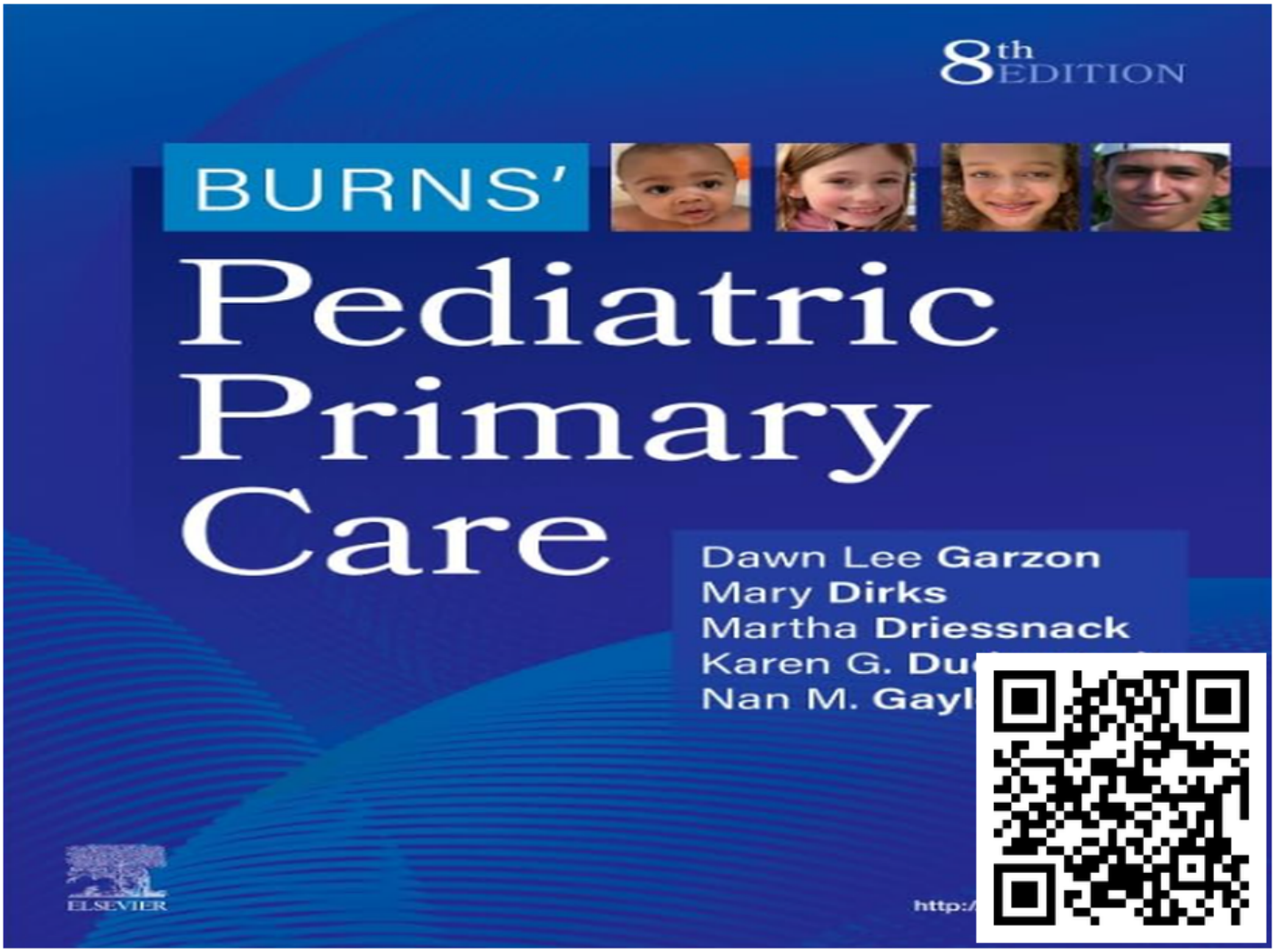

8th EDITION

BURNS'




Pediatric Primary Care

Dawn Lee **Garzon**
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Martha **Driessnack**
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Burns' Pediatric Primary Care

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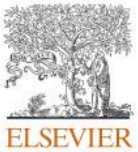

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This edition is dedicated to the timeless leadership, professional expertise, and dedication of our emeriti authors who nurtured this text through the years. With this edition, the ranks of emeriti grow from three to five. The role of emeriti is not guaranteed but is a special acknowledgement of their outstanding contribution to the text and our profession. These authors are mentors to countless people, role models to thousands, and tireless advocates for millions of children and their families. They helped to shape pediatric-focused advanced practice and set high standards for best pediatric care, and they are the best role models of pediatric primary care providers. We are honored to be their friends and colleagues, and we are better pediatric nurse practitioners because of our association with them. We hope this edition celebrates their renowned legacy while continuing to honor their purpose and passion. With deepest thanks and sincere admiration to:

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Preface

We are delighted to introduce the eighth edition of *Burns' Pediatric Primary Care*. Maintaining the clinical relevancy of a book of this size requires frequent updates and intentional thought about how pediatric primary care practice evolves in an ever-changing healthcare environment. We reorganized content into three distinct units: health promotion, health supervision, and disease management. The editorial team consists of actively practicing pediatric nurse practitioners who understand the challenges of practicing in post-pandemic healthcare settings and the increasing complexities and responsibilities placed on the primary care healthcare system. This text's success over the last two decades is largely attributable to the contributions of the chapter authors, each of whom is an expert in their field and actively is in their specialty and actively relevant for contemporary clinicians.

Burns' Pediatric Primary Care is a complete reference for anyone who provides primary care to infants, children, and adolescents. Pediatric nurse practitioners (PNPs) and family nurse practitioners (FNPs) are the primary audiences for this textbook. However, physicians, physician assistants, and nurses who care for children in a variety of settings also find this book to be a valuable resource. The textbook emphasizes health promotion, disease prevention, and problem management from the primary care provider's point of view. Each chapter introduces key concepts and provides an evidence-based and theoretical care foundation. Content is designed to allow experienced clinicians to easily navigate or jump to the topic or diagnosis in question, while the novice clinician or learner can read the entire chapter for immersion into the topic. Additional resources for each chapter include websites to access organizations and printed materials that may be useful for clinicians and their patients and families.

Special Features of the Eighth Edition

Some features of the eighth edition about which we are particularly excited include:

- Content reorganization that aligns our health supervision section with Bright Futures[1] and other national health guidelines. We made this change to reflect the current understanding of the continuum of health and illness and to ensure that the flow and classification of information are intuitive to students and providers.
- An introductory **Pediatric Primary Care** chapter helps set the tone for the book, focusing on the role of and influences on pediatric primary care.
- The **Global and National Influences on Child Health Status** chapter highlights selected topics, including adverse childhood experiences (ACEs) and the global effects of the COVID-19 pandemic.
- The **Environmental Influences on Pediatric Health** chapter focuses on the effects of climate change and its impact on health, as well as pediatric social, cultural, and physical environments. The chapter was redesigned to have less emphasis on specific environmental toxins.
- The **NEW Justice, Equity, Inclusion, and Diversity** chapter is completely redesigned to reflect a contemporary understanding of the roles of inequity and racism and their impact on pediatric health care and outcomes.
- The **Sexuality and Gender Identity** chapter was modified to include a discussion of gender identity and an expanded discussion of lesbian, gay, bisexual, transgender, queer, intersex, and asexual (LGBTQIA+) health.
- A **NEW Child Maltreatment** chapter, separating this content from the Injury Prevention chapter to emphasize the importance of its diagnosis and management in pediatric care.
- The impact of the COVID-19 pandemic on child physical and mental health was incorporated throughout the text, and the **Immunizations** chapter was updated with information about novel immunization technologies pioneered to develop the COVID-19 vaccines.
- The **Prescribing Traditional and Complementary Therapies** chapter is restructured with evidence-based treatments most likely to be helpful for the pediatric primary care provider.
- A **NEW Pediatric Palliative Care** chapter. This subspecialty has grown substantially in the last 2 to 3 years, and the chapter serves as a guide for primary care providers who manage and provide care coordination for pediatric patients at the end of life or who need palliative care.

