Protecting maternal, newborn and child health from the impacts of climate change: call for action
Climate hazards, including extreme heat, are associated with increased risks of developing complications that lead to adverse maternal and perinatal outcomes. These may include multiple causes of maternal and neonatal morbidity and mortality such as gestational diabetes, hypertensive disorders of pregnancy, preterm birth, low birth weight and stillbirth. In addition to the health risks related to poor nutrition, water, hygiene and sanitation, the effects of exposure to climate hazards and their aftermath during and after pregnancy can affect mental health and contribute to intergenerational trauma. They may increase stress, anxiety and depression – known risk factors for adverse perinatal outcomes.
WHO (21/11/2023)

JOURNAL ARTICLES

Pollutants and Child Health
Exposure to different residential indoor characteristics during childhood and asthma in adolescence: a latent class analysis of the Danish National Birth Cohort
Many residential indoor environments may have an impact on children’s respiratory health. The aims of this study were to identify latent classes of children from the Danish National Birth Cohort (DNBC) who share similar patterns of exposure to indoor home characteristics. They included data on residential indoor characteristics of offspring from the DNBC whose mothers had responded to the child’s 11-year follow-up and who had data on asthma from the 18-year follow-up. The findings suggest that, in a high-income country such as Denmark, groups of

CHILDREN’S ENVIRONMENTAL HEALTH NEWS

COP28: The climate crisis is also a health crisis
Health has made it onto the agenda of a UN climate conference, and health advocates at COP28 in Dubai on Sunday said the topic was long overdue for discussion as climate inaction is costing lives and impacting health every single day. Our planet has logged higher mean temperatures each year, with 2023 set to be the hottest on record. Ice sheets are melting at an unprecedented rate. Wildfires have made the air hazardous in some regions, while in others, floods regularly threaten to contaminate drinking water. Against this backdrop, more and more people are being affected by disasters, climate-sensitive diseases and other health conditions. Climate change exacerbates some existing health threats and creates new public health challenges. Worldwide, only considering a few health indicators, an additional 250,000 deaths per year will occur in the next decades because of climate change, according to the UN World Health Organization (WHO).
UN News (03/12/2023)

1 in 3 children exposed to severe water scarcity – UNICEF
1 in 3 children – or 739 million worldwide – already live in areas exposed to high or very high water scarcity, with climate change threatening to make this worse, according to a new UNICEF report. Further, the double burden of dwindling water availability and inadequate drinking water and sanitation services is compounding the challenge, putting children at even greater risk. The Climate Changed Child – released ahead of the COP28 climate change summit - throws a spotlight on the threat to children as a result of water vulnerability,
adolescents growing up in homes with mold and moisture during mid-childhood might be at increased risk of current asthma at age 18. Adolescents who grew-up in a farmhouse and who were exposed to pets seem less likely to suffer from asthma by age 18.

Respiratory Diseases

Air Pollution

Characterising sources of PM$_{2.5}$ exposure for school children with asthma: a personal exposure study across six cities in sub-Saharan Africa

The authors aimed to identify potential exposure reduction strategies for school children with asthma living in urban areas in sub-Saharan Africa. Personal exposure to particulate matter (PM) was monitored in school children in six cities in sub-Saharan Africa. Participants were selected if they were aged 12–16 years and had symptoms of asthma. Monitoring was conducted using a backpack with a small air pollution monitoring unit with an inbuilt Global Positioning System (GPS) data logger. Children filled in a questionnaire detailing potential sources of air pollution during monitoring and exposures were tagged into three different microenvironments (school, commute, and home) with GPS coordinates. The results show only 227 (20%) of 1109 days monitored were lower than the current WHO 24 h PM$_{2.5}$ exposure health guideline of 15 μg/m$^3$. The mixed-effects model highlighted the following determinants for higher PM$_{2.5}$ exposure: presence of smokers at home, use of coal or wood for cooking, and kerosene lamps for lighting. By contrast, 37.2% lower PM$_{2.5}$ exposures were found for children who went to schools with paved grounds compared with those whose school grounds were covered with loose dirt.

