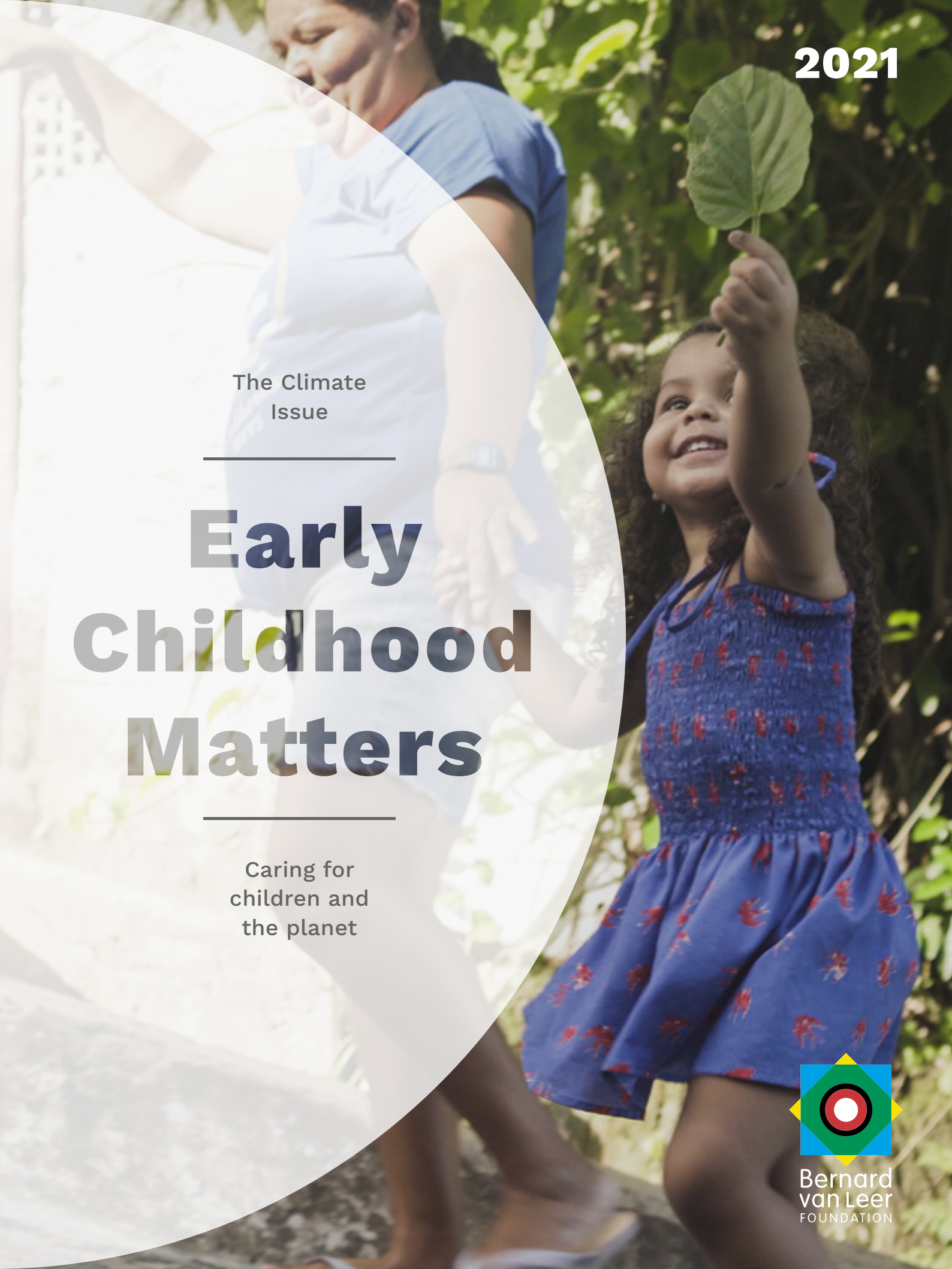
2021

The Climate Issue

Early Childhood Matters

Caring for children and the planet



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Early Childhood Matters aims to elevate key issues, spread awareness of promising solutions to support holistic child development and explore the elements needed to take those solutions to scale. It is published annually by the Bernard van Leer Foundation. The views expressed in *Early Childhood Matters* are those of the authors and do not necessarily reflect those of the Bernard van Leer Foundation. Initiatives featured are not necessarily funded by the Bernard van Leer Foundation.

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The Climate Issue

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Introduction

Making the climate conversation about children

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Executive Director
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The Hague, the Netherlands

Climate change is especially dangerous for children under 5. They have the overwhelming share of climate-related diseases, and are highly vulnerable to air pollution and heat.