Organization of the Book

Infants, children, and adolescents are a unique population. Pediatric primary healthcare requires unique perspective grounded in a fundamental understanding of the complexities of pediatric development, unique epidemiologic health influences, varied social determinants and environmental influences of health, and each child's unique genetic influences. These themes are incorporated throughout this book, along with the influence of telehealth and nontraditional appointment types in primary care.

The book is now reorganized into three units: Pediatric Primary Care, Pediatric Health Supervision, and Pediatric Diseases and Disorders. Unit I, Pediatric Primary Care, provides an overview of pediatric health care and influences that affect child health. Unit II, Pediatric Health Supervision, begins with overviews of pediatric/family assessment, behavioral/mental health, and sexuality/gender identity, followed by three subsections: Growth and Development, Health Promotion, and Health Protection. Unit III, Pediatric Diseases and Disorders, has two subsections: General Management and Specific Management. Special care was taken to ensure each chapter has the same organizational format to assist readers in locating information in busy clinical settings. Standards and guidelines for care are clearly identified, relevant child development is described, the physiologic and assessment parameters are discussed, management strategies are identified,

and the management of common problems is presented in a problem-oriented format. The scope of practice of the primary care provider is emphasized with appropriate referral and consultation strategies identified.

It is our hope that this book continues in the tradition of the prior editions. It is our aim to support the primary care provider with the highest quality, evidence-based care strategies and foster improved health and wellness of pediatric patients and their families.

Reference

[1]Hagan JF, Shaw JS, Duncan PM. *Bright Futures: Guidelines for Health Supervision of Infants, Children and Adolescents*. 4th ed. American Academy of Pediatrics; 2017.

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- The health of our nation's children is our most important resource. My hope is that this edition will contribute to that critical mission of improving the health and well-being of our children and families. Further, to my ever-patient husband who has sustained and bolstered me through the work on this edition! *Karen Duderstadt*
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Section 3B: Disease Management

1 Pediatric Primary Care

MARTHA DRIESSNACK

This chapter provides a brief review of the history and core concepts of pediatric primary care, including health promotion and protection, disease and/or disability prevention, the pediatric medical home, and the distinction between primary care versus prevention. It also draws attention to some of the many unique challenges in pediatrics, including caring for a two-generation or dual patient (parent/child), the importance of early influences and protective factors, children and youth with special healthcare needs, and facilitating transitions within/across pediatric healthcare specialists and from pediatric to adult health care. The chapter concludes by introducing Bright Futures, a national health promotion and preventive care initiative from the American Academy of Pediatrics (AAP), along with a list of other professional resources for pediatric primary care providers (PCPs). Subsequent chapters focus on global, national, and local issues; environmental influences; justice, equity, diversity, and inclusion; behavioral mental health promotion; and sexuality amidst emerging gender identity.

Pediatric Primary Care

Primary care represents one level of care within the larger health system. Subsequent levels of healthcare involve increased complexity, additional specialists, and specialized equipment. Accordingly, *primary* care is generalist care; *secondary* care requires specialized expertise; *tertiary* care requires both specialized expertise and equipment; and *quaternary* care requires highly specialized expertise and highly unusual or specialized equipment. Primary care is not site specific; however, it is often incorrectly used synonymously with *outpatient* or ambulatory care, while subsequent levels of care are typically associated with *inpatient* or acute care.

Primary care is conceptualized as being more *person* rather than *disease* centered and makes prevention as important as cure by addressing the root causes of poor health and focusing on threats to health. It includes the provision of continuous, relationship-oriented care over time, rather than being a series of limited disease-based interactions. Pediatric primary care serves as the primary interface between the child/family and the health system, except in the case of serious emergencies. The emphasis is on health promotion and protection, and disease and/or disability prevention. It is designed to be a first contact point, not simply a point of entry into the health system, and the "hub" of coordination (Fig. 1.1). In this central position, the PCP provides continuity as well as integrates subsequent or specialty care, regardless of where the care is delivered and who provides it. Decades of experience tell us that primary healthcare produces better outcomes, at lower costs, and with higher user satisfaction.[1,2] Because it is comprehensive, continuous, and person-centered care, primary care is also the ideal place for the establishment of the medical home.

The pediatric *medical home* is a care model that delivers patient- and family-centered care, coordinated, and tracked by a PCP within a community-based system, or *medical neighborhood*.

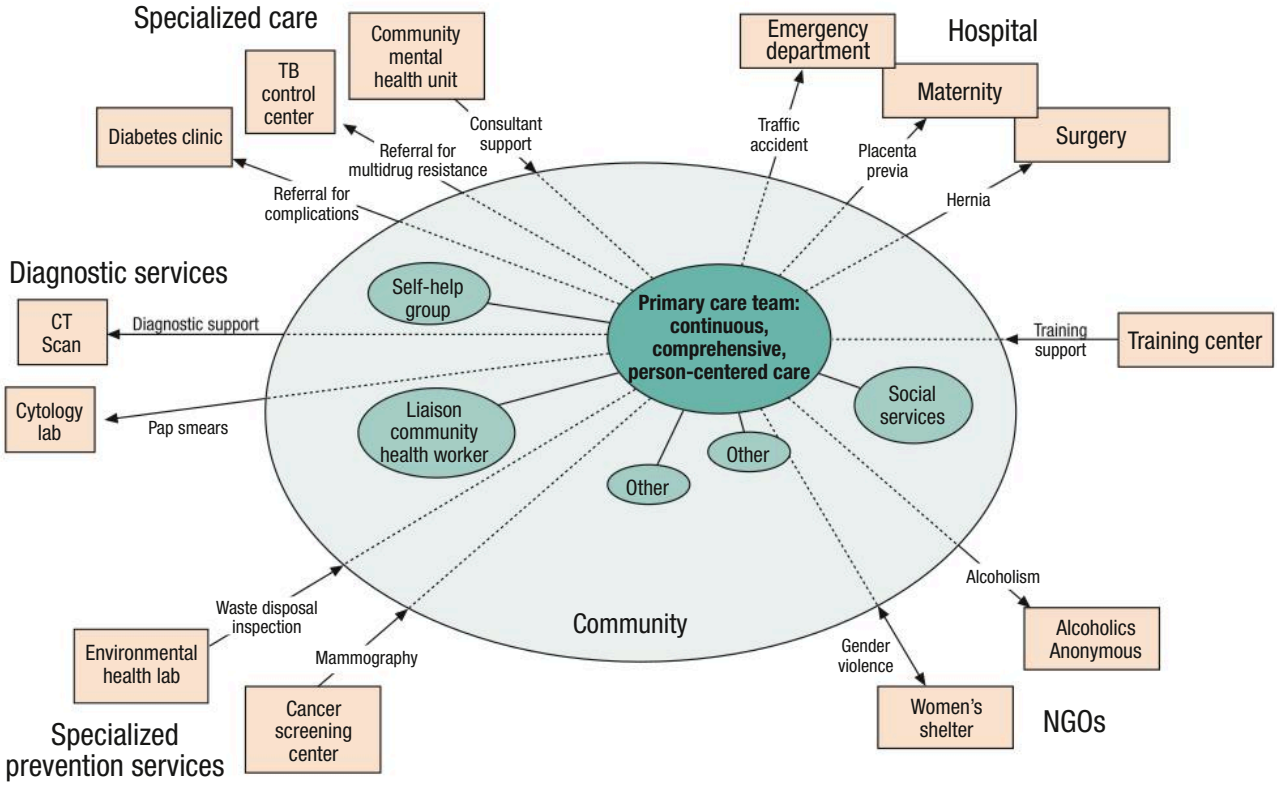
The AAP introduced the medical home concept over 50 years ago as a central location for archiving a child's medical record. In its 2002 policy statement (https://publications.aap.org/pediatrics/article-abstract/110/1/184/64107/The-Medical-Home?redirectedFrom=fulltext), the AAP expanded the medical home concept to include operational characteristics, such as accessible, continuous, comprehensive, family-centered, coordinated, compassionate, and culturally effective care. At the core of the medical home is the PCP whose provision of high-quality, developmentally appropriate healthcare services needs to continue uninterrupted as the child moves within/across the healthcare system and later when transitioning from pediatric to adult care.

