The impact of climate change on global child health - position statement

The Royal College of Paediatrics and Child Health recognises that climate change is an existential threat to the health and wellbeing of children and young people. In October 2020, we joined national health and academic alliances to declare climate change an emergency requiring accelerated collaborative actions. This position statement summarises our recommendations and activity about mitigation and adaptation against the impact of climate change on children and young people around the world.

Last modified
26 October 2021

Post date
25 October 2021

Table of contents

You can download this 'at a glance' poster below

Our top three requests for global leaders

The climate crisis is the single biggest health threat facing humanity. The 2021 UN Climate Change Conference (COP26) is a crucial opportunity to assess, reaffirm and strengthen existing climate change commitments made by the international community. Worldwide, health professionals are united in calling for emergency action to limit global temperature increases, restore biodiversity, and protect health. We call on the leaders of every country and their representatives to make human health central to all climate change mitigation and adaptation actions to protect current and future generations of children and young people.

In particular, we want them to commit to the following three areas:

1. Support and protection of children

We call for child health to be a central theme in all climate change policy decisions. All children have the right to clean air, safe water, sanitation, affordable and nutritious food, and shelter. Yet millions of children in the UK and globally do not have access to these critical health determinants – a situation that will be worsened by climate change. The climate crisis is a child rights crisis, and governments should mobilise and allocate the maximum available resources to protect those rights and include a child rights risk assessment as part of all climate policy decisions.

2. Mitigation to reduce the emissions associated with climate change

We call for all countries to prioritise the delivery of a rapid and just transition away from fossil fuels. Children and young people are especially vulnerable to the impacts of air pollution, and exposure to poor air quality has lifelong implications for an individual's potential. Governments should strengthen targets to end the use of fossil fuels in all sectors as part of their transition to clean renewable sources of energy, including immediate cessation of all fossil fuel exploration and subsidies.

3. Adaptation to protect current and future generations of children

from the impacts of climate change

We call for targeted investment in climate-resilient, low-carbon and sustainable health and education services. Growing up in a clean and safe environment is every child's right, and urgent investment in clean water, sanitation and good hygiene practices should be prioritised to enable children to thrive. It is vital that children can continue to go to school and access healthcare services despite the increasing risks presented by climate change.

Background and policy context

Compared with pre-industrial levels, the world has already warmed by more than 1.2°C, impacting every aspect of life, every region of the world, and all income groups.[1] Moreover, temperature increases of 1.5°C and 2°C will be exceeded during the 21st century unless the next decade sees significant reductions in carbon dioxide (CO2) and other greenhouse gases.[2] Worldwide, health professionals have united in calling for emergency action to limit global temperature increases below 1.5°C, restore biodiversity, and protect health.[3]

Almost all children (>99%) worldwide are **already** exposed to one or more climate and environmental risks to their health. Many children, especially those in parts of the world that have contributed least to the climate crisis, do not have access to the critical determinants of health (clean air, safe water, sanitation, affordable and nutritious food and shelter) and are highly vulnerable to further deterioration due to climate change.[4]

In addition, the mental health effects of climate change on children are significant and may be long lasting. Children exhibit high levels of concern over climate change and the mental health consequences, including post-traumatic stress disorder, depression, anxiety, phobias, sleep disorders, attachment disorders, and substance abuse, can lead to problems with learning, behaviour and academic performance.[5]

In 2000, the World Health Organisation estimated that low and middle-income countries were bearing 99% of the disease burden from climate change and 88% of this burden was in children aged less than five years.[6] Children have the right to their determinants of health as these are fundamental economic and social human rights and among the seventeen Sustainable Development Goals (SDGs).[7]

Many governments have demonstrated that they can introduce structural changes rapidly by their response to COVID-19. The COP26 in Glasgow presents a critical opportunity to link the recovery from COVID-19 to countries' revised commitments under the Paris Agreement.[1]

Key facts

Current environmental risks

The world's population of 7.79 billion people, which includes 2.35 billion children aged < 18 in 2020,[8] is currently exposed to multiple overlapping environmental risks:

- 90%, including 2 billion children, are exposed to poor air quality.[4] [9] For example, in 2016, 86% of UK cities exceeded the World Health Organisation's recommended limits for particulate matter[4] [10] [11]
- 29% do not use safely managed drinking water[12]
- 55% do not use safely managed sanitation services[12]
- 40% do not have basic handwashing at home[12]
- 41% live in houses that depend on polluting fuels for lighting, cooking and heating and are exposed to household air pollution[9]