When extreme weather forces young children to migrate, they face malnutrition, interrupted education and many other threats, during a key period in their physical and emotional growth. It's also very reasonable to expect that a baby born today will grow up to experience major climate chaos and environmental degradation – worse than any faced by current adults.

Despite all this, discussions about climate change seldom refer to the fate of young children.

They should. This year's issue of *Early Childhood Matters* is dedicated to examining the many ways that climate change and early childhood intersect. We hear from leading policymakers, researchers, educators, urban planners and activists around the world about how to both develop ecological resilience, and improve wellbeing in the early years.

We also spotlight a critical fact: many of the measures that improve life for young children and their caregivers also help cities to cope with climate change.

In the first section, Evidence, we review the worrying data, to create greater awareness.

The first five years of a child's life are a crucial developmental period that is directly impacted by their environment. To better understand this, physicians Bruce Bekkar and Nathaniel DeNicola survey the American data and show that heat and air pollution are already threatening newborns (pages 34–38).

UNICEF's Kelly Ann Naylor explains how droughts, floods and rising sea levels are making safe drinking water even more scarce, imperilling children's health, education and very survival (pages 14–17).

Few people have looked at how climate change impacts new mothers and infants in indigenous communities. So Naomi Lanoi Leleto and Eva Rehse

of the Global Greengrants Fund take us to a Kenyan village where nursing mothers and their newborns are suffering from its effects (pages 45–47).

Extreme weather events have forced millions of babies and toddlers to leave their homes and ecosystems. Researcher Lucy Earle, a specialist in forced displacement, shows that many end up in high-risk urban slums, where they face new climate challenges (pages 28–30).

And photographer Nicoló Filippo Rosso brings us striking images of Venezuelan, Colombian and Central American families, illustrating the daily struggles of young children and their caregivers who are living with the effects of climate change (pages 18–27).

Yet there are reasons to be hopeful. In the second section, New Approaches, we look at how people in cities around the world, which host the vast majority of the global population, are prioritising young children and investing in measures to improve their lives.

Some cities are setting the example. In Lima, Peru, Mayor Jorge Muñoz has launched a programme to expand natural spaces for children and their caregivers (pages 56–58). In Jundiaí, Brazil, Mayor Luiz Machado is expanding green areas for all and promoting walking and cycling (pages 59–61). Jantirar Abay, Deputy Mayor in Addis Ababa, Ethiopia, explains how his city is transforming streets into safe public spaces where children can play (pages 62–64).

> “A baby born today will grow up to experience major climate chaos and environmental degradation.”

Collecting data is often the first step. So in Latin America, Marcelo Mena and Xavier Altamirano have launched a network called Aires Nuevos. They monitor the air that children breathe while going to and from daycare centres and schools, in order to pressure governments to change their pollution policies (pages 91–93).

Our contributors make the case that the solution is not just about cutting carbon emissions; it’s also about establishing a more harmonious relationship with our environment. Children everywhere need regular access to nature, in order to thrive.

American author and activist Richard Louv describes how over-protective parenting and time indoors can lead to what he calls nature deficit disorder, in which children are disconnected from the outside world and from other living beings (pages 72–74).

In Israel, we meet landscape designer Ram Eisenberg, who’s transforming concrete urban spaces into natural wonderlands. “It would be too simplistic to say that children who play in these parks will save the planet,” Eisenberg says, but “if you lack sufficient exposure to these kinds of experiences, you are in a high-risk situation. At least I’m giving them a chance.” (pages 82–90).

In the final section, Education and Activism, we hear from individuals committed to combating climate change on behalf of the world’s youngest population.

Increasingly, some are joining the struggle as parents – a role which can cut across ideological lines. Activist Maya Mailer, in London, describes taking her 3-year-old to a protest outside Lloyd’s of London, one of the world’s biggest insurers of fossil fuels (pages 132–135).

Others are joining as children. We introduce the staggeringly articulate 14-year-old Almaaz Mudaly, of South Africa, a member of the newest generation of climate activists (pages 138–139).

And Sana Mohamed Suhail and Shaikha Al Dhaher of Abu Dhabi’s government describe how the emirate is making children central to its efforts to combat climate change (pages 116–119).

There are many ways to have an impact. South African educator Xoli Fuyani shares her enthusiasm for the worm farms that she’s bringing to

disadvantaged urban schoolchildren. The farms teach students as young as 5 to grow vegetables and manage waste (we've included the lovely "worm pledge" they recite at the start of each class) (pages 120–123).

