

Resource Pack for Adapting Health Systems to Protect Children from the Impact of Climate Change

Heat Stress and its Impacts on Maternal, Newborn, and Child Populations

This resource pack was developed as a complement to the ongoing webinar-based discussions related to heat stress. It aims to support implementers to quickly **understand how heat stress impacts MNCH populations** and **identify best practices** from existing examples of interventions that can be adapted, replicated, and/or scaled up for their own contexts. *This is a selected list of resources and does not reflect the full scope of work on-going. We recommend that users of this resource pack treat it as a starting point.*

To add resources to this pack or to connect with the Child Health Task Force Sub-Group on 'Reimagining the Package of Care for Children', please email: childhealthtaskforce@jsi.com. We would also love your feedback on whether this resource was useful and how to improve it!

1. Example Guidelines for Implementation

The following are implementable guidelines made by various governments, implementers, and researchers that seek to address heat stress for various populations that could also include MNCH populations.

Care in Clinical Settings

- Clinical Guidelines on Management of Heat Related Illness at Health Clinic and Emergency and Trauma Department (Ministry of Health, Malaysia, 2016): [click here](#)
- Treatment and Prevention of Heat-Related Illness (Sorensen et al, 2022): [click here](#)
- Heat: A provider manual for healthcare professionals on assessment and management of patients with heat exhaustion and heat stroke (Aga Khan University and Johns Hopkins University, Pakistan): [click here](#)
- Extreme Heat and Human Health: Information for Pharmacists and Pharmacist Technicians (Health Department, Canada): [click here](#)
- Heatwave: Checklists to Assess Vulnerabilities in Health Care Facilities in the Context of Climate Change (WHO, 2019): [click here](#)
- Checklist for Mental Health Service Providers (New York City Health Department): [click here](#)

Action Plans and Policies

- National Action Plan on Heat Related Illnesses (Ministry of Health and Family Welfare, India, 2021), including flow of care for pediatric populations: [click here](#)
- Ahmedabad Heat Action Plan, including checklists for healthcare settings (Ahmedabad Municipal Corporation and the National Resources Defence Council, India, 2019): [click here](#)
- Extreme Heat Action Plan (Office of Resilience, Miami-Dade County, USA, 2022), including interventions targeting health care focal points: [click here](#)
- National Heat Health Action GuidelinesL Guide to extreme heat planning in South Africa for the human health sector (Department of Health, Republic of South Africa, 2020): [click here](#)

2. Recommended Evidence and Literature from Presenters

The following is a collection of literature that has been recommended by panelists/speakers of our webinars on heat stress, to better understand the impact of heat stress on MNCH populations. You can find out more about the panelists by [going here](#) and searching for ‘Impact of Climate Change’

Global Evidence

- Healthy Environments for Healthy Children (UNICEF, 2021), a global framework for prioritizing and addressing environmental and climate hazards to which children are uniquely vulnerable: [click here](#)
- The Coldest Year of the Rest of their Lives: Protecting children from the escalating impacts of climate change (UNICEF, 2022), including global data on number of children affected: [click here](#)
- The Children’s Climate Risk Index (UNICEF, 2021), including global data on number of children affected by various climate hazards: [Link here](#)
- Physiological mechanisms of the impact of heat during pregnancy and the clinical implications: review of the evidence from an expert group meeting (Samuels et al, 2022): [click here](#)
- Hot climate and weather impacts on infant feeding practices in low- and middle-income settings: a systematic review of epidemiological, clinical, and anthropological evidence (Edney et al, 2022): [click here](#)

Regional Evidence

- How climate change may threaten progress in neonatal health in the African region (Nakstad et al, 2022): [click here](#)
- Past and projected climate change impacts on heat-related child mortality in Africa. Environmental Research Letters (Chapman et al, 2022): [click here](#)
- Projected changes in maternal heat exposure during early pregnancy and the associated congenital heart defect burden in the United States (Zhang et al, 2019): [click here](#)
- Maternal ambient heat exposure during early pregnancy in summer and spring and congenital heart defects - a large US population-based, case-control study (Lin et al, 2018): [click here](#)

3. Other Selected Reports and Peer Reviewed Articles

These are additional resources recommended by Task Force members and the sub-group facilitators.

Global Evidence

- The effect of high and low ambient temperature on infant health: A systematic review. Journal of Environmental Research and Public Health (Lakhoo et al, 2022). [click here](#)
- Taking the Heat: Potential Fetal Health Effects of Hot Temperatures. [click here](#)
- Chersich et al. (2020). Associations between high temperatures in pregnancy and risk of preterm birth, low birth weight, and stillbirths: systematic review and meta-analysis (Chersich et al, 2020): [click here](#)

- Relationship between season of birth, temperature exposure, and later life wellbeing (Isen and Rossin-Slater, 2017): [click here](#)
- Global Burden of Disease High temperature - Level 3 risk (IHME, 2022): [click here](#)

Regional Evidence

- Association of Air Pollution and Heat Exposure With Preterm Birth, Low Birth Weight, and Stillbirth in the US (Bekkar et al, 2020): [click here](#)
- Assessing the impact of heat stress on growth faltering in the first 1000 days of life in rural Gambia (Bonell et al, 2023): [click here](#)
- Impact of community education on heat-related outcomes and heat literacy among low-income communities in Karachi, Pakistan: a randomised control trial (Razzak et al, 2021): [click here](#)
- Prenatal Temperature Shocks Reduce Cooperation: Evidence from Public Goods Games in Uganda. Frontiers in Behavioral Neuroscience (Duchoslav, 2017): [click here](#)

4. Examples of Communication Materials

- Key Signs of Heat-Related Illnesses and Actions to Take (CDC): [click here](#)
- Comic Book for Children Educating them on Heat Stress (Punjab University and Postgraduate Institute of Medical Education and Research Chandigarh, 2022): [click here](#)
- How Can Heat Affect Your Pregnancy? (Dedicated to Women, 2018): [click here](#)
- Harvard and AmeriCares toolkit on responding to heat stress (2022): [click here](#)

5. Useful Databases and Platforms for More Information

- Global Heat Health Information Network: <https://ghhin.org/>
- Lancet Countdown (2022). Exposure of Vulnerable Populations to Heatwaves. [Link here](#)
- WHO Country Profiles on Climate and Health:
<https://www.who.int/teams/environment-climate-change-and-health/climate-change-and-health/evidence-monitoring/country-profiles>
- UNICEF Climate Change Database: <https://data.unicef.org/topic/climate-change/overview/>
- WHO-WMO Portal: www.ClimaHealth.info (Heat specific literature [here](#))