Additional environmental risks reported by the United Nations Children Fund include:[4]

- 920 million children are highly exposed to water scarcity
- 820 million children are highly exposed to heatwaves
- 600 million children are highly exposed to vector-borne diseases
- 400 million children are highly exposed to cyclones
- 330 million children are highly exposed to river flooding and 240 million to coastal flooding

The impact of climate change on environmental hazards

Current avoidable environmental risks cause one-quarter of all diseases and deaths globally each year.[13] In one year, 2016, 300,000 children aged less than five years died because of ambient air pollution and a further 400,000 died as a result of household air pollution.[9] [10] The current environmental hazards highlighted (above) will be further amplified by climate change. For example, it has been

estimated that by 2030 there could be an additional 77,000–131,000 deaths among children under five years of age due to malnutrition attributable to climate change.[13] [14]

Air pollution, extreme weather, drought, food insecurity and vector-borne diseases will all increasingly impact the determinants of children's physical and mental health in the future.[15] [16] We have summarised the evidence to highlight the risks in these different areas.

Air quality

Globally, more than 90% of children are exposed to ambient fine particulate matter (PM2.5) levels above the World Health Organisation's Global Air Quality Guidelines.[9] Ambient and household air pollution from cooking are linked to more than half of acute lower respiratory tract infections in children under five years in low and middle-income countries and almost two-thirds of the deaths from lower respiratory tract infections, globally, which account for 16% of all deaths in children under five years.[9] In addition, indoor air quality is worsened by overcrowding, poor ventilation, and fossil fuel burning for cooking.[17]

Air pollution is a mixture of fine particles which can penetrate deep into the lung, inducing inflammation, and gases which cause oxidative injury. The fine particulate matter that pollutes both indoor and ambient air is associated with asthma exacerbations in childhood.[18] These impacts will be exacerbated further in the future by warmer temperatures, increased levels of pollen and pollution from wildfires.[6]

Children are more vulnerable than adults to the effects of air pollution because:

- they breathe faster, so they inhale more airborne toxicants in proportion to their weight, than adults exposed to the same amount of air pollution.[19]
- their organs are still forming. Therefore, exposure to air pollutants during pregnancy and early childhood can have harmful and irreversible effects on the development of the lungs and other organs with the potential for respiratory and other health problems as an adult.[19]

Existing WHO and EU air quality guidelines limit the annual mean level of PM2.5 µm (fine particulate matter with an aerodynamic diameter of ≤ 2.5 µm) to 5 µg/m3 and 25 µg/m3, respectively.[20] [21] However, cut-off levels of 25 µg/m3 may be inadequate to protect children's health, as evidenced by the number of paediatric

emergency department visits for asthma exacerbations, bronchiolitis and pneumonia.22 UK legal limits for PM2.5 are currently set higher than the WHO Global Air Quality Guidelines.20 23

Many studies have found that higher exposure to PM and traffic are linked to poorer lung function in childhood, including impaired development of the tracheobronchial tree.24 25 26 Other studies have shown that exposure to high levels of PM2.5, PM10 and NO2 were associated with smaller infant head size during pregnancy and birth, and increased risk of intrauterine growth restriction. 27 A recent meta-regression and analysis study concluded that globally 15.6% of all low birth weight and 35.7% of all preterm births could be attributable to PM2.5 exposure throughout pregnancy.28

Water and sanitation

920 million children are highly exposed to water scarcity.4 Half of the world's population could be living in areas of water scarcity by 2025 and by 2040, one in four children will be living in areas of extremely high water stress.29 This exposure also has long term impacts. For example, women exposed to drought are more likely to give birth to low birth weight infants.30

Diarrhoeal disease is a leading cause of of deaths in children under five years old,31 responsible for >500,000 deaths in total, and can be largely prevented with safe water, sanitation, and adequate hygiene (WASH).31 Similarly, access to WASH is shown to reduce childhood undernutrition by reducing the rate of repeated diarrhoea and intestinal worm infestation.32

Inadequate access to water, sanitation and hygiene facilities results in long travelling distances to collect water from distant water sources, where individuals may sometimes be vulnerable to physical and sexual assault. The potential risk of assault can prevent the use of sanitary facilities outside of the home at night. This increased vulnerability and fear of violence may result in mental health repercussions.32