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In her opening essay, former New Zealand Prime Minister Helen Clark argues that – since children are at particular risk from climate change – they ought to be at the centre of the Sustainable Development Goals, and all governments should track how their policies impact the very youngest in society (pages 10–13).

We at the Bernard van Leer Foundation agree. All countries must urgently consider the broader environmental dimensions of children's wellbeing.

We've reached the point where we know the terrible effects of climate change. It's time to show intergenerational solidarity by adjusting our lifestyles, making responsible decisions for the future, demanding climate accountability, and enforcing sustainable practices.

It's my hope that the data and solutions in this issue of *Early Childhood Matters* will inform policy and inspire collective action. The diversity of authors reminds us that anyone can contribute to the wellbeing of young children around the world.

Most of all, I hope that human beings will rethink how we connect with mother nature, and acknowledge that we are all part of her.

"It's time to show intergenerational solidarity by adjusting our lifestyles, making responsible decisions for the future, demanding climate accountability, and enforcing sustainable practices."

Photo: Courtesy of JS Drones

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Evidence

From heatwaves to air pollution, how climate change affects children and their caregivers

Governments of the world must prioritise children, amid climate change

Changing weather patterns put children at increased risk of poor health, poverty, disrupted education and displacement

Helen Clark
Board Chair, Partnership for Maternal, Newborn and Child Health
Former Prime Minister of New Zealand
Auckland, New Zealand

In February 2020, the WHO–UNICEF–*Lancet* Commission, which I was honoured to co-chair, recommended that children should be positioned at the very centre of the Sustainable Development Goals (SDGs). It noted that climate change poses a specific threat to children and that states must recognise and respond to this, now and in the future. The Commission urged governments to create one overarching department or a similar high-level mechanism to coordinate work for children, drive forward child-friendly policies, and assess the effect of all policies on children (Clark et al., 2020).

We made this urgent recommendation because of the many ways in which climate change negatively impacts children, and especially young children. It puts gains made in the health and wellbeing of children around the world, over many decades, at risk of being reversed.

Threats to children's health

One crucial impact is on children's health. It is estimated that 88% of the global burden of disease attributable to climate change occurs in children younger than 5 years old, in both industrialised and developing countries (Zhang et al., 2007; UNICEF, 2021).

Climate change is also impacting child malnutrition. Undernourishment rates have risen significantly since 2015, in part due to extreme weather events (Niles et al., 2021). In 2019, 34 million people suffered weather-driven acute food insecurity, a 17% increase on 2018 (Food Security Information Network, 2020). While childhood malnutrition has decreased over the past several decades globally, one in three children in low- and middle-income countries still suffers from it, many of them under the age of 5 (UNICEF, 2019).

Malnutrition is of course linked to poverty. According to the World Bank, if the impact of climate change is not addressed, between 32 million and 132 million more people could be pushed into extreme poverty by 2030 (Jafino et al., 2020).

Photo: Panumas/Adobe Stock

Children are displaced

Children are also being displaced by climate change. More than half a billion live in high flood occurrence zones, and 160 million live in high drought severity zones (International Federation of Red Cross and Red Crescent Societies, 2020). A study conducted in Somaliland revealed that 450,000 of Somaliland's estimated one million displaced persons are children who have mostly been forced out of their homes by drought (UNICEF Office of Research – Innocenti, 2019).

Consider a single year, 2019. Worldwide that year, nearly 80 million people – including 30–34 million children – were forcibly displaced by conflict, climate change and nearly 400 natural disasters (UNHCR, 2021; Internal Displacement Monitoring Centre, 2020). In the first six months of 2020, nearly 10 million more people were displaced by further natural disasters (United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA), 2019).

Their education is disrupted

As a result of displacement, childrens' education can be disrupted. Education (including early childhood education programmes) and access to essential services are particular problems for children who are displaced across borders.

Since cross-border displacement resulting from climate change or natural disaster is not legally recognised in the 1951 Convention relating to the Status of Refugees (UNHCR, n.d.), it is not yet regarded as a valid reason to apply for refugee status. Thus children displaced in the context of climate change and natural disasters are often worse off with respect to access to essential health and social services, compared to those officially recognised as refugees. And without legal protection or status, many are at risk of becoming separated from their parents, losing family members, and/or being forced into trafficking or early marriage, with profound psychological and social implications.

During the 2010–11 drought in the Horn of Africa, for example, there was a marked increase in the number of underage girls sold by desperate families into marriage in exchange for livestock (UNOCHA, 2017).