Primary Care Versus Primary Prevention

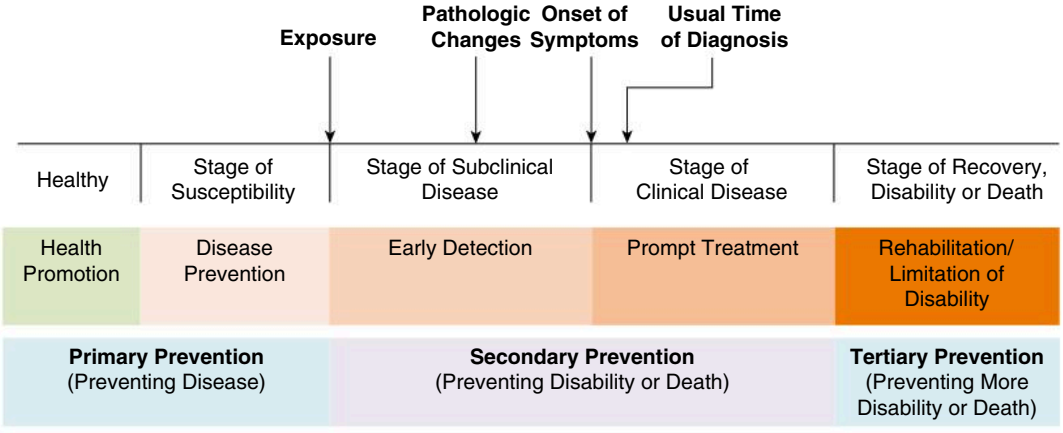
While primary care represents one of four levels of *care* within the larger health system, these levels are sometimes confused with levels of [disease] *prevention*. Disease prevention covers measures that not only prevent the occurrence of disease, but also arrest its progress and reduce its consequences once established. Preventive measures can be applied at any stage along the natural history of a disease, with the goal of preventing further progression of the condition. First described by Leavell and Clark,[3] primary, secondary, and tertiary levels of prevention are best understood in terms of the natural history of disease (Fig. 1.2).

All healthcare providers aim to favorably influence the natural history of disease, but the anticipatory preventive actions they take differ based on the disease, disease stage, and the provider's role in the health system. Preventive care is an important task that is assigned principally to PCPs.

Primary prevention includes efforts that keep disease processes from becoming established by either eliminating the causes or increasing individual resistance to disease. Preventive actions are taken before the onset of disease to remove the possibility that a disease ever occurs. There are two subcategories in primary prevention: (1) health promotion and (2) specific protection. *Health promotion* involves health maintenance and education efforts, including lifestyle changes/choices, nutrition, and maintenance of safe environments. *Specific protection* involves actions targeted at specific diseases, such as immunizations, antimalarial prophylaxis, and environmental modifications (such as fluoride).



• **Fig 1.1** Primary Care as a Hub of Coordination: Networking Within the Community Served and With Outside Partners. (From Van Lerberghe W. *World Health Organization. Primary Health Care: Now More Than Ever*. World Health Organization; 2008: 55.)



• **Fig 1.2** The Natural History of Disease Aligned With Levels of Prevention. (From Health Beyond Hospitals. Lecture for Ramathibodi Clinical Fellows. https://www.slideshare.net/nawanan/health-beyond-hospitals-lecture-for-ramathibodi-clinical-fellows/.)

Secondary prevention involves early diagnosis and prompt treatment, focusing on efforts that interrupt the disease process before it becomes symptomatic or halting the disease process at its incipient stage to prevent complications. The goal of secondary prevention efforts, including screening, early detection, and prompt treatment, is to cure the disease at the earliest stage, delay disease onset and/or duration, and reduce or reverse the transmission of disease.

Tertiary prevention efforts limit the physical and social consequences of symptomatic disease. The goal is to improve survival and/or quality of life. As with primary prevention, there are two subcategories: (1) disability limitation and (2) rehabilitation. *Disability limitation* focuses on early symptomatic disease and includes measures aimed at correcting the anatomic and/or physiologic components of disease, thus preventing or limiting the impairment or disability caused by the disease. *Rehabilitation* focuses on late symptomatic disease. The goal is to mitigate the ultimate effects of the disease by preventing total social and/or functional disability or by restoring persons with disabilities to a self-sufficient role in society through psychosocial, medical, and/or vocational services.

Pediatric Primary Care Providers

There are several different pediatric PCPs, including pediatric and family nurse practitioners, pediatric and family physicians, and physician assistants. All are important and all are needed. It has been almost 10 years since the Children's Health Fund (CHF) shared that more than 20 million children (~28%) in the United States lacked sufficient access to essential healthcare. These statistics have only worsened as the CHF recently (2022) reported a 40% decrease in health screenings and a 44% decrease in outpatient mental health (see https://www.childrenshealthfund.org/covid-19-has-kept-kids-from-primary-care/). The fact that so many children are not receiving the care they need is a call to action for all who care for children.

> *Not only does failing to address healthcare access barriers threaten and undermine the health and wellbeing of children, but it also may have a direct impact on a child's ability to succeed academically and enter the workforce at their full potential. Loss of later productivity and the extraordinary costs of remediation will clearly have deleterious consequences for the future economic strength and vibrancy of the United States. The stakes could not be higher.*[4]

This call to action is particularly timely as pediatric health concerns take on new issues and importance. For example, gun violence became the leading cause of death of youth under age 20 in the United States in 2020, surpassing deaths from car accidents, cancer, and even COVID-19 (see https://www.childrenshealthfund.org/a-public-health-crisis-gun-violence-and-child-health-and-well-being/).

Pediatric Nurse Practitioners Then and Now

In 1965 Dr. Loretta Ford and Dr. Henry Silver started the nation's first nurse practitioner (NP) program at the University of Colorado. As a result, Dr. Ford is often referred to as the mother of the NP movement and remains one of its greatest champions. One important piece of history is that this first NP program was pediatric, and its focus was on primary care. The emphasis in those early years was to expand public health nurses' roles, integrating the traditional role of the nurse with advanced training and authority in the delivery of primary care to children and families. This early focus on health promotion, protection, and disease prevention remains the mainstay of primary care pediatric nurse practitioner (PNP) programs across the country.

Today, the PNP role continues to evolve. The key difference between a primary care PNP and an acute care PNP is not the site where they practice, but the acuity of the patient for whom they are caring.[5] Primary care PNPs, much like those in the early days with Dr. Ford, provide primary care, which includes well-child care and the prevention and/or management of both common pediatric acute illnesses and chronic conditions. In contrast, acute care PNPs provide care for acutely, critically, and chronically ill children who are unstable, experiencing life-threatening illness, are medically fragile, and/or are technologically dependent.

Unique Issues in Pediatrics

In this section, some of unique issues in pediatrics are introduced along with the inherent challenges that accompany them.

The Two-Generation or Dual Patient

One of the unique challenges in pediatrics is the two-generation or dual patient. Although the primary focus in pediatrics is the patient, each pediatric patient comes with at least one parent or caregiver, if not three or four. Taking the time to understand and work with parents is essential to caring for the child; however, there are some distinctions with patient- and family-centered care (PFCC) and shared decision-making that are unique to pediatrics. When providing PFCC in adult care, providers acknowledge that it is the patient who has ultimate control over health-related decisions, while also knowing these decisions are contextualized within each patient's broader life experiences and family (see Chapter 5). The challenge of using a PFCC model in pediatrics is that there is not one patient, but two, and while the child is the focus, the parent is considered the authority in terms of decisions. For pediatric PCPs, one of the ongoing challenges is how to access, acknowledge, and include the child's voice in care decisions, as it is often lost and/or overridden in health care.

This ongoing tendency to lose track of children's voices is rooted in the long-standing tradition of looking at children across the pediatric lifespan through a deficit-based or developmental lens (see Chapter 8). For example, when it comes to children and adolescents, there is a presumption of decisional incapacity and therefore deference to parental authority. In contrast, adult patients get a presumption of decisional capacity, with familial insight serving only as adjunctive. While most parents make decisions in the best interests of their children most of the time, balancing the needs and wishes within the context of the dual patient can create difficult and challenging care decisions, especially as children's cognitive and executive function mature. Children's needs, and more often their wishes, do not take priority, especially when they differ from their parents. While parents are clearly authorities and caregivers, they are not complete surrogates. PCPs need to remember that, ultimately, they are the child's advocate and need to seek out their voices, actively engaging them in care and health-related decision making, and work to ensure that their voices are heard.