Nutrition and food supply

Climate change will impact food security in a myriad of ways, both directly – via mechanisms such as variable rainfall, excessive temperatures, increased pest prevalence, decreased pollinators, poor livestock adaptation, ocean warming and

acidification; and indirectly – via flooding, forest fires, human migration, conflict, disrupted distribution systems and increased poverty.[33] Crop yields are sensitive to temperature and water availability and reduction in production is anticipated, particularly in low-latitude regions, by up to 25% for maise and 15% for wheat.[33]

Globally 149 million children < 5 years (22%) are stunted, 45 million (6.7%) are underweight and 39 million (5.7%) are overweight.[34] Underweight-malnutrition increases the risk of dying from infections, and overweight-malnutrition is a risk factor for cardiovascular disease, diabetes, and cancer. Undernourished infants are more likely to be obese adults.[35]

The Millennium Development Goal to reduce under-nutrition in children was not achieved by many countries.[36] Unfortunately, the same concerns persist during the era of the SDGs.[37] Coordinated and multifaceted action that includes the wider socioeconomic and environmental contributors is required.[36] Increased food insecurity will have its greatest impact on children at critical periods of their growth and development. It has been estimated that climate change will result in an additional 7.5 million children stunted by 2030, increasing to an additional 10.1 million by 2050.[15]

Extreme weather

820 million children are currently highly exposed to heatwaves[4] and very young children are especially vulnerable to heat-related deaths, including dehydration, as they cannot regulate their temperature and control their environment. This risk is greater if the child is already vulnerable due to homelessness, poor access to water and sanitation, or malnutrition.[6]

570 million children live in areas with extremely high flood occurrences.[4] As well as the immediate risk of injury and drowning, other hazards include reduced access to safe water. The use of unsafe water sources, such as surface water, and the spread of faecal matter into water resources after flooding, increases the spread of water-borne diseases (eg diarrhoea) and food insecurity, resulting in higher rates of under-five mortality in flood-affected areas.[6]

Extreme weather events such as drought and flooding already result in 23 million people being forced to leave their homes every year, with those living in politically fragile and conflict-affected countries being particularly vulnerable.[38] When families are displaced, children are exposed to higher risks of violence, physical

and sexual abuse, and potential mental health consequences.16 In addition, natural disasters increase the risk of separation of children from their families while extreme weather disrupts preventive healthcare and education.

Heatwaves, drought, and wildfire are interlinked. Wildfires cause serious health, social, and economic consequences. The 2015-16 El Niño weather phenomenon exacerbated the stress caused by wildfires in Indonesia and its neighbours, leading to increased smoke and haze-related health problems.6

Vector borne and infectious disease

600 million children are currently highly exposed to vector-borne diseases,4 which are responsible for 17% of the global infectious disease burden, with a direct effect on the health and wellbeing of children in low and middle-income countries.39

Malaria and dengue are the most important mosquito-borne diseases. If emissions keep rising at the current rates, it is estimated that 4.7 billion more people will be at risk from developing malaria and dengue in 2070 when compared with the period between 1970-1999.40 The incidence of other infectious diseases, such as yellow fever, chikungunya, and Zika viruses, is also expected to increase due to climate change.14

Warmer weathers are expected to increase the suitability of the UK climate to vector-based transmission of malaria and dengue fever. For example, it has been estimated that by 2030, there will be two months of malarial transmission in the southern parts of the UK under medium to high climate change.41

Key considerations

The RCPCH considers that there are several key issues in relation to child health and the climate crisis.

- **The climate crisis is a child rights crisis.**4 42 Millions of children in the UK and globally do not have access to their determinants of health, including clean air, safe water, sanitation, affordable and nutritious food, and shelter. These are fundamental rights as enshrined in the United Nations Convention on the Rights of the Child, and the importance of children's rights is

recognised in the Paris Agreement and the United Nations Framework Convention on Climate Change, and states have the responsibility to take action.16 It is appropriate that we use a child rights-based approach in responding to the climate crisis on children and draw attention to the clear link between the United Nations Convention on the Rights of the Child (which is the most ratified treaty globally) and the SDGs.37

- **Present generations have a duty of care towards future generations (often referred to as inter-generational justice)**. Climate change raises particularly pressing issues, such as which risks those living today can impose on future generations and how we use available natural resources without threatening the sustainable functioning of the planet's ecosystems. When we talk about the rights of future generations, this inevitably seems to raise the issue of balancing the rights claims of those alive today against the rights claims of future generations.43

- **The importance of the voice of children and young people**. For decades, many young people have been concerned about climate change. The latest generation of protestors is louder and more coordinated than its predecessors, and their voice continues to reach the highest levels.44 For example, before the 25th Conference of Parties (COP25), held in Madrid in 2019, sixteen children and young people presented a complaint to the United Nations Committee on the Rights of the Child. This action was in protest at world leaders' failure to deliver on their promises to tackle the climate crisis. 45

What have children and young people said

Many examples of children's voices on climate change are available, and we offer a small sample here.

