



Children's
Environmental
Health
Network

US Global Change Research Program Draft Climate and Health Assessment Comments

The Children's Environmental Health Network (CEHN) commends the U.S. Global Change Research Program (USGCRP) on the Draft Climate and Health Assessment report and on its review of the latest science on human health implications of climate change, and appreciates the opportunity to comment on the report.

Climate change has and will continue to significantly alter the global environment. In addition to the health of the environment CEHN recognizes that climate change presents major challenges to the health and welfare of children, and that children in communities that are already disadvantaged will be the most harmed. Therefore, CEHN takes the following positions on climate change:

- Urges prompt action to mitigate global climate change
- Promotes the inclusion of children's specific vulnerabilities, needs, and social health outcomes in international, national, state, and local climate change policies/adaptation plans
- Encourages collaboration of partners across disciplines and among different types of organizations to develop innovative and comprehensive approaches to mitigation and adaptation
- Calls for additional research to determine to what extent and how children's health will be affected by climate change and what domestic/international policies, structures, and systems need to be developed, implemented, and sustained in order to protect all children
- Charges all professionals serving families and children to work to minimize the harmful health effects global climate change may have on children through educational outreach and other relevant activities

We acknowledge the efforts this team of writers and reviewers have extended to this draft report, especially in identifying children as a vulnerable population to climate change effects. Overall the report is well-written, well-documented and well-presented. The "Research Needs" and "Key Findings" sections of the report help the reader digest the chapter information and understand the state of science. The figures, diagrams, and tables are also helpful. However, there are several points in each chapter where more specific information is needed. CEHN is pleased to offer recommendations below to aid this effort.

Executive Summary

The explanation to the studies approach to quantified uncertainty, such as high confidence is well written.

Page 5, line 11 and 12, *Temperature extremes can also worsen chronic conditions such as cardiovascular disease, respiratory disease, cerebrovascular disease, and diabetes-related conditions.* It should also be mentioned that extreme temperatures, which affect air quality, worsen child related illness (i.e. decrease in IQ, lung development etc.) due to developing neurological and organ systems. See report: Poursafa, P., & Kelishadi, R. (2011). What health professionals should know about the health effects of air pollution and climate change on children and pregnant mothers. *Iranian Journal of Nursing and Midwifery Research*, 16(3), 257–264.

Chapter 1: Climate Change and Human Health

Page 31, lines 2-7: These bullets go over the health trends related to the presence of chronic disease, ill health, and disease risk. Each bullet addresses various age ranges (“older than 65”, and “over the age of 20”) but excludes children, those under the age of 20. To complete the age demographics outlined in these bullets it is recommended to include a statistic on children or adolescent health. For example: *Recent estimates in the United States show that about one in six, or about 15%, of children aged 3 through 17 years have a one or more developmental disabilities* (CDC: <http://www.cdc.gov/ncbddd/developmentaldisabilities/facts.html>) OR *The percentage of children aged 6–11 years in the United States who were obese increased from 7% in 1980 to nearly 18% in 2012. Similarly, the percentage of adolescents aged 12–19 years who were obese increased from 5% to nearly 21% over the same period.* (1. Ogden CL, Carroll MD, Kit BK, Flegal KM. Prevalence of childhood and adult obesity in the United States, 2011–2012. *Journal of the American Medical Association* 2014;311(8):806-814. 2. National Center for Health Statistics. Health, United States, 2011: With Special Features on Socioeconomic Status and Health. Hyattsville, MD; U.S. Department of Health and Human Services; 2012.)

Page 32-33, *Table 1. Current estimates and future trends in chronic medical conditions that interact with the health risk associated with climate change.* The table is helpful in giving a snapshot of the current health risk and conditions of the adult population. However the report would benefit from adding more information on the current state of children’s health.