Lifelong Impact of Protective and Adverse Childhood Experiences

Science continues to highlight that early exposure to protective and adverse experiences can promote or disrupt healthy development. This awareness is fueling a new way of looking at life itself, not as disconnected stages, but as an integrated process across time. This *life course perspective* highlights that an individual's physical, mental, socioemotional, and spiritual health results from multiple risk and protective factors that operate throughout the lifespan, and the impact of those factors varies based on the life stage and context.[6] As the science continues to develop, the scope of adverse experiences is evolving to include new factors (e.g., racism, weight stigma). It also focuses attention on the long-term effect of health-related interventions, such as the danger of ionizing radiation exposure from diagnostic medical radiation. *Image Gently* is a long-standing campaign to reduce pediatric risk for cancer during adulthood by increasing awareness and advocating for the protection of children from unnecessary radiation.[7]

In other words, what happens in childhood does not stay in childhood.[8] Instead, what children experience in their earliest days and years of life shapes and defines their future, as early experiences shape the architecture of the developing brain and lay a foundation for long-term health (See Professional Resources, Center for the Developing Child). The World Health Organization (WHO), World Bank, and the United Nations International Children's Emergency Fund (UNICEF) have all drawn attention to the First 1000 Days of Life

(https://www.unicef-irc.org/article/958-the-first-1000-days-of-life-the-brains-window-of-opportunity.html) as the brain's "window of opportunity" or unique period when the foundations of health, growth, and neurodevelopment across the life span are established. Equally intriguing is the science behind Developmental Origins of Health and Disease (DOHaD), which suggests that harmful exposures early in life may increase the risk of disease (e.g., obesity, type 2 diabetes, insulin resistance, asthma, cardiovascular diseases, behavioral disorders, neurodegenerative diseases, reproductive disorders, some cancers) later in life.[9] Further, some of these risks carry over into future generations. The link between early-life environmental factors and later-life disease was originally called the *Barker hypothesis,* a proposal that low birth weight predisposes to higher death rates in adult life.[10]

British epidemiologist David Barker's early work highlighting the influences of adverse events that occur during early phases of human development on the patterns of an individual's health and disease throughout life provided the foundation for the identification and study of adverse childhood experiences (ACEs). ACEs are linked to risky health behaviors (e.g., smoking, alcohol use, drug use), chronic health conditions (e.g., obesity, diabetes, depression, heart disease, cancer, stroke, chronic obstructive pulmonary disease), low life potential (graduation rates, academic achievement, lost time from work), and early death (see https://www.cdc.gov/violenceprevention/aces/). As the number of ACEs increases, so does the risk for adverse outcomes, which highlights the call for all pediatric PCPs to screen for and identify adversity in early life (See Professional Resources, The Resilience Project). Paralleling the work on adverse experiences and exposures is the science that identifies and promotes protective factors and ensuring that children flourish despite adversity.[8] At the core of this research is seeking out and ensuring that children are exposed to safe, stable, and nurturing relationships (SSNRs), which can buffer adversity and build resilience. These efforts are particularly evident in the attachment and biobehavioral catch-up (ABC) interventions being introduced in foster care.[11] The PCP is well positioned to seek out, assess, and support protective factors at each well-child visit.

One additional protective factor for PCPs to consider is children's exposure to nature and/or green space, as there is continuing evidence that shows a positive relationship between nature contact and children's health.[12] In his now classic book, *Last Child in the Woods,*[13] Louv wrote about what he called *nature-deficit disorder,* citing studies looking at the benefits of nature and calling attention to the problems that can come from being too isolated from the natural world. PCPs need to continue to emphasize, and perhaps even write prescriptions, for children to go outside and play in nature, limit screen time, and read stories about nature (or have them read to them). At the same time, they need to advocate for equitable nature contact for children in neighborhoods, schools, and communities.[12]

Transition to Adult Care

One of the core responsibilities of pediatric PCPs is coordinating transitions in care within/across the healthcare system as well as preparing all youth for the smooth transition to adulthood, to being responsible for their own health and decisions, and to adult care.[14] The transition from pediatric to adult primary care is critical for all children, but especially for children and youth with special healthcare needs and those with congenital and/or inherited conditions. As advances in neonatal and pediatric medicine continue to improve the prognosis for many childhood conditions, transitioning care is increasingly identified as a critical process for ongoing wellbeing. The AAP and the National Center for Medical Home Implementation created practice-based quality improvement guidelines that include specific activities, decision points, and a clear timeline for transition planning, transfer, and integration into adult care.[15]

Caring for Children and Youth With Special Healthcare Needs

In the United States, the federal government maintains a special responsibility to serve children living with complex and chronic medical conditions beginning with the early "crippled children's programs," which then evolved with the establishment of the Title V Maternal and Child Health Services Block Grant program.[16] More recently, the Health Resources and Services Administration's Maternal and Child Health Bureau (HRSA-MCHB) established the term Children and Youth With Special Health Care Needs (CYSHCN) as "those who have or are at increased risk for a chronic physical, developmental, behavioral, or emotional condition and who also require health and related services of a type or amount beyond that required by children generally," such as asthma, cerebral palsy, and inherited conditions.[17] A subset of CYSHCN is children with medical complexity, a fraction of the overall CYSHCN population, that require the most intensive services including home nursing care, respite, and palliative care.[18]

The proportion of CYSHCN increased over the past few decades, creating new challenges for the healthcare system as their care spans inpatient, outpatient, and community-based settings. These children and youth make up a sizable, yet diverse, population. While the overall prevalence of CYSHCN is approximately 19% of the pediatric population, the majority (85.1%) of these families report their child's care is poorly coordinated.[16] Also of note are the inequities experienced by CYSHCN and their families, particularly those in under-resourced communities.[16] One effort to address these issues is the HRSA-MCHB Blueprint for Change,[18] which identifies four critical, yet interconnected, areas: health equity, family and child wellbeing and quality of life, access to services, and financing of services. Addressing these critical areas requires a concerted, holistic, and integrated approach so that CYSHCN can enjoy a full life from childhood through adulthood; thrive in a system that supports their families and their social, health, and emotional needs; and be assured that their dignity, autonomy, independence, and active participation in their communities will be supported.[18]

The role of the PCP in the care of CYSHCN cannot be overstated, as these children and youth also require ongoing health maintenance, illness prevention, and developmental surveillance. As noted earlier, primary care is designed to be a first contact point, not simply a point of entry into the health system, and the "hub" of coordination (see Fig. 1.1). For CYSHCN, the PCP provides much needed continuity and coordination of care as these children and youth grow and develop. In this role, the PCP reviews subspecialty notes and recommendations, looks for areas of duplication or contradictions, and helps understand recommendations, treatments, and federal and state programs [e.g., Section 504 Plan, Individualize Education Plan (IEP)]. For some CYSHCN, an interdisciplinary specialty clinic (e.g., spina bifida) may be the preferred care coordinator, reaching out to the PCP as a consultant on primary care issues.