- "We are the last generation that can end climate change. We can and we will." Khishigjargal, 24, Mongolia.46
- "The sea is swallowing villages, eating away at shorelines, withering crops. Relocation of people ... cries over loved ones, dying of hunger and thirst. It's catastrophic. It's sad ... but it's real." Timoci, 14, Fiji.46
- “Children need to hear back from adults making decisions since they have a

right to know what is happening" Member of Scotland's Children's Parliament, 13, Edinburgh.[47]

- "You might think that we are too young to know about the risks and realities of climate change. But we see its effects in our daily lives." Gertrude, 16, Tanzania.[46]
- "I believe that any adult, including anyone from the ISSOP [paediatric] community, can stand by youth in the climate movement, just like my middle school teachers did. Truthfully, we need you to. Fighting for climate justice is hard. You can make a difference. Whether it is by having children's books on the topic in your waiting room, "prescribing" time spent in nature to develop a family's fondness of it, attending strikes, donating, or signing petitions. You too can be a climate activist, and I sincerely hope you will." Mira Madsen, Fridays for Future, Denmark.[48]

Key messages for health professionals

- The climate crisis is urgent and will affect all aspects of children's lives. Health professionals can play an important role in relaying this information.
- Many children feel anxious and depressed about climate change and enquiry about this could enter routine consultations where appropriate.
- Health professionals are highly regarded and respected members of the community and are listened to by the public for this reason; they are also important role models and should aim to set a good example with climate change mitigation both personally and within their professional role.
- Children and young people's voices are vital at the present time and children will value support from health professionals in this crucial activity. Where local children and young people's groups exist, contact and support from concerned health professionals will be appreciated.

Roles and responsibilities of paediatricians

There is an important for paediatricians, and many are taking action.

- Paediatricians should consider engaging with the urgent issue of climate change and support RCPCH in calling on governments to take urgent action on climate change.
- Paediatricians should consider ways to keep up to date with relevant resources

relating to climate change and child health.
    - Across the UK, the Centre for Sustainable Healthcare can provide methodologies and metrics to help paediatricians develop sustainable models of care.
    - In Scotland, NHS Scotland and the SDGs (PDF) has been developed to increase knowledge and understanding of the SDGs within NHS Scotland. In addition, work is underway on a new NHS Scotland Climate Change & Sustainability Strategy and a dedicated NHS Sustainability Action website has been established.
    - In England, through the Greener NHS programme, paediatricians can inform themselves about, and support, the steps being taken in their own trusts to promote sustainability.
    - In Wales, NHS Wales has published a decarbonisation strategic delivery plan for 2021-2030.
    - In Northern Ireland all Health and Social Care (HSC) Trusts are reducing direct carbon emissions through energy efficiency improvements, including adoption of renewable energy technologies. However, the forthcoming Climate Change Bill will require a broader approach to include indirect carbon emissions. RCPCH continue to engage with the Department of Health to advocate for a bespoke green strategy for HSC NI (Northern Ireland).
- Paediatricians should consider how they can reduce their carbon footprint both personally and within their professional role.
- Paediatricians should consider how they can promote sustainability in their workplace through, for example, disinvestment from fossil fuel funds, greening of the supply chain, using sustainable transport, using local and plant-based products in the kitchens, and considering sustainability at all points in their models of care and service delivery.
- Paediatricians should consider introducing the importance of climate change and sustainability into consultations where appropriate, and be able to advise simple, positive steps that individuals, families and communities can take to mitigate the impact of climate change on their health.
- Where possible, paediatricians should take steps to ensure that educational sessions they attend are sustainable, eg using tap water, vegetarian and vegan preponderance at catering sessions, not distributing any non-biodegradable resources and the use of online teaching whenever possible. This includes transitioning international educational sessions and

conferences from face to face to distance learning where possible to reduce the need for unsustainable air travel.

