payne CL, Scarborough P, Cobiac L. Do low-carbon-emission diets lead to higher nutritional quality and positive health outcomes? A systematic review of the literature. *Public health nutrition*. 2016 Oct;19(14):2654-61.
- <sup>xvii</sup> Wood L, Hooper P, Foster S, Bull F. Public green spaces and positive mental health—investigating the relationship between access, quantity and types of parks and mental wellbeing. *Health & place*. 2017 Nov 1;48:63-71.
- <sup>xviii</sup> Shanahan DF, Bush R, Gaston KJ, Lin BB, Dean J, Barber E, Fuller RA. Health benefits from nature experiences depend on dose. *Scientific reports*. 2016 Jun 23;6:28551.

- 
- <sup>xix</sup> Engemann K, Pedersen CB, Arge L, Tsirogianis C, Mortensen PB, Svenning JC. Residential green space in childhood is associated with lower risk of psychiatric disorders from adolescence into adulthood. *Proceedings of the National Academy of Sciences*. 2019 Mar 12;116(11):5188-93.
- <sup>xx</sup> Engemann K, Pedersen CB, Arge L, Tsirogianis C, Mortensen PB, Svenning JC. Childhood exposure to green space—A novel risk-decreasing mechanism for schizophrenia?. *Schizophrenia research*. 2018 Sep 1;199:142-8.
- <sup>xxi</sup> Bratman GN, Hamilton JP, Hahn KS, Daily GC, Gross JJ. Nature experience reduces rumination and subgenual prefrontal cortex activation. *Proceedings of the national academy of sciences*. 2015 Jul 14;112(28):8567-72.
- <sup>xxii</sup> Kühn S, Düzel S, Eibich P, Krekel C, Wüstemann H, Kolbe J, Martensson J, Goebel J, Gallinat J, Wagner GG, Lindenberger U. In search of features that constitute an “enriched environment” in humans: Associations between geographical properties and brain structure. *Scientific reports*. 2017 Sep 20;7(1):11920.
- <sup>xxiii</sup> Dadvand P, Nieuwenhuijsen MJ, Esnaola M, Fornis J, Basagaña X, Alvarez-Pedrerol M, Rivas I, López-Vicente M, Pascual MD, Su J, Jerrett M. Green spaces and cognitive development in primary schoolchildren. *Proceedings of the National Academy of Sciences*. 2015 Jun 30;112(26):7937-42.
- <sup>xxiv</sup> Hoffman JS, Shandas V, Pendleton N. The Effects of Historical Housing Policies on Resident Exposure to Intra-Urban Heat: A Study of 108 US Urban Areas. *Climate*. 2020; 8(1):12. <https://doi.org/10.3390/cli8010012>
- <sup>xxv</sup> Eckelman MJ, Sherman J. Environmental impacts of the U.S. health care system and effects on public health. *PLoS One*. 2016;11(6):e0157014. doi:10.1371/journal.pone.0157014
- <sup>xxvi</sup> American Thoracic Society, Committee of the Environmental and Occupational Health Assembly. Health effects of outdoor air pollution. Part 1. *Am J Respir Crit Care Med*.1996;153 :3– 50
- <sup>xxvii</sup> American Thoracic Society, Committee of the Environmental and Occupational Health Assembly. Health effects of outdoor air pollution. Part 2. *Am J Respir Crit Care Med*.1996;153 :477– 498
- <sup>xxviii</sup> Thurston GD, Ito K, Hayes CG, Bates DV, Lippmann M. Respiratory hospital admissions and summertime haze air pollution in Toronto, Ontario: consideration of the role of acid aerosols. *Environ Res*.1994;65 :271– 290
- <sup>xxix</sup> White MC, Etzel RA, Wilcox WD, Lloyd C. Exacerbations of childhood asthma and ozone pollution in Atlanta. *Environ Res*.1994;65 :56– 68
- <sup>xxx</sup> Tolbert PE, Mulholland JA, MacIntosh DL, et al. Air quality and pediatric emergency room visits for asthma in Atlanta, Georgia, USA. *Am J Epidemiol*.2000;151 :798– 810
- <sup>xxxi</sup> Gilliland FD, Berhane K, Rappaport EB, et al. The effects of ambient air pollution on school absenteeism due to respiratory illnesses. *Epidemiology*.2001;12 :43– 54
- <sup>xxxii</sup> Woodruff TJ, Grillo J, Schoendorf KC. The relationship between selected causes of postneonatal infant mortality and particulate air pollution in the United States. *Environ Health Perspect*.1997;105 :608– 612
- <sup>xxxiii</sup> Bobak M, Leon DA. The effect of air pollution on infant mortality appears specific for respiratory causes in the postneonatal period. *Epidemiology*.1999;10 :666– 670
- <sup>xxxiv</sup> Ritz B, Yu F. The effect of ambient carbon monoxide on low birth weight among children born in southern California between 1989 and 1993. *Environ Health Perspect*.1999;107 :17– 25
- <sup>xxxv</sup> Bobak M. Outdoor air pollution, low birth weight, and prematurity. *Environ Health Perspect*.2000;108 :173– 176
- <sup>xxxvi</sup> Dejmek J, Solansky I, Benes I, Lenicek J, Sram RJ. The impact of polycyclic aromatic hydrocarbons and fine particles on pregnancy outcome. *Environ Health Perspect*.2000;108 :1159– 1164
- <sup>xxxvii</sup> Wang X, Ding H, Ryan L, Xu X. Association between air pollution and low birth weight: a community-based study. *Environ Health Perspect*.1997;105 :514– 520
- <sup>xxxviii</sup> Bobak M. Outdoor air pollution, low birth weight, and prematurity. *Environ Health Perspect*.2000;108 :173– 176
- <sup>xxxix</sup> Ritz B, Yu F, Chapa G, Fruin S. Effect of air pollution on preterm birth among children born in Southern California between 1989 and 1993. *Epidemiology*.2000;11 :502– 511
- <sup>xl</sup> Ha EH, Hong YC, Lee BE, Woo BH, Schwartz J, Christiani DC. Is air pollution a risk factor for low birth weight in Seoul? *Epidemiology*.2001;12 :643– 648
- <sup>xli</sup> Xu X, Ding H, Wang X. Acute effects of total suspended particles and sulfur dioxides on preterm delivery: a community-based cohort study. *Arch Environ Health*.1995;50 :407– 415