All families with a CYSHCN need to be prepared for acute and/or emergency care from those not familiar with their child's condition. The AAP and the American College of Emergency Physicians created an Emergency Information Form (EIF) that ensures a CYSHCN's complicated medical history, as well as special needs and/or considerations, are concisely summarized. This form can be used to transfer relevant information when the CYSHCN has an acute health problem and their parent, caregiver, or familiar PCP is not immediately available, as well as shared with unfamiliar emergency departments and/or personnel (e.g., EMS professionals). A downloadable version is available at: https://www.acep.org/by-medical-focus/pediatrics/medical-forms/emergency-information-form-for-children-with-special-health-care-needs/. Other resources for these families include:

- Centers for Medicare and Medicaid Services Forms: https://www.cms.gov/Medicare/CMS-Forms/CMS-Forms/CMS-Forms-List.html
- Child Care Aware: state-by-state resources. Includes childcare, health and social services, financial assistance, children with special needs, additional resources available in each US state. https://www.childcareaware.org/resources/map/
- Children and Youth with Special Health Care Needs (CYSHCN): https://mchb.hrsa.gov/programs-impact/focus-areas/children-youth-special-health-care-needs-cyshcn
- Family Voices: National Center for Family Professional Partnerships (NCFPP): www.fv-ncfpp.org
- Medical Home Portal: https://www.medicalhomeportal.org/issue/writing-letters-of-medical-necessity

Additional Resources

Bright Futures: Health Promotion and Preventive Care Initiative

While there are many resources for primary care, Bright Futures (https://www.brightfutures.org/) is a key resource for all pediatric PCPs. It provides theory-based and evidence-driven guidance for well-child care and preventive care screenings. The resource emphasizes the family as the child's primary source of strength and support and recognizes the importance of the child's and family's perspectives in clinical decision-making. This patient- and family-centered approach captures the importance of engaging both the family and the patient in a developmentally supportive manner as essential members of the primary healthcare team.

Bright Futures is led by the AAP and supported by the Maternal and Child Health Bureau, Health Resources and Services Administration (HRSA). It identifies 12 key health promotion themes, including healthy development, family support, mental health and emotional wellbeing, nutritional health, physical activity, healthy weight, lifelong health for families and communities, oral health, healthy adolescent development, safety and injury prevention, healthy and safe use of social media, and children and youth with special health needs. These themes align with the content of this textbook, providing a parallel resource for pediatric PCPs.

Other Resources for Primary Care Providers

- Bright Futures for Families: https://familyvoices.org/projects/
- Center for the Developing Child: https://developingchild.harvard.edu/
- National Resource Center for Patient/Family-Centered Medical Home: https://www.aap.org/en/practice-management/medical-home/
- The Resilience Project: https://www.acesaware.org/resource/american-academy-of-pediatrics-the-resilience-project-related-aap-policy/

References

1. Mold JW. How primary care produces better outcomes: a logic model. *Ann Fam Med*. 2014;12(5):483–484.
2. *Primary Health Care Measurement Framework and Indicators: Monitoring Health Systems through a Primary Care Lens*. Geneva: World Health Organization and the United Nations Children's Fund (UNICEF); 2022.
3. Leavell H, Clark AE. *Preventive Medicine for Doctors in the Community*. New York: McGraw-Hill; 1965.
4. Children's Health Fund Children's Health Fund. *Unfinished Business. 20 Million Children in U.S. Still Lack Sufficient Access to Essential Health Care*; 2016. https://www.childrenshealthfund.org/advocacy-publications/.
5. American Nurses Association. *Pediatric Nursing: Scope and Standards of Practice*. American Nurses Association; 2015.
6. Russ SA, Hotez E, Berghaus M, et al. Building a life course intervention research framework. *Pediatrics*. 2022;149(suppl 5).
7. Applegate KE, Cost NG. Image gently: a campaign to reduce children's and adolescents' risk for cancer during adulthood. *J Adolesc Health*. 2013;52(5 Suppl):S93–S97.
8. Garner A, Yogman M. Preventing childhood toxic stress: partnering with families and communities to promote relational health. *Pediatrics*. 2021;148(2):e2021052582.
9. Heindel JJ, Vandenberg LN. Developmental origins of health and disease: a paradigm for understanding disease cause and prevention. *Curr Opin Pediatr*. 2015;27(2):248–253.
10. Bianchi ME, Restrepo JM. Low birthweight as a risk factor for non-communicable diseases in adults. *Front Med (Lausanne)*. 2022;8:793990.
11. Grube WA, Liming KW. Attachment and biobehavioral catch-up: a systematic review. *Infant Ment Health J*. 2018;39(6):656–673.
12. Fyfe-Johnson AL, Hazlehurst MF, Perrins SP, et al. Nature and children's health: a systematic review. *Pediatrics*. 2021;148(4):e2020049155.
13. Louv R. *Last Child in the Woods*. Algonquin Books; 2008.
14. Davidson LF, Doyle MH. Healthcare transition: a vital part of care, growth, and change for pediatric patients. *Pediatr Rev*. 2021;42(12):684–693.
15. White PH, Cooley WC, Transitions Clinical Report Authoring Group; American Academy of Pediatrics; American Academy of Family Physicians; American College of Physicians. Supporting the health care transition from adolescence to adulthood in the medical home. *Pediatrics*. 2018;142(5):e20182587. Erratum in *Pediatrics*. 2019;143(2).
16. Ghandour RM, Hirai AH, Kenney MK. Children and youth with special health care needs: a profile. *Pediatrics*. 2022;149(suppl 7).
17. McPherson M, Arango P, Fox H, et al. A new definition of children with special health care needs. *Pediatrics*. 1998;102(1 Pt 1):137–140.
18. McLellan SE, Mann MY, Scott JA, Brown TW. A blueprint for change: guiding principles for a system of services for children and youth with special health care needs and their families. *Pediatrics*. 2022;149(suppl 7):e2021056150c.

2

Global and National Influences on Child Health Status

KAREN G. DUDERSTADT

The health of all children is interconnected worldwide, and each child's health must be viewed through a global lens. Whether considering pandemic infectious diseases or global migration, child health status inequities globally and nationally are largely determined by socioeconomic status, which affects overall pediatric health and child development. Biosocial circumstances, or social determinants of child health, are shaped by economics, social policies, politics, and climate change at local, regional, national, and global levels. This social health gradient that runs from the top to the bottom of the socioeconomic spectrum creates health inequities that affect low-, middle-, and high-income countries (HICs) disproportionately.

Significant global progress had been made to reduce childhood morbidity and mortality before the onset of the COVID-19 global pandemic. Although there was a low risk of severe illness or death in children who contracted COVID-19, the pandemic had a profound effect on the physical and mental health of the pediatric population nationally and globally.

This chapter presents an overview of the global health status of infants, children, and adolescents. It describes the effects of the COVID-19 pandemic on pediatric health, the impact of climate change on child health inequality, the progress towards achieving the United Nations (UN) Sustainable Development Goals (SDGs) and Healthy People 2030 targets, and the factors that affect child health in the Unites States, including food and housing insecurity. The chapter also discusses the important role pediatric primary care providers (PCPs) have in advocating for policies that foster health equity and access to quality healthcare services for all children and families.

COVID-19 and the Global Health Status of Children

The launch of the 2030 Agenda for the UN SDGs a decade ago heralded a period of dramatic improvements in most countries in maternal and child survival rates (Fig. 2.1). The global maternal mortality rate (MMR) declined 38% from 2000 to 2017 and the mortality rate for children younger than 5 years declined by more than half.[1] However, the global crises of the COVID-19 pandemic, climate change, and warring conflicts are all affecting the likelihood of reaching the 2030 SDGs.

The recent indicators for the 17 UN SDGs reflect the impact of a reversal of progress towards achieving improving maternal and child health status globally.[2] Findings include[1,2]:

- The COVID-19 pandemic erased previous progress on poverty eradication and pushed 93 million more people into extreme poverty in 2020.
- Twenty-five percent of the global population lives in conflict-affected countries. A record 100 million people were forcibly displaced worldwide.
- More than 24 million learners from primary school to university are at risk of never returning to school.
- Childhood immunization coverage dropped for the first time in a decade, and a global rise in deaths from tuberculosis and malaria occurred. Coverage for the third dose of diphtheria-tetanus-pertussis (DTP) declined from 86% to 81% globally during the first 2 years of the pandemic.
- Global administration of the first dose of the human papillomavirus (HPV) vaccine declined from 20% (2019) to 15% (2021), leaving millions of adolescents at risk for cervical, genital, and oral cancers later in life.

Around 40% of the global population forcibly displaced worldwide are children, and this disruption to their lives and development results in adverse stress and childhood trauma, which is linked to later impairments in learning, behavior, and physical and mental wellbeing.[3] Anxiety and depression among adolescents and young adults increased significantly during the pandemic, particularly in females, and highlighted the lack of available counseling and psychiatric services in health system structures globally and nationally.