RCPCH recommendations

Addressing the climate crisis requires bold and urgent action. Actions largely fall into one of two broad categories: climate change mitigation and climate change adaptation. Mitigation measures require coordinated action from governments to reduce the emissions associated with climate change. Adaptation measures require investing to protect current and future generations of children from the impacts of climate change.

Support and protection of children

- As a minimum, all children everywhere must have access to their fundamental economic and social human rights, including clean air, safe water, sanitation, affordable and nutritious food and shelter by 2030, as per the 2030 Agenda for Sustainable Development. All governments should mobilise and allocate the maximum available resources to protect children's rights everywhere, and include a child rights risk assessment as part of all climate policy decisions.
- All professional and voluntary groups concerned with children and young people's health should seek to unite and speak with one voice about the climate crisis and the urgency required to tackle its impact.

Mitigation to reduce the emissions associated with climate change

- All governments, acting individually and collectively, should prioritise the delivery of a rapid and just transition away from fossil fuels, including cessation of all fossil fuel exploration and subsidies, as part of the transition to clean renewable sources of energy.
- All nations should update their national climate commitments to commit to their fair share of limiting warming to 1.5°C. Equity must be at the centre of this, with wealthier countries in particular going beyond their existing commitments not only at home but also in supporting low- and middle-income countries to build cleaner, healthier, and more resilient societies.
- The UK Government should go further and faster than its current commitments to reduce greenhouse gas emissions to net-zero by 2050 by bringing the target forwards and avoiding policies that contradict their net-

zero commitments.

Adaptation to protect current and future generations of children from the impacts of climate change

- All countries should prioritise targeted investment in climate resilient, low-carbon and sustainable health and education services.[49]
- Bodies responsible for medical student training in all countries should look at including the topic of the climate crisis in undergraduate education.
- All countries should improve their capacity to carry out environmental monitoring and health surveillance to evaluate the health impacts from environmental risks.

In addition, as a member of the UK Health Alliance on Climate Change, we join other UK professional bodies in supporting the following recommendations:[10]

- All countries to achieve net zero emissions by 2040, with countries with high emissions of carbon making much bigger cuts than those with low emissions.
- Countries with the greatest responsibility for carbon emissions (mostly high-income countries) to transfer funds to countries that are most vulnerable to the impacts of the climate crisis, enabling them to adapt and prepare.
- All fossil fuel subsidies to end (while protecting the vulnerable who may be unfairly disadvantaged) coupled with a massive investment in renewable energy and storage, green infrastructure, and green jobs.
- All fossil fuel companies to become net zero by 2040.
- All health services to become net zero as soon as possible and before 2040.

RCPCH activity on climate change

The RCPCH strategy includes a commitment to climate change as a strategic priority for 2021-2024.[50] We are committed to several actions under the auspices of our climate change working group. These include:

- Effectively using our collective voice and expertise as paediatricians to influence the national and international climate change agenda, focusing on the health impacts faced by children and young people now and in the future.
- Advancing research on the effects of climate change on child health

inequalities and on the impacts of the climate crisis on young people's physical and mental health.
- Reducing the carbon footprint associated with RCPCH and developing our own ambitious plan for sustainability.
- Developing and promoting training for our members on key aspects of sustainable healthcare and the climate crisis, including communication about this topic with patients and families.
- Supporting our members to advocate for improved sustainability locally in their clinical work and workplaces as well as supporting wider national NHS net zero ambitions.
- Advancing and supporting the narrative that the climate crisis is a child rights crisis and promoting children and young people's own advocacy on climate change.

- 1. a. b. Watts N, Amann M, Arnell N, Ayeb-Karlsson S, Beagley J, Belesova K, et al. The 2020 report of The Lancet Countdown on health and climate change: responding to converging crises. Lancet. 2021;397(10269):129–70. Available from: www.thelancet.com/article/S0140-6736(20)32290-X/fulltext
- 2. Intergovernmental Panel on Climate Change. Headline Statements from the Summary for Policymakers A. The Current State of the Climate [Internet]. 2021 [cited 2021 Aug 29]. Available from: www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_Headline_Statements.
- 3. Atwoli L, Baqui AH, Benfield T, Bosurgi R, Godlee F, Hancocks S, et al. Call for emergency action to limit global temperature increases, restore biodiversity, and protect health. BMJ [Internet]. 2021 Sep 6 [cited 2021 Sep 15] Available from: www.bmj.com/content/374/bmj.n1734
- 4. a. b. c. d. e. f. g. h. i. United Nations Children's Fund (UNICEF). The climate crisis is a child rights crisis [Internet]. New York. New York; 2021 [cited 2021 Sep 22]. Available from: www.unicef.org/media/105376/file/UNICEF-climate-crisis-child-rights-crisis.pdf
- 5. Burke SEL, Sanson A V., Van Hoorn J. The Psychological Effects of Climate Change on Children [Internet]. Vol. 20, Current Psychiatry Reports. Current Medicine Group LLC 1; 2018 [cited 2021 Jul 5]. Available from: pubmed.ncbi.nlm.nih.gov/29637319/
- 6. a. b. c. d. e. 6. United Nations Childrens Fund. Unless we act now [Internet]. 2015 [cited 2021 Jul 5]. Available from: www.unicef.org/media/50391/file/Unless_we_act_now_The_impact_of_climate_change ENG.pdf
- 7. United Nations - Office of the High Commissioner of Human Rights.

