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# Preface



The publication of *Pediatric Environmental Health*, 3rd Edition, reflects many advances in our understanding of the etiology, identification, management, and prevention of diseases and conditions linked to the environment. The field of environmental health is growing rapidly and new information becomes available almost daily. Hardly a week goes by in which parents don't read an article or hear a news story about the effects of the environment on health, and they may ask their pediatrician for advice about this topic. Since March, stories about the massive earthquake in Japan and the subsequent nuclear crisis have dominated the news. Dramatic events such as these offer an opportunity to bring focus to environmental issues, to teach children about them, and to bring attention to prevention and remediation. They also highlight the many different "environments" in which a child lives: the bedroom, the home, the family, the school, the neighborhood, the community or town, the state, the country, the world—in some ways these are concentric circles. Although large scale events such as the disastrous earthquake and tsunami in Japan heighten our awareness that environmental crises have important physical and psychological effects on children and their families, it is easy to overlook the fact that less visible (or invisible) environmental threats can also have profound physical and psychological effects on children and their families. We as pediatricians must attend to both. This book provides a foundation for understanding where to begin.

First published in 1999, this book is intended for pediatricians and others who are interested in preventing children's exposures to environmental hazards during infancy, childhood, and adolescence. In this edition, we present updated summaries of the evidence that has been published in the scientific literature about environmental hazards to children. Twenty-two new chapters have been

introduced in this edition, including topics such as birth defects, global climate change, plasticizers, and the precautionary principle. Major modifications have been made to all 43 chapters from the second edition. Knowledge, research, and information relevant to pediatric practice started growing at an exponential rate after the children's environmental health and disease prevention research programs were established by the US Environmental Protection Agency and the National Institute of Environmental Health Sciences. New associations are being discovered and our knowledge of existing ones is constantly being refined and expanded. As the field of pediatric environmental health evolves, appropriate guidance may change with the publication of additional research findings.

Although all of the 65 contributors to this book are from North America, most of the information presented here should be useful to those in other parts of the world. Children's exposures to some contaminants may be higher in less industrialized countries than in North America; nonetheless, the book can be expected to provide reliable background information for clinicians who are faced with providing practical advice to parents and communities. A chapter about environmental health considerations for children in developing nations gives pediatricians in North America a glimpse of the array of problems facing children growing-up in a variety of international settings.

The book is meant to be practical, containing information that is useful in office practice, but that could also be helpful to a clinician preparing a grand rounds presentation for colleagues or testimony before a group of state legislators. Throughout the book, we have taken the liberty of combining the contributions of multiple authors in each chapter. Though the third edition is more than double the size of the first, there are still many aspects of environmental health that could not be covered. The Council gave priority to those topics that appeared to have the greatest effect on child health, or to be of concern to parents. I hope that the information presented in the handbook will foster an informed understanding of environmental health among those who care for children.

Parents of young children are intensely interested in the impact of the environment on their children's health. They may look to their pediatrician for guidance about how to evaluate news reports about potential hazards in the air, water, and food. Yet the history of such well-established hazards as the exposure of children to secondhand smoke shows many years of epidemiologic and laboratory research before the weight of the evidence compels a consensus. While the evidence is accumulating, what should a worried parent do? Prudently avoid exposure after the first study suggesting problems is published? At what point should the pediatrician advocate a specific action? Obviously, there are no easy answers to these questions. Issues of value, scientific understanding, and cost are involved. Each hazardous exposure must be considered in the context of other problems facing the child and the financial, emotional, and intellectual

resources available to surmount them. After fully understanding the facts and uncertainties, reasonable pediatricians may choose different ways to respond to the accumulating evidence.

I have many people to thank for their contributions to this book. First, I am grateful to those who contributed the 33 chapters to the first edition and the 43 chapters to the second edition because their outstanding work provided an excellent foundation for this revised and expanded third edition. Forty one councils, committees and sections of the American Academy of Pediatrics (AAP) reviewed and provided comments on new and revised chapters of this edition. I owe special thanks to Paul Spire, who managed to juggle requests from multiple authors with unflagging good cheer and worked tremendously hard to keep this book on track, and to Jennifer Shaw, senior medical copy editor, and Theresa Weiner, Manager, Division of Publishing and Production Services, for their invaluable help in its preparation. I am immensely grateful to the associate editor, Sophie J. Balk, MD, for her careful attention to ensuring that complex topics were clearly explained and that key action steps for the clinician were provided. Thanks also to Helen Binns, MD, MPH, Chair of the Council on Environmental Health for her strong leadership and to the hardworking members of the Council, who provided many new chapters and reviewed and updated the existing chapters of the book. I owe special thanks to Carole E. Allen, MD, District I Chair and member of the AAP Board of Directors for her painstaking (because she had a broken arm) yet thoughtful and comprehensive review of the book for consistency with AAP policy.