Since the onset of the COVID-19 pandemic, international data regarding pediatric mortality were published and the recent UN Inter-Agency Group for Child Mortality Estimation (UNIGME) reported on data from 77 countries. This organization found that the youngest children were the least vulnerable to COVID-19 variants. UNIGME defines pediatric deaths as those that occur in individuals under the age of 24 years. Twenty-seven percent of the COVID-19 pediatric deaths occurred in children from birth to 9 years of age, while 42% occurred in youth 20 to 24 years of

• **Fig 2.1** United Nations Development Program (UNDP) Sustainable Development Goals (SDGs) for 2030. (From United Nations. *The Sustainable Development Goals Report 2022*. https://www.un.org/sustainabledevelopment/. The content of this publication has not been approved by the United Nations and does not reflect the views of the United Nations or its officials or Member States.)

age.[4] Overall child mortality remains high, and the COVID-19 pandemic exacerbated the burden of pediatric loss of life. In 2020 alone, 5 million children died from all causes before reaching their third birthday.[4] Children born in sub-Saharan Africa had the highest mortality rate at 74 deaths per 1000, 14 times higher than in the HICs. Sub-Saharan Africa has the highest rate of neonatal mortality at 27 per 1000 live births, followed by Southeastern Asia at 23 per 1000 live births.[4] If the current trend continues, 54 countries will not meet the 2030 UN SDGs.

It became evident during the pandemic that the COVID-19 crisis was an extraordinary challenge for national statistical systems and a wake-up call for the need for stronger information and communication technology (ICT) infrastructure foundations.[2] It also became an opportunity for countries to experiment with innovative data collection methods, explore new data sources, and modernize ICT infrastructures to meet data demands for global and national policymaking to guide healthcare decisions.

In 2022 the UN General Assembly adopted a resolution that codified the human right to a clean, healthy, and sustainable environment on the 75th anniversary of the Universal Declaration of Human Rights.[5] The confirmation of this human right gives global activists a new tool for advocacy on the effects of climate change and the loss of biodiversity. Reigniting optimism and collective action are required as the impact of the global pandemic eases to strengthen healthcare systems and social and political protective systems to create a more resilient and secure world for our children and families.[1]

Pediatric Mortality Globally

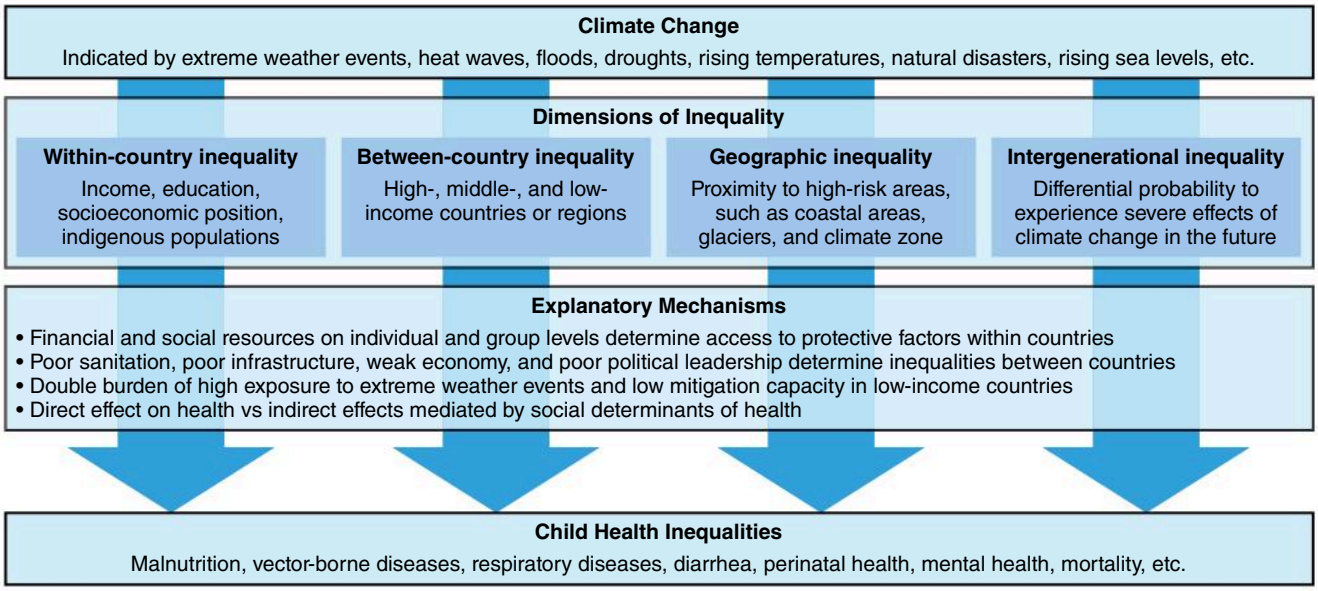
The UN SDGs called for an end to preventable deaths of newborns and children under 5 years old, set the goal of a neonatal mortality rate of 12 or fewer deaths per 1000 live births and an under-5 years mortality rate of 25 or fewer deaths per 1000 live births. However, 54 countries will not meet the under-5 mortality target by 2030, and 61 countries will miss the neonatal mortality target.[4] Of further concern, neonatal and infant mortality remains highest in sub-Saharan Africa, Central Asia, and Southeast Asia.

About 43% of pediatric deaths globally occurred among those 5 to 24 years old. Although adolescent mortality declined by nearly 40% since 1990, almost 1 million adolescents died in 2020.[4] Over 70% of all pediatric deaths occurred in sub-Saharan Africa (45%) and Central and Southern Asia (27%). The global pandemic contributed to a significant setback in recent progress on each of these health indicators.

Food Insecurity

Hunger and undernutrition are often associated with *food insecurity,* which exists when individuals, families, and/or whole populations do not have physical and economic access to sufficient, safe, nutritious, and culturally acceptable food to meet nutritional needs. Food insecurity may occur in impoverished populations in developing countries and in industrialized nations, particularly among immigrant populations. Children affected by migration and family separation are at the highest risk for food insecurity and are also vulnerable to adverse health consequences such as exposure to exploitation and child trafficking.

Growing evidence indicates the dramatic effect of climate change on food crop production and distribution issues globally and subsequent contributions to human migration patterns and food insecurity. Globally, undernutrition is an important determinant of maternal and child health and accounts for 45% of deaths in children younger than 5 years.[6] Children who are exclusively breastfed for the first 6 months of life are 14 times more likely to survive than nonbreastfed infants, yet the lowest breastfeeding rates are in nations with the lowest per capita incomes.



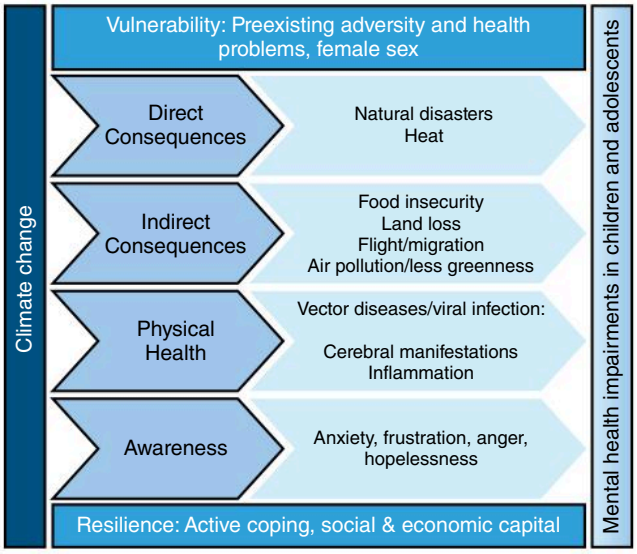
• **Fig 2.2** Relationship Between Climate Change and Child Health Inequalities. (From Arpin E, Gauffin K, Kerr M, et al. Climate change and child health inequality: a review of reviews. *Int J Environ Res Public Health*. 2021;18[20]:10896.)