The Lancet Child & Adolescent Health

Contrasting Health Outcomes following a Severe Smoke Episode and Ambient Air Pollution in Early Life: Findings from an Australian Data Linkage Cohort Study of Hospital Utilization

Episodic spikes in air pollution due to landscape fires are increasing, and their potential for longer term health impacts is uncertain. The authors aimed to evaluate associations between exposure in utero and in infancy to severe pollution from a mine fire, background ambient air pollution, and subsequent hospital care. They linked health records of births, emergency department (ED) visits, and hospitalizations of children born in the Latrobe Valley, Australia, 2012–2015, which included a severe pollution episode from a mine fire one of the ways in which the impacts of climate change are being felt. It provides an analysis of the impacts of three tiers of water security globally – water scarcity, water vulnerability, and water stress. According to the report findings, the greatest share of children are exposed in the Middle East and North Africa and South Asia regions – meaning they live in places with limited water resources and high levels of seasonal and interannual variability, ground water table decline or drought risk. Far too many children – 436 million - are facing the double burden of high or very high water scarcity and low or very low drinking water service levels – known as extreme water vulnerability – leaving their lives, health, and well-being at risk. It is one of the key drivers of deaths among children under 5 from preventable diseases.

UNICEF (13/11/2023)

In the Media

EU poised to water down new car pollution rules after industry lobbying

The EU is poised to water down a landmark piece of car pollution legislation after extensive lobbying from the automotive industry, which experts say will cause an estimated €100bn in health and environmental costs. Analysis provided by the Consortium for Ultra-low Vehicle Emissions (Clove) exclusively to the Guardian and Voxeurop shows that half of the projected financial savings from the new Euro 7 standards on car emissions will be lost due to damage caused by excess nitrogen dioxide. This toxic gas is the main contaminant released by combustion engines, especially diesel ones, and was responsible for 49,000 premature deaths in the EU and 5,750 in the UK in just one year.

The Guardian (07/11/2023)

Children’s rights in jeopardy 34 years after landmark UN treaty

Stronger action is needed to uphold children’s rights in a world where they are increasingly under threat due to conflicts, rising poverty and climate impacts, the head of the UN Children’s Fund, UNICEF, said. Catherine Russell made the appeal in a statement to mark World Children’s Day, which commemorates the adoption of the UN Convention on the Rights of the Child (CRC) – the most widely ratified human rights treaty in history.

“At no time since the CRC was adopted 34 years ago have children’s rights been in greater jeopardy,” she said. Although the 1989 treaty acknowledges that all boys and girls have inalienable rights which
(9 February 2014 to 25 March 2014). They found that higher episodic and lower ambient concentrations of PM2.5 in early life were associated with visits for allergic, respiratory, and infectious conditions. Our findings also indicated differences in associations at the two developmental stages.

*Environmental Health Perspectives*

**Chemicals**

**Follicular DNA Damage and Pesticide Exposure Among Latinx Children in Rural and Urban Communities**

The intersectional risks of children in United States immigrant communities include environmental exposures. The authors assessed pesticide exposure and related these exposures to DNA double-strand breaks (DSBs) in Latinx children from rural, farmworker families (FW) and from urban, non-farmworker families (NFW) living in North Carolina. DSBs were quantified in hair follicular cells and exposure to 72 pesticides and pesticide degradation products were determined using silicone wristbands. DSB frequencies were higher in FW compared to NFW children. Acetylcholinesterase depression had the same seasonality and correlated with follicular DNA damage. Organophosphate pesticides were more frequently detected in FW than in NFW children. Participants with organophosphate detections had increased follicular DNA damage compared to participants without organophosphate detection. These results point to rural disparities in pesticide exposures and their outcomes in children from vulnerable immigrant communities.

*Exposure and Health*

**Prenatal Exposure to Perfluoroalkyl Substances and Child Behavior at Age 12: A PELAGIE Mother–Child Cohort Study**

Exposure to per- and polyfluoroalkyl substances (PFAS) during pregnancy represents a specific window of vulnerability for child health. The objective of this study was to assess the impact of prenatal exposure to multiple PFAS on emotional and behavioral functions in 12-year-old children. In the PELAGIE mother–child cohort (France), prenatal exposure to nine PFAS was measured from concentrations in cord serum samples. Behavior was assessed at age 12. The authors found that prenatal exposure to PFNA and PFOA were associated with increasing scores for measures of externalizing behaviors, specifically hyperactivity.