- Row 4, *Diabetes*, column 1, *Current Estimates: In 2012, approximately 9% of the U.S. population had diabetes.* Currently the incidence rate of diabetes in young adult and children is increasing. Children are beginning to make up a large portion of the 9% of U.S. diabetic population. It is recommended to add information on childhood diabetes i.e. more than 18,000 youth diagnosed with type I diabetes each year in 2008 and 2009, and more than 5,000 youth diagnosed with type II diabetes each year in 2008 and 2009. (CDC, 2014 National Diabetes Statistics Report, <http://www.cdc.gov/diabetes/data/statistics/2014statisticsreport.html>)

- Row 6, *Mental Illness*, column 1, *Current Estimates*: Mental illness is on the rise in children, especially children in low-income and minority groups. There should be a statement on the prevalence of mental illness in children.
- Row 7, *Obesity*, column 1, *Current Estimates*: *In 2009-2010, approximately 35% of American adults were obese.* This should also include information on obesity rates in children. i.e. - In 2012, more than one third of children and adolescents were overweight or obese. (Ogden CL, Carroll MD, Kit BK, Flegal KM. Prevalence of childhood and adult obesity in the United States, 2011-2012. *Journal of the American Medical Association* 2014;311(8):806-814.)
- Row 8, *Functional Disabilities*, column 1, *Current Estimates*: This section goes over the health trends related to functional disabilities. The report addresses various age ranges (“age 18-44”, “ages 45-64”, and “persons 65 and older”) but excludes children/adolescents, those under the age of 18. To complete the age demographics outlined in these bullets it is recommended to include a statistic on functional disabilities of children, ages 0-18yrs

Chapter 2: Temperature related death and illness

Page 60, lines 15-16 notes that the U.S. population has become less sensitive to heat due to a combination of how many homes and businesses have air conditioning. This leaves out crucial environments that children spend a sizeable portion of their time in: child care centers and school environments. It should be noted here that children’s health and development can be at risk of temperature related illnesses when they spend time in these environments that lack air conditioning. The working paper released by the National Bureau of Economic Research should be cited: *Temperature and Human Capital in the Short- and Long-Run*, which shows that short run changes in temperature lead to statistically significant decreases in cognitive performance on math: <http://www.nber.org/papers/w21157>. Another point to consider is that in the event of an extreme temperature event, air conditioning units and systems can be compromised, leaving parts of the population without resilient systems without air conditioning.

Chapter 3: Air Quality Impacts

Page 89, line 32: It would be beneficial to add a sentence or two on ground level ozone effect on children’s health. More information from U.S. EPA Summer Time Safety <http://epa.gov/airquality/ozonepollution/pdfs/safety.pdf>

Page 99, line 31, and Page 103, line 38: the asthma rate should be 6.8 million, as mentioned later in the report.

Page 95, lines 13-21: This portion refers to allergic illnesses, hay fever and asthma rates in the U.S. population. Allergic illnesses in children has drastically increased therefore it is recommended that the report include statistics on the increase in childhood asthma and other allergic illnesses in children. More information from U.S. EPA Summer Time Safety <http://epa.gov/airquality/ozonepollution/pdfs/safety.pdf>

Page 97, lines 26-29: As an example of indoor ozone exposure the report uses elderly's sensitivity to short term ozone exposure. Since children are also a sensitive population to ozone exposure like the elderly there should be a sentence on children's indoor exposure to ozone and potential health effects. More information from U.S. EPA Summer Time Safety <http://epa.gov/airquality/ozonepollution/pdfs/safety.pdf>

Page 99, lines 27-30: states that *African American, women, and elderly experience greatest baseline risk from air pollution whereas young, older adults, asthmatics, and people whose immune system are compromised are more vulnerable to indoor air pollution.* Children are at greatest risk for both and should be included in the first statement as well.

Chapter 4: Vectorborne Diseases

This chapter does a good job of characterizing the health risk associated with an increase in West Nile disease and Lyme disease across the U.S.. It is critical, however, to include information on the potential increase in West Nile and Lyme disease found in children due to their extended time outside during warmer months. For more information see- CDC- Confirmed Lyme disease cases by age and sex--United States, 2001-2010 <http://www.cdc.gov/lyme/stats/chartstables/incidencebyagesex.html>

Page 137, lines 1, 2: The report refers to advanced age and males having increased risk of being bitten by a mosquito. In the same vein the report should include children, because children are not in school during the summer months and spend a large amount of time in recreational areas with standing water where mosquitoes live and breed.

Chapter 5: Climate Impacts on Water-Related Illness

Pages 164-165 include a table that outlines pathogens/toxins/agents, their waterborne exposure routes, health outcomes and symptoms, and major climate correlations or drivers. While this table is very helpful in outlining the different types of climate sensitive agents of water-related illness, language either in the table, in the further descriptions of these pathogens/toxins/agents, or in the populations of concern section should be added to describe which of these are most dangerous to children. Diseases and health outcomes suffered by children, or pregnant mothers can cause life-long damage, and have more time to manifest themselves. Describing here how specifically children's long term health can be affected by these water related illnesses is important. The increased risk exposure of children and of pregnant women is mentioned in the populations of concern chapter, but this chapter should be more specific.