Climate Change and Global Child Health Inequality

Climate change is an urgent problem that impacts the global pediatric population disproportionately. Many children living in low- and middle-income countries (LMICs) lack the essential determinants of health, including clean air, adequate shelter, nutrition, safe water, and sanitation, which contributes to the higher risk of malnutrition and growth stunting. These factors are exacerbated by the direct and indirect effects of climate change, which include vector-, water-, and food-borne infectious diseases.[7] Inequalities also exist within HICs, as many children in low-income households experience high levels of air pollution, food insecurity, and poor housing conditions (Fig. 2.2).[7] Even with recent improvements in childhood survival rates in LMICs, the mortality rate of children under 5 years of age remains twice as high for children born in the poorest countries compared to the highest per-capita income countries.[1]

The mental health of children and adolescents globally is impacted by immigration, social, and economic environments including loss of native lands due to crop failures resulting in food insecurities, exposure to violence, and disruption in learning and teaching as well as the COVID-19 pandemic (Fig. 2.3).[8] The overall prevalence of pediatric posttraumatic stress (PTS) increased globally, with the highest prevalence in regions impacted by natural disasters. In a recent study in the United States, more than 80% of children 10 to 12 years of age revealed fear, sadness, and anger when discussing their feelings about environmental problems.[8] As the pandemic eased, many 10- to 19-year-olds globally moved to environmental advocacy, despite adversity, and established "Fridays for Future" to put moral pressure on policymakers to take forceful action to address climate change (https://fridaysforfuture.org/).

The recent Intergovernmental Panel on Climate Change (IPCC) Report illustrated the urgent need for interventions to mitigate the effects of climate change and echoed editorials published in 200 medical journals calling for urgent action to address



• **Fig 2.3** Effect of Climate Change and Mental Health Policy in Children and Adolescents. (From Clemens V, von Hirschhausen E, Fegert J. Report of the intergovernmental panel on climate change: implications for the mental health policy of children and adolescents in Europe—a scoping review. *Eur Child Adolesc Psychiatry*. 2022;31:701–713.)

climate change, restore biodiversity, and protect health.[9] LMICs have limited capacity to mitigate the effects of climate change with current economic structures and prevailing political forces. Enhanced interventions by HICs are necessary to promote and fund mitigation and adaptation in LMICs to address climate change.[7]

Despite the recognition of the health-related inequities due to climate change, quantitative data are lacking on the direct consequences of extreme heat events, hurricanes, and subsequent flooding and infrastructure damage on child health outcomes.[7] Global greenhouse gas emissions must decline 43% by 2030 to stave off the worst climate-related impacts.[2] Current national commitments

point to a nearly 14% increase by 2030, and greater engagement in policy action and behavior change is urgently needed to meet the 1.5°C target.[2]

Health Status of Children in the United States

The COVID-19 pandemic disrupted data collection for the key child health indicators—economic wellbeing, education, health, and family and community—resulting in some data in the latest report reflecting 2020 estimates. As a result, the child health indicators do not fully reflect the effect of the pandemic on children and families. In 2020 fewer children were living in poverty, with one in six children living in poor families.[10] Massachusetts continues to rank first in overall child wellbeing, followed by New Hampshire and Minnesota. Three states including Mississippi (48th), Louisiana (49th), and New Mexico (50th) ranked the lowest nationally.[10] Children living in the Southwest have the lowest rating in child wellbeing indicators. California ranks seventh in child health indicators but 45th in family economic wellbeing.[10]

The United States has significant gaps in educational achievement and graduation outcome by race and income among all pediatric age groups.[10] High-school graduation rates dipped in 20 of 26 states reporting in 2021, ending two decades of national progress. Home confinement and learning remotely during the pandemic disrupted teaching and learning, with greater impacts seen among children and adolescents living in low-income families. Illinois, Oregon, and North Dakota dropped 2% in 2021.[11] In some counties in Nevada, graduation rates dropped 2.6% during the pandemic due to adolescents living in low-income families working longer hours and caring for younger siblings.[11] In Oregon and Nevada, the share of high-school freshmen who completed their last school year on track to graduate was about 10% lower than before the pandemic.[11] Students contending with mental health issues may not be able to focus in the classroom, fall behind in core areas such as math and reading, and often struggle to graduate.[10]

In December 2021 the US Surgeon General and leaders in pediatric health policy declared a child mental health emergency.[12] The 2019 National Survey on Drug Use report indicated in the year before the onset of the pandemic, 3.5 million adolescents had a major depressive episode, about one in seven youths aged 12 to 17 years (15.7%).[13] Between March and October 2020, emergency department (ED) visits for mental health issues rose by 24% for children ages 5 to 11 years and 31% for those ages 12 to 17 years. Compared to the same period in 2019, in early 2021, ED visits for suspected suicide attempts increased by nearly 51% among girls ages 12 to 17 years.[14] Suicidal behaviors increased among youth with 19% seriously considering suicide (33% increase from 2009 to 2019).[15] Pediatric deaths nationally reflect increased suicide rates and include victims of gun violence, which surged ahead of motor vehicle deaths to become the leading cause of death for young people ages 1 to 19 years in 2020.[15]

The pandemic contributed significantly to the youth mental health crisis. More than 140,000 children in the United States lost a primary and/or secondary caregiver, with youth of color disproportionately impacted.[16] This family crisis compounded the already increasing rates of depression, anxiety, trauma, loneliness, and suicidality among youth in the United States. The current challenges facing children and adolescents are so widespread that urgent action is needed at all levels of government and by PCPs and advocates for children and adolescents for increased policy action nationally.[12]

Infant Mortality

Infant mortality in the United States remains higher than other HICs. The United States ranks 21st among the other higher per-capita income countries. In 2020 the overall infant mortality rate in the United States was 5.4 deaths per 1000 live births. Almost 20,000 infants died in the United States in 2020 from causes including preterm birth and low birth weight, birth defects, maternal pregnancy and neonatal complications, and sudden infant death syndrome (SIDS).[17] Inequality in infant mortality rates remains, with Black infants having the highest mortality rate at 10.38 per 100,000, followed by Native American and Alaskan Native infants at 7.68 per 100,000. Hispanic infant mortality rates improved slightly in 2020 at 4.69 per 100,000 and non-Hispanic White infants at 4.40 per 100,000.[18]

Childhood Obesity

One of the most concerning pediatric health indicators is the percentage of overweight and obese children in the United States. In 2020 the prevalence of pediatric obesity was 19.7%, with about 14.7 million children and adolescents.[19] Children gained weight at a faster rate during the pandemic compared to prepandemic, with younger school-aged children (6–11 years) experiencing a body mass index change rate that was 2.5 times higher than before the pandemic.[20] Schools contribute to obesity prevention efforts for school-aged youth by providing regularly scheduled opportunities for physical activity and offering nutritious foods through school meal programs. This approach does not single out students according to their weight status or body size but aims to support the health and wellbeing of all students. With the prevalence of pediatric obesity, there is a significant increase in the prevalence of type 2 diabetes, metabolic syndrome, and hypertension. Of all the pediatric health indicators, overweight and obesity significantly directly affect public health costs and the cost of providing healthcare services nationally.

Food and Housing Insecurity

Despite many government food assistance programs in the United States, 10.2% (13.5 million) of US households were food insecure at some time during 2021.[21] Children who are food insecure are more likely to have poor general health, higher hospitalization rates, experience more behavioral problems, and have increased incidence of overweight, asthma, and anemia. Factors other than income impact whether a household is food insecure. Lower maternal education, single-parent households, intimate partner violence, and parental substance abuse all contribute to food-insecure households. Maternal depression increases the likelihood that young children experience food insecurity by 23% to 79%, depending on enrollment in public programs, which play an important role in buffering the effects of food insecurity nationally.[22]

Three-quarters of children spend some portion of their preschool years being cared for outside of the home. Depending on childcare arrangements, the care contributes to or ameliorates the effects of food insecurity for children. Those who attend a preschool or childcare center have lower food insecurity, whereas

children cared for at home by an unrelated adult are at higher risk for food insecurity. The Supplemental Nutritional Assistance Program (SNAP), the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), and the School Breakfast Program (SBP) are federally funded programs established to address childhood hunger. WIC provides an average of $56.90 per participant per month for purchasing healthy food.[23] Recent WIC data indicate the proportion of infant formula distributed to enrollees declined during the pandemic, which may reflect the trends of increased rates of breastfeeding in the United States.