Special credit is due to two esteemed pediatrician scholars who made enormous contributions to the field of pediatric environmental health: Robert W. Miller, MD, DrPH and Michael W. Shannon, MD, MPH. Dr Miller, a world-renowned epidemiologist at the National Cancer Institute, served on the Committee from 1970 to 2004 and chaired it from 1973 until 1979. He was among the first scholars to emphasize the need to consider the special vulnerability of the fetus and child to chemicals in the environment. In 1973, he was instrumental in organizing the Conference on the Susceptibility of the Fetus and Child to Chemical Pollutants, held in Brown's Lake, WI. The Conference uncovered a serious problem: no federal health agency had the responsibility for research into the special exposures and susceptibility of the fetus and child. Throughout his life, Dr Miller worked to ensure that pediatricians knowledgeable about child health and the environment were appointed to leadership roles in government agencies and had a place at the table when key decisions affecting children's health were deliberated. He is fondly remembered as the father of pediatric environmental health because of his vision in articulating the need for special consideration of children's exposures to chemicals and his role as the mentor for many past and present pediatric environmental health leaders.

Dr Shannon, an internationally-recognized pediatrician, toxicologist, and emergency physician at the Harvard Medical School, served on the Committee from 1997 to 2007 and chaired it from 2003 until 2007. He also played a pivotal role in the AAP efforts in disaster preparedness and was a prolific writer, inspired educator, and trusted mentor to fellows and students interested in the effects of drugs and chemicals on children. His role as an Associate Editor of the 3rd edition of *Pediatric Environmental Health* was cut short by his sudden death in March 2009. This book is dedicated to the memory of these treasured colleagues.

Ruth A. Etzel, MD, PhD  
Editor

## Chapter 1

# Introduction



Environmental hazards are among the top health concerns many parents have for their children.<sup>1,2</sup> Little time is spent during medical school and pediatric residency training on environmental hazards and their relationship to illness among children,<sup>3-5</sup> and many pediatricians report that they are not fully prepared or comfortable taking an environmental history or addressing parents' concerns about the environment in clinical practice.<sup>6-9</sup> General medical and pediatric textbooks devote scant attention to illness as a result of environmental factors. Information pertinent to pediatric environmental health is widely scattered in epidemiologic, toxicologic, and environmental health journals that may not regularly be read by pediatricians.<sup>10</sup>

Fifty-four years have passed since the American Academy of Pediatrics (AAP) formed its first committee on environmental health. In that time, substantial progress has been made in understanding the role of the environment in the illnesses of childhood and adolescence. Consideration of illnesses traditionally associated with the environment, such as waterborne and foodborne diseases, has expanded to include study of toxic chemicals and other environmental hazards that derive from the rapid expansion of industry and technology.<sup>11</sup>

This is the third edition of *Pediatric Environmental Health*, a book written by the AAP Council on Environmental Health and intended to be useful to practicing pediatricians and other clinicians. The first edition was published by the AAP in 1999; the second in 2003.<sup>12,13</sup> This book is organized into 7 sections. The first section gives background information. The second, third, and fourth sections focus on specific environments, food and water, and chemical and physical hazards. The fifth section addresses a variety of special topics. The

sixth section provides information about public health aspects of environmental health, and the seventh section describes resources for pediatricians and others.

Most chapters on chemical and physical hazards are organized in sections that describe the pollutant, routes of exposure, systems affected, clinical effects, diagnostic methods, treatment, and prevention of exposure and include suggested responses to questions that pediatricians may have or that parents may ask. The Resources section refers readers to additional resources to be considered when further information is needed.

The AAP Council on Environmental Health recognizes that pediatric environmental health is a specialty field in the early stages of development. Knowledge in some areas has evolved rapidly, whereas in other areas, there may be more questions than answers. The council and the editors have attempted to make readers aware of the controversial areas and gaps in scientific information. The goal of this book is to provide clinicians with the most accurate information needed to prudently advise parents and children about specific pollutants and situations commonly encountered in 21st century life.

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