Governments promised would be protected and upheld, “unfortunately, children today are living in a world that is increasingly hostile to their rights,” she said. Nowhere is this more obvious than in the experience of children impacted by conflicts. UNICEF estimates that some 400 million—roughly one in five—are living in or fleeing conflict zones. “Many are being injured, killed, or sexually violated. They are losing family members and friends. And some are being recruited and used by armed forces or groups,” said Ms. Russell. She added that many have been displaced multiple times, risking separation from their families, losing critical years of education, and fraying ties to their communities.

UN News (20/11/2023)

**Air pollution from fossil fuels ‘kills 5 million people a year’**

Air pollution from fossil fuel use is killing 5 million people worldwide every year, a death toll much higher than previously estimated, according to the largest study of its kind. The stark figures, will increase pressure on world leaders to take action. Among the decisions they must make will be whether to agree, for the first time, to gradually “phase out” fossil fuels. Research has shown that switching from fossil fuels to clean, renewable energy sources would save many lives from air pollution and help combat global heating. However, until now, mortality estimates have varied widely. These findings were published in The BMJ.

The Guardian (29/11/2023)

**Can US pull off a $30bn plan to dump lead water pipes?**

President Joe Biden's administration has announced a plan to rip out nine million lead water pipes across the US. The 10-year proposal aims to shield communities from a neurotoxin that can cause permanent damage to the brain and nervous system, especially in children. It would cost about $30bn (£24bn), the Environmental Protection Agency says. The task is no small feat, but is a "really big step for the US", Rutgers University Professor Douglas Cantor tells the BBC. He says it is a lofty goal, though "totally doable". Under the proposed rule, the nation's utilities would be required to shoulder most of the project's cost, which may end up passed on to ratepayers.

BBC (30/11/2023)

**Gas cookers pump out pollutants linked to childhood asthma, report finds**
We also identified associations between PFNA and PFDA prenatal exposure levels and increasing scores related to internalizing behaviors (general anxiety and major depressive disorder), which adds to the as yet sparse literature examining the links between prenatal exposure to PFAS and internalizing disorders. *Environmental Health Perspectives*

**Associations Between Phthalate, Eosinophil, and Aeroallergen Sensitization in Schoolchildren**

Phthalates and bisphenol A (BPA) are endocrine-disrupting chemicals and may cause immunological disorders in children. Therefore, according to the region, the authors investigated urinary phthalates and BPA levels and the relationship between urinary phthalate, aeroallergen sensitization, and eosinophil count during the coronavirus pandemic. In total, 203 schoolchildren (134 residential and 69 industrial) aged 7–10 years were enrolled between July 2021 and July 2022. The BPA, metabolites of four high-molecular-weight phthalates and three low-molecular-weight phthalates, were measured in the urine samples. Total eosinophil count and transepidermal water loss (TEWL) were also measured along with the skin prick test. The authors found that exposure to phthalates was significantly associated with eosinophil count but not with aeroallergen sensitization or vitamin D. Therefore, reducing the use of plastic containers may effectively prevent exposure to phthalates and reduce Th2 cell-mediated inflammation in children. *Journal of Korean Medical Science*

**Heavy Metals**

**Exposure to metal mixtures and young children’s growth and development: A biomonitoring-based study in Eastern China**

The authors investigated the associations of metal mixture exposure with children’s physical and behavioral development. A total 15 metals were detected in the urine samples of 278 preschoolers aged 3–6 years from eastern China. Dose-response relationships between single metal and children’s physical and behavioral development were analysed. The results showed that exposure to arsenic (As) appears to have adverse effects on with z score of height for age (HAZ), while exposure to tin (Sn) may hinder children’s behavioral development. Conversely, exposure to strontium (Sr) may have a protective effect on children’s behavioral development. Additionally, the combined impact of metal mixtures is implicated in potentially Gas cookers are pumping pollutants linked to childhood asthma into kitchens, living rooms and bedrooms across Europe, a report has found. Dutch scientists measured the air quality in 247 homes and found average levels of nitrogen dioxide (NO₂) were almost twice as high in those cooking with gas as in those cooking without. One in four homes with gas cookers breached hourly pollution levels set by the World Health Organization, while none of the homes in the control group, which used electric cookers, broke the limits. Piet Jacobs, a scientist from the Netherlands Organisation for Applied Scientific Research, said: “Changing to electric cooking – preferably combined with use of well-designed ventilation hoods to reduce exposure to high levels of particulate matter from cooking – can bring these values down to below recommended levels.” The Guardian (08/11/2023)