Chapter 6: Food Safety, Nutrition, and Distribution

Page 224, line 21 Populations of Concern section does not have enough specific information about the vulnerabilities of children with relation to food safety, nutrition and distribution. While

the section states that “children may be especially vulnerable because they eat more food by body weight than adults and do so during important stages of physical and mental growth and development”, a sentence should be added that the nutritional content or lack thereof of the food they eat during this crucial developmental time is also important, especially to avoid obesity. Especially, as the chapter notes, since rising CO₂ can reduce the nutritional value of most food crops and is expected to do so in the future (page 220, lines 36-38).

The chapter also states on page 219, starting on line 19, that climate induced changes in pest distributions and populations of pests will likely lead to an increased use of pesticides and as such, increased human exposure to pesticides. Children have been shown to be uniquely vulnerable to pesticide exposure from a number of different pesticides, and studies have shown different types of pesticides can hinder neurodevelopment, have linked pesticide exposure to childhood cancers and asthma exacerbations. (The Pesticide Action Network of North America has a report with many studies that relate to these exposure consequences: <http://www.panna.org/sites/default/files/KidsHealthReportOct2012.pdf>).

Chapter 7: Impacts of Extreme Events on Human Health

Page 253, Table 1: The example health outcomes and symptoms of flooding do not mention long term flooding damage that can cause mold/fungi growth which can affect children’s health by increasing asthma incidence and exacerbating allergies.

Page 254, starting at line 9, details the three elements that encompass vulnerability: exposure, sensitivity, and adaptive capacity. In the vulnerable populations section of this chapter, it should be noted that children are especially vulnerable in relation to these three elements because children often do not have control over their exposure, less so than adults, are definitively sensitive to climate events, and often have less adaptive capacity than other populations.

Chapter 8: Mental Health and Well-Being

CEHN commends the report for adding a chapter on mental health and well-being, a topic that is usually overlooked, under researched and or not discussed. In this chapter there is an unique opportunity to emphasize children’s increased mental vulnerability to the effects of extreme weather and climate change. Page 299, lines 22-26: Report should include a breakdown of the demographics (age groups, etc.) of the Bouchama et al. 2007 study referenced.

This chapter, specifically in Key Finding 4, does not address the effect of climate-related illnesses on children who are taking behavior related medications such as Ritalin, it only discusses elderly. There should be an inclusion of children who are on behavior modification medications and the potential effect climate change has on their health.

Additionally, chapter should include information on high risk coping behavior of children due to extreme weather events, child suicide rates, and increase in violent behavior due to chronic

stress associated with climate change. See paper from Jyotsana Shukla, "Extreme Weather Events and Mental Health: Tackling the Psychosocial Challenge," ISRN Public Health, vol. 2013, Article ID 127365, 7 pages, 2013. doi:10.1155/2013/127365

Chapter 9: Climate- Health Risk Factors and Populations of Concern

Page 345, lines 31-38 and page 346, lines 1-3: Although athletes are at great risk of exertional heat illnesses, other children who spent long amounts of time outdoors (doing general play, intramural sports, sports other than football etc.). There should be more information in this section on heat related physical exertion in children who are not just sports players.

About the Children's Environmental Health Network

CEHN is a national multi-disciplinary organization whose mission is to protect the developing child from environmental hazards and promote a healthier environment. CEHN's Board of Directors and advisory committee members include internationally-recognized experts in children's environmental health science and policy who serve on key Federal advisory panels and scientific boards. We recognize that children, in our society, have unique moral standing.

CEHN strives to promote the incorporation of the following basic pediatric facts into policy and practice:

- Children can be more susceptible and more vulnerable than adults to toxic chemicals and certain health outcomes;
- Children are growing. Pound for pound, children eat more food, drink more water, and breathe more air than adults. Thus, they are likely to be more exposed to substances in their environments than are adults;
- Children's systems, including their nervous, reproductive, digestive, respiratory, and immune systems, are developing. This process of development creates periods of vulnerability;
- Children have a longer life expectancy than adults, thus they have more time to develop diseases with long latency periods that may be triggered by early environmental exposures.