Sustainable Development Goals and Human Rights [Internet]. 2021. Available from: www.ohchr.org/EN/Issues/SDGS/Pages/The2030Agenda.aspx

- 8. UNICEF DATA - Child Statistics [Internet]. 2021 [cited 2021 Aug 2]. Available from: data.unicef.org/
- 9. a. b. c. d. e. World Health Organisation. Air Pollution and Child Health [Internet]. 2018 [cited 2021 Jun 30]. Available from: www.who.int/publications/i/item/air-pollution-and-child-health
- 10. a. b. c. UKHACC. COP26 - UN Climate Change Conference 2021 - UK Health Alliance [Internet]. 2021 [cited 2021 Sep 15]. Available from: www.ukhealthalliance.org/cop26/
- 11. RCPCH. Outdoor air quality in the UK-position statement Background and policy context [Internet]. 2020 [cited 2021 Jun 28]. Available from: www.rcpch.ac.uk/sites/default/files/generated-pdf/document/Outdoor-air-quality-in-the-UK---position-statement.pdf
- 12. a. b. c. World Health Organization, UNICEF. Progress on household drinking water, sanitation and hygiene 2000-2017. 2019. Available from: www.unicef.org/media/55276/file/Progress%20on%20drinking%20water,%20sanitation
- 13. a. b. World Health Organisation. Global Strategy on Health, Environment and Climate Change and wellbeing sustainably through healthy environments[Internet]. 2020. 36 p. Available from: apps.who.int/iris/bitstream/handle/10665/331959/9789240000377-eng.pdf?ua=1
- 14. a. b. Bhutta ZA, Aimone A, Akhtar S. Climate change and global child health: what can paediatricians do? Arch Dis Child [Internet]. 2019 [cited 2021 Jun 28];104(5). Available from: adc.bmj.com/content/104/5/417
- 15. a. b. World Health Organization. Quantitative risk assessment of the effects of climate change on selected causes of death, 2030s and 2050s. 2014; Available from: www.who.int/globalchange/publications/quantitative-risk-assessment/en/
- 16. a. b. c. Office of the United Nations High Commissioner for Human Rights (OHCHR). Analytical study on the relationship between climate change and the full and effective enjoyment of the rights of the child. 2017;07113(May):18. Available from: www.ohchr.org/EN/Issues/HRAndClimateChange/Pages/RightsChild.aspx
- 17. Brown N, Rizvi A, Kerai S, Nisar MI, Rahman N, Baloch B, et al. Recurrence of WHO-defined fast breathing pneumonia among infants, its occurrence and predictors in Pakistan: a nested case-control analysis. BMJ Open [Internet]. 2020 [cited 2021 Aug 28];10:35277. Available from:

bmjopen.bmj.com/

- 18. Bouazza N, Foissac F, Urien S, Guedj R, Carbajal R, Tréluyer JM, et al. Fine particulate pollution and asthma exacerbations. Arch Dis Child. 2018 Sep 1;103(9):828–31. Available from: adc.bmj.com/content/103/9/828
- 19. a. b. Schraufnagel DE, Balmes JR, Cowl CT, Matteis S De, Jung S-H, Mortimer K, et al. Air Pollution and Noncommunicable Diseases: A Review by the Forum of International Respiratory Societies' Environmental Committee, Part 1: The Damaging Effects of Air Pollution. Chest [Internet]. 2019 Feb 1 [cited 2021 Sep 16];155(2):409. Available from: europepmc.org/article/PMC/6904855
- 20. a. b. World Health Organization. WHO global air quality guidelines [Internet]. 2021 [cited 2021 Oct 8]. Available from: apps.who.int/iris/bitstream/handle/10665/345329/9789240034228-eng.pdf
- 21. World Health Organization. WHO global air quality guidelines [Internet]. 2021 [cited 2021 Oct 8]. Available from: apps.who.int/iris/bitstream/handle/10665/345329/9789240034228-eng.pdf?sequence=1&isAllowed=y
- 22. Pablo-Romero M de P, Román R, Limón JMG, Praena-Crespo M. Effects of fine particles on children's hospital admissions for respiratory health in Seville, Spain. J Air Waste Manage Assoc [Internet]. 2015 [cited 2021 Aug 28];65(4):436–44. Available from: www.tandfonline.com/doi/abs/10.1080/10962247.2014.1001499
- 23. 23. British Lung Foundation. PM2.5 | Taskforce for Lung Health [Internet]. [cited 2021 Sep 15]. Available from: www.blf.org.uk/taskforce/data-tracker/air-quality/pm25
- 24. Schultz ES, Hallberg J, Bellander T, Bergström A, Bottai M, Chiesa F, et al. Early-life exposure to traffic-related air pollution and lung function in adolescence. American journal of respiratory and critical care medicine [Internet]. 2016 Jan 15[cited 2021 Sep 8]; 193(2): p. 171-7. Available from: pubmed.ncbi.nlm.nih.gov/26397124/
- 25. Gauderman WJ, Urman R, Avol E, Berhane K, McConnell R, Rappaport E, et al. Association of Improved Air Quality with Lung Development in Children. N Engl J Med [Internet]. 2015 Mar 5 [cited 2021 Sep 16];372(10):905. Available from: www.ncbi.nlm.nih.gov/pmc/articles/PMC4430551/
- 26. Rice MB, Rifas-Shiman SL, Litonjua AA, Oken E, Gillman MW, Kloog I, et al. Lifetime Exposure to Ambient Pollution and Lung Function in Children. Am J Respir Crit Care Med [Internet]. 2016 Apr 15 [cited 2021 Sep 16];193(8):881. Available from: www.ncbi.nlm.nih.gov/pmc/articles/PMC4849180/

- 27. Clemens T, Turner S, Dibben C. Maternal exposure to ambient air pollution and fetal growth in North-East Scotland: A population-based study using routine ultrasound scans. Environ Int [Internet]. 2017 [cited 2021 Sep 16];107:216. Available from: www.ncbi.nlm.nih.gov/pmc/articles/PMC5571229/
- 28. Ghosh R, Causey K, Burkart K, Wozniak S, Cohen A, Brauer M. Ambient and household PM2. 5 pollution and adverse perinatal outcomes: A meta-regression and analysis of attributable global burden for 204 countries and territories. PLoS medicine [Internet]. 2021 Sep 28 [cited 2021 October 12]; 18(9): p. e1003718.Available from: www.ncbi.nlm.nih.gov/pmc/articles/PMC8478226/
- 29. UNICEF. Water Scarcity.; 2021 [cited 2021 October 12]. Available from: www.unicef.org/wash/water-scarcity.
- 30. Hyland M, Russ J. Water as destiny – The long-term impacts of drought in sub-Saharan Africa. World Dev. 2019 Mar 1;115:30–45.
- 31. a. b. World Health Organization. Diarrhoeal disease [Internet]. 2017 [cited 2021 Sep 15]. Available from: www.who.int/news-room/fact-sheets/detail/diarrhoeal-disease
- 32. a. b. Mills JE, Cumming O. The impact of water, sanitation and hygiene on key social outcomes: review of evidence [Internet]. 2016. Available from: www.communityledtotalsanitation.org/sites/communityledtotalsanitation.org/files/Im
- 33. a. b. Myers SS, Smith MR, Guth S, Golden CD, Vaitla B, Mueller ND, et al. Climate Change and Global Food Systems: Potential Impacts on Food Security and Undernutrition. doi.org/101146/annurev-publhealth-031816-044356 [Internet]. 2017 Apr 6 [cited 2021 Aug 29];38:259–77. Available from: www.annualreviews.org/doi/abs/10.1146/annurev-publhealth-031816-044356
- 34. UNICEF / WHO / World Bank Group Joint Malnutrition Estimates. Levels and trends in child malnutrition Key findings of the 2021 edition. 2021. Available from: www.who.int/publications/i/item/9789240025257
- 35. Swinburn BA, Kraak VI, Allender S, Atkins VJ, Baker PI, Bogard JR, et al. The Lancet Commissions The Global Syndemic of Obesity, Undernutrition, and Climate Change: The Lancet Commission report. Lancet [Internet]. 2019 [cited 2021 Aug 28];393:791–846. Available from: dx.doi.org/10.1016/
- 36. a. b. Oruamabo. RS. Child malnutrition and the Millennium Development Goals: much haste but less speed? Arch Dis Child [Internet]. 2015 Feb 1 [cited 2021 Aug 29];100 (Suppl:S19–22). Available from: pubmed.ncbi.nlm.nih.gov/25613961/
- 37. a. b. Clark H, Marie Coll-Seck A, Banerjee A, Peterson S, Dalglish SL, Ameratunga S, et al. A future for the world's children? A WHO-UNICEF-Lancet Commission. www.thelancet.com [Internet]. 2020 [cited 2021 Jun