**How to protect your child’s lungs when air pollution peaks**

Before and after the Diwali festival, notorious for causing a spike in air pollution, it’s essential for parents to be proactive in safeguarding their children’s respiratory well-being. There are devastating effects of air pollution on children's lung health every day which make it crucial for parents to protect their children. Prolonged exposure to pollutants leads to respiratory infections, asthma, and even long-term lung damage. Parents can take action several ways, such as investing in air purifiers to keep indoor air clean during the Diwali season, and limiting outdoor activities during periods of high pollution (such as early morning and late evening). Parents can teach good respiratory hygiene, including proper including proper handwashing and covering their mouth and nose and mouth when coughing or sneezing, and consider masking when outdoors. It is also important to stay updated on air quality levels in your area using reliable sources. Times of India (14/11/2023)

**UNICEF: 1 in 5 children in world’s richest countries living in poverty**

A sharp rise in child poverty was registered across 40 of the world’s richest countries between 2014 and 2021, according to a new report published on Wednesday by the UN Children’s Fund’s global research centre, Innocenti. The new findings focus on Member States of the Organization of Economic Cooperation and Development (OECD) and the European Union (EU). Analysing child support policies among the group of developed economies, the report finds that despite an overall decrease in
impairing children’s physical development, particularly in terms of HAZ. Ecotoxicology and Environmental Safety

Urine heavy metals and attention-deficit/hyperactivity symptoms of preschool children: a mixed-exposure analysis

This study evaluates the association between mixed exposure to neurotoxic metals and the psychosocial behavior of preschool children. Using a stratified sampling strategy, 977 kindergarten aged children in Taiwan were recruited. Urine was collected and analyzed for cadmium, manganese, arsenic, chromium, lead, and nickel concentrations. Parent questionnaires were used to evaluate the psychosocial behaviors. The authors evaluated the associations between each heavy metal and the mixed effects with the outcomes. In single pollutant models, they observed adverse effects of urinary manganese, nickel, arsenic, and lead on the specific subsets. Furthermore, the combined effect of six heavy metals significantly affected the hyperactivity/inattention symptoms and chromium and lead were the two major contributors. Similar detrimental effects of urinary cadmium and lead were also observed in some subsets. The study provided evidence that concurrent exposure to multiple heavy metals may exert increased risks of hyperactivity/inattention in children compared to single pollutant exposure. Ecotoxicology and Environmental Safety

Reproductive Health

Association of exposure to ozone and fine particulate matter with ovarian reserve among women with infertility

Evidence linking diminished ovarian reserve, a significant cause of female infertility, and exposure to particulate matter with aerodynamic diameters ≤2.5 μm (PM_{2.5}) or O_3 exposure remains a critical knowledge gap in female fertility. This study investigated the association between ambient PM_{2.5}, O_3 pollution, and anti-Müllerian hormone (AMH), a sensitive marker of ovarian reserve, in reproductive-aged Chinese women. The authors enrolled 2212 women 2018 and 2021. The daily mean concentrations of outdoor PM_{2.5} and O_3 were estimated, followed by matching the participants’ residential addresses. Three exposure periods were designed according to AMH expression patterns during follicle development. A generalized linear model was used to investigate changes in AMH associated with air pollution. The results indicated an inverse association between ovarian reserve poverty of nearly eight per cent over the seven year period, there were still more than 69 million children living in households earning less than 60 per cent of the average national income. “The impacts of poverty on children are both persistent and damaging,” said Innocenti’s Director, Bo Viktor Nylund. Children may grow up without enough nutritious food, clothes, school supplies, or a warm place to call home. It prevents the fulfilment of rights and can lead to poor physical and mental health.” UN News (05/12/2024)

Community design that includes parks, safe routes, green space contributes to child health, equity: AAP

The “built environment” represents human-made structures such as buildings, parks and roads that comprise the neighborhoods and communities where people live, work, learn and recreate. An updated AAP technical report describes how this environment influences multiple child health conditions, including asthma, mental health, obesity and injuries. An accompanying policy statement focuses on health-promoting community design solutions. AAP News (18/12/2023)