Children living in poverty are significantly affected by access to affordable housing, particularly immigrant children and families living in large metropolitan areas. The affordable housing crisis is one of the primary reasons so many families are homeless. Children made up 107,069—nearly one in five—of the nearly 568,000 people who were homeless on a single night in January 2019.[24] Although many children who are homeless are reportedly in shelter programs, experiencing this lack of family financial stability, the limited housing supply in inner cities, and the high eviction rates during the pandemic negatively combined to impact the education and physical and mental health of the children in these families.

Healthy People 2030

Healthy People (HP) 2030 is the fifth national initiative focused on improving healthcare services and health outcomes for children, adolescents, and families. The initiative monitors the national data trends on 23 specific leading health indicators (LHIs) on child and adolescent health status and includes foci specific to the social determinants of health and health-related quality of life objectives. The HP 2020 initiative met five of the target objectives in the LHIs[25]:

- 36% of children aged 9 to 35 months were screened for autism spectrum disorder and other developmental delays in the past 12 months.
- 46% of children and adolescents accessed oral health care.
- 95% of children entering kindergarten had received two doses of MMR vaccine.
- Reduced the proportion of children who get no recommended vaccines by 2 years of age to less than 2%.
- Reduced the number of children who experience child abuse and neglect (8.4 per 1000 children).

Reporting on HP 2020 initiative found that progress declined in seven of the target areas, including[24]:

- The percentage of fourth-grade students attending public and private schools with reading skills at or above their grade level fell to 35%.
- The proportion of children 6 to 13 years of age who have sufficient aerobic physical activity declined to 25.6%.
- The proportion of students participating in the School Breakfast Program declined to 21%.
- The rate of deaths in children and adolescents aged 1 to 19 years of age increased to 27.6 deaths per 1000.
- The percentage of children and adolescents under 18 years of age with special healthcare needs who received care in family-centered, comprehensive health care declined to 14%.

To meet the target objectives for HP 2030, strong advocacy is needed by PCPs and policymakers to move the national focus to improve healthcare and educational systems that better address the needs of children and adolescents to improve overall pediatric healthcare status.

Advocacy for Improved Child Health Status

Pediatric PCPs have a key role in advocating for child health locally, nationally, and globally. They provide continuity of care in the ambulatory care setting for underserved children with health conditions such as asthma, pneumonia, and vaccine-preventable conditions that might otherwise lead to greater use of costly emergency departments and hospitalizations. Increasing access to pediatric PCPs who deliver comprehensive primary care services reduces healthcare costs, improves health outcomes, and produces healthcare savings—all steps that would allow the United States to lead rather than trail the other economically developed countries in child health indicators. In addition, pediatric PCPs can advocate for children and influence economic and political decisions to ameliorate health disparities and increase health equality among populations and communities to build a healthier generation of adults. A sustained effort is required globally and nationally to build better health systems to continue to positively impact child health outcomes. The framework of the UN Millennium Development Goals and Healthy People 2030 goals sets the mark for improving child health status globally and nationally.

References

1. World Health Organization (WHO) and United Nations Children's Fund (UNICEF). *Protect the Promise: 2022 Progress Report on the Every Woman Every Child Global Strategy for Women's, Children's, and Adolescents' Health (2016–2030)*; 2022. https://data.unicef.org/resources/protect-the-progress-every-woman-every-child-report-2022/#.
2. United Nations (UN). *The Sustainable Development Goals Report*; 2022. https://unstats.un.org/sdgs/report/2022/The-Sustainable-Development-Goals-Report-2022.pdf.
3. Shonkoff J, Garner A, et al. The lifelong effects of early childhood adversity and toxic stress. *Pediatrics*. 2012;129(1):e232–e246.
4. United Nations Inter-Agency Group on Child Mortality Estimation (UNIGME). *Levels & Trends in Child Mortality: Report*; 2021. https://www.who.int/publications/m/item/levels-and-trends-in-child-mortality-report-2021.
5. United Nations Development Programme. UN General Assembly Resolution July 28th 2022. https://news.un.org/en/story/2022/07/1123482
6. World Health Organization (WHO). *Child Mortality (under 5 years)*; 2020. https://www.who.int/news-room/fact-sheets/detail/levels-and-trends-in-child-under-5-mortality-in-2020.
7. Arpin E, Gauffin K, Kerr M, et al. Climate change and child health inequality: a review of reviews. *Int J Environ Res Publ Health*. 2021;18(20):10896.
8. Clemens V, von Hirschhausen E, Fegert J. Report of the intergovernmental panel on climate change: implications for the mental health policy of children and adolescents in Europe—a scoping review. *Eur Child Adolesc Psychiatr*. 2022;31:701–713.
9. Masson-Delmotte V, Zhai P, Pirani A, et al. *Climate Change 2021: The Physical Science Basis*; 2021.
10. A.E. Casey Foundation. An annual report on how children are faring in the United States. The 2022 KIDS COUNT Data Book: State Trends in Child Well-Being. https://assets.aecf.org/m/resourcedoc/aecf-2022kidscountdatabook-2022.pdf.
11. Barnum M, Belsha K, Wilburn T. *Graduation Rates Dip across U.S. As Pandemic Stalls Progress*; 2022. https://www.chalkbeat.org/2022/1/24/22895461/2021-graduation-rates-decrease-pandemic.
12. American Academy of Pediatrics (AAP). *American Academy of Child and Adolescent Psychiatry (AACAP) AAoCaAP, Children's Hospital Network (CHN). A Declaration from the American Academy of*

Pediatrics. American Academy of Child and Adolescent Psychiatry and Children's Hospital Association; 2021. https://www.aap.org/en/advocacy/child-and-adolescent-healthy-mental-development/aap-aacap-cha-declaration-of-a-national-emergency-in-child-and-adolescent-mental-health/.

13. Substance Abuse and Mental Health Services Administration. *Key Substance Use and Mental Health Indicators in the United States: Results from the 2019 National Survey on Drug Use and Health*; 2020. https://store.samhsa.gov/sites/default/files/SAMHSA_Digital_Download/PEP20-07-01-001-PDF.pdf.
14. Leeb R, Bitsko R, Radhakrishnan L, et al. Mental health-related emergency department visits among children aged <18 years during the COVID-19 pandemic—United States, January 1–October 17. *Morb Mortal Wkly Rep*. 2020;69:1675–1680.
15. Centers for Disease Prevention and Control. Youth risk behavior survey data: Summary and trend Reports 2009-2019. https://www.cdc.gov/healthyyouth/data/yrbs/.
16. Hillis S, Blenkinsop A, Villaveces A, et al. COVID-19–Associated orphanhood and caregiver death in the United States. *Pediatrics*. 2021;148(6):31–43.
17. Center for Disease Prevention and Control. Infant Mortality. https://www.cdc.gov/reproductivehealth/maternalinfanthealth/infantmortality.htm.
18. Ely D, Driscoll A. Infant mortality in the United States, 2020: data from the period linked birth/infant death file. *Natl Vital Stat Rep*. 2022;71(5):1–18.
19. Center for Disease Prevention and Control. Prevalence of Childhood Obesity in the United States. https://www.cdc.gov/obesity/data/childhood.html.
20. Center for Disease Prevention and Control. Obesity. https://www.cdc.gov/healthyschools/obesity/.
21. US Department of Agriculture. Food Insecurity in the U.S. https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-u-s/key-statistics-graphics/.
22. Noonan K, Corman H, Reichman N. Effects of maternal depression on family food insecurity. *Econom Hum Biol*. 2016;22:201–215.
23. Center on Budget and Policy Priorities. *Policy Basics: Special Supplemental Nutrition Program for Women, Infants, and Children*; 2022. https://www.cbpp.org/research/food-assistance/special-supplemental-nutrition-program-for-women-infants-and-children.
24. Children's Defense Fund. *The State of America's Children*; 2021. https://www.childrensdefense.org/wp-content/uploads/2021/04/The-State-of-Americas-Children-2021.pdf.
25. US Department of Health and Human Services. Healthy People 2030. Children. https://health.gov/healthypeople/objectives-and-data/browse-objectives/children.

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