Climate change also places immense pressure on societies, especially in settings which are already fragile, and can drive resource scarcity and large-scale population displacement. When shelter, water, sanitation, and food security are threatened, children are at increased risk of mortality, morbidity, exploitation, physical harm, and gender-based violence (Venton, 2011; Bodanac et al., 2016; Pegram and Colón, 2019).

All of this occurs during early childhood, a key moment in children's development. To reach their potential, children throughout their life course need the five interrelated components of nurturing care: good health, adequate nutrition, safety and security, responsive caregiving, and opportunities for early learning (World Health Organization et al., 2018). Yet, due to climate change and other factors, many children do not have access to these components.

Low investment in early childhood development has lifelong effects on children's capacity to reach their full potential (UNICEF, n.d.). Exposure to climate-related stress in the early years of life also adversely affects outcomes for future generations (Van Susteren, 2020).

Prioritising children makes economic sense

Over the last three decades, there has been a dramatic increase in the number of children throughout the world who survive the first few months and years of life. Mortality in children under 5 has declined by almost 60% since 1990 (United Nations Inter-agency Group for Child Mortality Estimation, 2019). Many children, however, are not *thriving* in those crucial early years of childhood, nor at other important stages of their development through to adolescence.

Not only is it a moral imperative to prioritise early childhood development, it also makes good economic sense. The *Lancet* series on Early Childhood Development (2016) found that it would cost approximately USD 0.50 per person per year to add services to support early childhood development to existing health and nutrition service packages (Richter et al., 2017). The Nurturing Care Framework notes that for every USD 1 spent on early childhood development, the return on investment can be as high as USD 13 (World Health Organization et al., 2018).

The WHO–UNICEF–*Lancet* Commission found that no country, however poor or wealthy, provides conditions to support both a healthy life for children now, and a healthy environment for their future.

"First, governments and policymakers must recognise the direct link between early childhood development and climate change."

States must summon the political will to help children

Given the disproportionate challenges faced by children in fragile settings, including those caused by climate change, it will require huge political will to provide the five components of nurturing care.

First, governments and policymakers must recognise the direct link between early childhood development and climate change. We also desperately need more investment in evidence-based services that support caregivers and give young children, especially the most deprived, the best start.

In addition, we must integrate policies concerning early childhood development with those mitigating and adapting to climate change. That means we must adopt a child-in-all-policies approach, in order to drive equity-enhancing action that puts the most vulnerable among us – our children – at the centre of all our efforts.

Early childhood is not only a period of sensitivity to risk, but also a time when the benefits of early interventions are amplified and risks can be reduced. Effective interventions need to be integrated into existing systems in health, education, and social and child protection. Many measures are already well known, and some of the lowest-cost initiatives have immediate, long-term, and intergenerational benefits (Venton, 2011; Clark et al., 2020).

The lives of many millions of children are already being severely impacted by what is happening to our climate system, and the numbers of those impacted are set to grow in the coming years. It is estimated that by 2040, one in four children will live in areas with extremely limited water resources (Pegram and Colón, 2019).

The impact of climate change on young children is immensely worrying. Urgent action is crucial. We must fill the knowledge gaps and find solutions. The early childhood and climate change communities need to respond together, for the sake of children living now and in generations to come (Pegram and Colón, 2019).

↗ **Find this article online at earlychildhoodmatters.online/2021-2**

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Climate change-induced water insecurity endangers children

The global community must act to ensure that all families have clean water

Photo: Courtesy of ©UNICEF/UN012965/Mad Sokhin

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Today, 1.42 billion people – including 450 million children – live in areas of high or extremely high water vulnerability (UNICEF, 2021). This means they face a double burden: their areas lack adequate water services and infrastructure, and water is already scarce.

Water stress is growing due to population growth and increased demand from sectors such as agriculture, as well as decades of misuse, poor management, over-extraction of groundwater and contamination of freshwater supplies. In the coming years, climate change is expected to exacerbate water scarcity even further.

Many changes in climate are felt through water – notably droughts, floods and rising sea levels. Approximately 74% of natural disasters between 2001 and 2018 were water related (UNICEF, 2021). Extreme weather events can damage water and sanitation infrastructure and services. This affects homes, schools and healthcare facilities, as well as food supplies.

Rising sea levels can lead to saltwater intrusion, contaminating the drinking water supplies on which entire communities rely. Rapid melting of glaciers changes river flow patterns in downstream areas. This contributes to risks of flooding and damage to infrastructure – including dam bursts – in some areas, and low flows in rivers in other areas, thus reducing the amount of water available.