Severe lack of water causing serious health risks for children in Chad

People displaced from Sudan sheltering in camps in eastern Chad are living in dire conditions, desperately short of clean water and decent sanitation. Médecins Sans Frontières (MSF) teams are providing water and sanitation assistance in three camps in the border region. Some 40,000 people in Metche refugee camp are receiving just six litres of water per person per day for drinking, cooking and washing – far below the 20 litres of water per person per day recommended by the World Health Organization in emergencies. The lack of water, latrines and proper waste management presents a serious risk to their health, say MSF medics, who are treating increasing numbers of people for skin conditions, gastrointestinal infections and acute watery diarrhoea, which is particularly risky for malnourished children. MSF (05/12/2023)

Polluted air means more asthma attacks for urban kids, says new study

Air pollution may trigger more asthma attacks in urban children and teens, a new study reports. Even moderate levels of ozone and fine airborne particulates—two ingredients of smog—appear to increase kids’ risk of asthma attacks, according to
and ambient O$_3$ exposure and suggested distinct susceptibility windows for O$_3$ and PM$_{2.5}$ for reduced ovarian reserve. These findings highlight the need to control ambient air pollution to reduce invisible risks to women's fertility, especially at high O$_3$ concentrations.

*Environmental Pollution*

**Climate Change and Health**

*Climate variability, armed conflicts and child malnutrition in sub-saharan Africa: A spatial analysis in Ethiopia, Kenya and Nigeria*

Sub-Saharan Africa (SSA) has one of the highest prevalence of malnutrition among children under 5 in the world. It is also the region most vulnerable to the adverse effect of climate change, and the one that records the most armed conflicts. This study analyses the influence of climatic variations and armed conflicts on malnutrition in children under 5 in Ethiopia, Kenya, and Nigeria. The results show that there is a spatial autocorrelation of malnutrition measured by the prevalence of underweight children in the three countries. Also, local geographically weighted analysis shows that armed conflict, temperature and rainfall are positively associated with the prevalence of underweight children in some localities. The findings support the implementation of conflict-sensitive climate change adaptation strategies.

*Heliyon*

**Heat wave exposure and increased heat-related hospitalizations in young children in South Korea: A time-series study**

Numerous studies have investigated the association between heat wave exposure increased heat-related hospitalizations in the general population. The authors aimed to evaluate the association between hospitalization for heat-related illness in children and heat wave exposure in South Korea. They used the National Health Insurance Service (NHIS) database, and defined daily hospitalizations for heat-related illness of children younger than five years during the summer period. Overall, heat wave exposure within two days was most related for heat-related hospitalizations in young children. We found that boys were more vulnerable to heat exposure than girls. In addition, we found that urban areas were more vulnerable to heat exposure than rural areas. The findings suggest the need for summer heat wave management and prevention for children.

*Environmental Research*

findings published online in *The Lancet Planetary Health* journal. "The strong association this study demonstrates between specific air pollutants among children in impoverished urban communities and non-viral asthma attacks further augments the evidence that reducing air pollution would improve human health," said Dr. Hugh Auchincloss, acting director of the U.S. National Institute of Allergy and Infectious Diseases (NIAID). The study also tied the two pollutants to distinct changes in children's airways that could trigger an asthma attack, according to study leader Dr. Matthew Altman, an associate professor in the department of medicine at the University of Washington School of Medicine, in Seattle, and colleagues. It's one of the first times elevated levels of distinctive air pollutants in specific urban locations have been tied to the risk of asthma attacks.

*Medical Express (22/12/2023)*

**Children’s jewellery laden with toxic metals, study shows**

Bracelets, rings, bangles, necklaces and other ornaments meant for children are heavily contaminated with toxic metals, particularly those made for Independence Day celebrations, a study has found. The analysed jewellery samples contained elevated levels of heavy metals like lead, cadmium and zinc. The findings are particularly concerning given the World Health Organisation’s estimation that environmental hazards contribute to 26 per cent of all deaths in children under five globally, amounting to nearly 1.5 million fatalities every year. The research, titled ‘Metals as Toxicants in Event-Based Expedited Production of Children’s Jewellery’, involved a thorough examination of jewellery items available both in physical markets and online across Pakistan from July to August in both 2021 and 2022. The surveyed items, whose prices ranged from Rs50 to Rs1,000, encompassed a wide range of children’s accessories, including bracelets, rings, bangles, necklaces, facemasks, goggles, hair accessories, and badges.

*Dawn (26/12/2023)*
EVENTS
Second Global Conference on Air Pollution and Health
28 October – 1 November 2024
Accra, Ghana

USA Exposome Symposium
January 22-24, 2024
Nashville, TN