28];395:605. Available from: doi.org/10.1016/

- 38. UNHCR. Strategic Framework for Climate Action [Internet]. 2020. Available from: www.unhttps//www.unhcr.org/604a26d84/strategic-framework-for-climate-action
- 39. Barry MA, Murray KO, Hotez PJ, Jones KM. Impact of vectorborne parasitic neglected tropical diseases on child health. Arch Dis Child [Internet]. 2016 Jul 1 [cited 2021 Aug 29];101(7):640–7. Available from: adc.bmj.com/content/101/7/640
- 40. Colón-González FJ, Odhiambo Sewe M, Tompkins AM, Sjödin H, Casallas A, Rocklöv J, et al. Projecting the risk of mosquito-borne diseases in a warmer and more populated world: a multi-model, multi-scenario intercomparison modelling study. Lancet Planet Heal [Internet]. 2021 [cited 2021 Aug 29];5:e404–14. Available from: www.thelancet.com/journals/lanplh/article/PIIS2542-51962100132-7/fulltext
- 41. Baylis M. Potential impact of climate change on emerging vector-borne and other infections in the UK. Environmental Health. 2017 Nov;16(1):45-51. Available from: pubmed.ncbi.nlm.nih.gov/29219091/
- 42. International Society for Social Pediatrics and Child. Declaration Responding to the Impact of the Climate Crisis on Children and Youth The Role of Child Health Professionals and Organizations [Internet]. 2021. Available from: www.issop.org/cmdownloads/issop_declaration_on_climate_change/
- 43. United Nations Childrens Fund. Climate Change and Intergenerational Justice [Internet]. 2021 [cited 2021 Jul 5]. Available from: www.unicef-irc.org/article/920-climate-change-and-intergenerational-justice.html
- 44. Marris E. Why young climate activists have captured the world's attention. Vol. 573, Nature. NLM (Medline); 2019. p. 471–2.
- 45. United Nations Children's Fund (UNICEF). 16 children, including Greta Thunberg, file landmark complaint to the United Nations Committee on the Rights of the Child. 2019. [cited 2021 Oct 8] Available from: www.unicef.org/press-releases/16-children-including-greta-thunberg-file-landmark-complaint-united-nations
- 46. a. b. c. UNICEF. Youth for climate action | UNICEF [Internet]. 2019. [cited 2021 Sep 15]. Available from: www.unicef.org/environment-and-climate-change/youth-action
- 47. Children's Parliament. Climate change for the Climate Assembly. 2021.. [Online].; 2021 [cited 2021 October 12. Available from: www.childrensparliament.org.uk/climate-change-for-the-climate-assembly/.

- 48. ISSOP. ISSOP e-Bulletin No 51 May 2021 [Internet]. 2021 [cited 2021 Sep 15]. Available from: www.dgspj.de/wp-content/uploads/neuigkeiten-issop-e-Bulletin-may-2021.pdf
- 49. World Health Organisation. Operational framework for building climate resilient health systems [Internet]. 2015 [cited 2021 Jul 5]. Available from: www.who.int/publications/i/item/operational-framework-for-building-climate-resilient-health-systems
- 50. RCPCH. Strategy 2021-24. September 2021. [cited 2021 October 18] Available from: www.rcpch.ac.uk/sites/default/files/2021-09/Full%20RCPCH%20College%20strategy%202021-24%20-%20web.pdf

Downloads

At a glance - Climate change and child health198.29 KB