Water scarcity and climate change are also drivers of conflict and migration, as communities and entire populations compete for shrinking water resources. Conflict, in turn, puts more strain on food and water supplies. Families may be forced to leave their homes in search of reliable water supplies and livelihood opportunities. They often move to urban areas and towns, which puts even more pressure on already strained services.

← 1-year-old Camari holds his mother's hand as they stand near the river in Lawaki village. Although their village tap is working again, the water pressure is too low to meet the needs of all the villagers

Taken together, the growing threat of water insecurity due to climate change jeopardises the significant progress in child survival and sustainable development made over the last several decades. It puts the lives of children in vulnerable communities at risk today, and threatens future generations.

"Every day, over 700 children under age 5 die from diarrhoea linked to unsafe water, inadequate sanitation and poor hygiene."

Water scarcity imperils children's education, health and safety

Access to safe water is paramount to children's survival. Every day, over 700 children under age 5 die from diarrhoea linked to unsafe water, inadequate sanitation and poor hygiene.[1] Those who survive can experience lifelong effects: when children get sick with diarrhoea, they are unable to absorb the nutrients they need to grow. Over time this can lead to stunting and may irreversibly damage children's physical and mental development. Unsafe water and sanitation can lead to malnutrition or make it worse: inadequate access to water, hygiene and sanitation is estimated to account for around 50% of global malnutrition.

Lack of water in pregnancy also impacts the unborn child: data from a study of women living in rural Africa show that girls born during severe droughts suffer the consequences throughout their lives, including growing up shorter (Damania et al., 2017).

Water scarcity can also profoundly affect children's education, development and safety. Their health and learning can suffer when educational facilities do not have adequate water for drinking and handwashing. When water sources dry up, children may be forced to drop out of school to spend more time collecting water from sources that are farther away. Not only does this disrupt their education, but carrying heavy loads of water places a great physical burden on children.

Whether it is violence or water shortages that force people from their homes, migration makes children and families more vulnerable both to abuses and to health threats. On the move, children often have no choice but to drink unsafe water. In protracted conflicts, children under 5 are more than 20 times more likely to die from diarrhoeal disease linked to unsafe water and sanitation than they are from violence (UNICEF, 2019).

We can achieve water security for every child only when families and communities have access to water that is safe, reliable and affordable and when they can cope with threats such as water scarcity, extreme weather events and climate shocks.

At UNICEF, we envision four dimensions to building a more water-secure future for children:

1. safe and affordable drinking water services that are sustainable, close to home and managed professionally
2. climate-resilient WASH (water, sanitation and hygiene) services that help communities both mitigate and adapt to the impacts of climate change
3. prevention of water scarcity crises through early warning systems and early action
4. water cooperation for peace and stability.

We are pursuing these goals by working with governments and partners using four main strategies:

1. advocating for political commitment and policy change
2. accelerating financing and capacity development
3. mobilising businesses and encouraging innovations
4. activating young people as champions and agents of change.

1 This is UNICEF's calculation based on several data points. See also UNICEF (2021).

↑ A boy enjoying his bath, in Limbe, in the south-west of Cameroon

In order to achieve SDG 6 targets (clean water and sanitation for all) and combat the impact of climate change, UNICEF has set an ambitious goal: by 2025, we aim for all 450 million children and their families who live in areas of high water vulnerability – 1.42 billion people in total – to have resilient solutions. By 2030, we aim for children everywhere to have access to a safe and affordable water supply and to live in water-secure communities.

↗ **Find this article online at earlychildhoodmatters.online/2021-3**

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photo essay

Children growing up on the move

A visual story of climate change and the uncertain futures of migrant families

Nicoló Filippo Rosso
Documentary photographer
Colombia

Nicoló Filippo Rosso is an award-winning Italian photographer, based in Colombia, whose photographs have been exhibited around the world. Since 2016, Rosso has documented life in La Guajira, an impoverished region of northern Colombia. Over the past three decades, climate change has worsened desertification and made living conditions increasingly harsh there. More recently, he has photographed Venezuelans who live in camps in La Guajira and elsewhere in Colombia, and Central American migrants en route to the USA–Mexico border.

Rosso shoots in black and white to make his photographs feel more universal: "It's a way to look at Latin American migration and then reflect on people migrating from Syria, Afghanistan, Africa," he explains. Although the circumstances of every migrant vary, "it's the same psychological trauma."

Migration "explains the state of the world now," says Rosso. In 2020, a total of 82 million people were displaced worldwide, including 35 million children. "It's about climate change, violence, totalitarian governments, dictatorships and war. It's a huge issue of human mobility from the south of the world to the north."

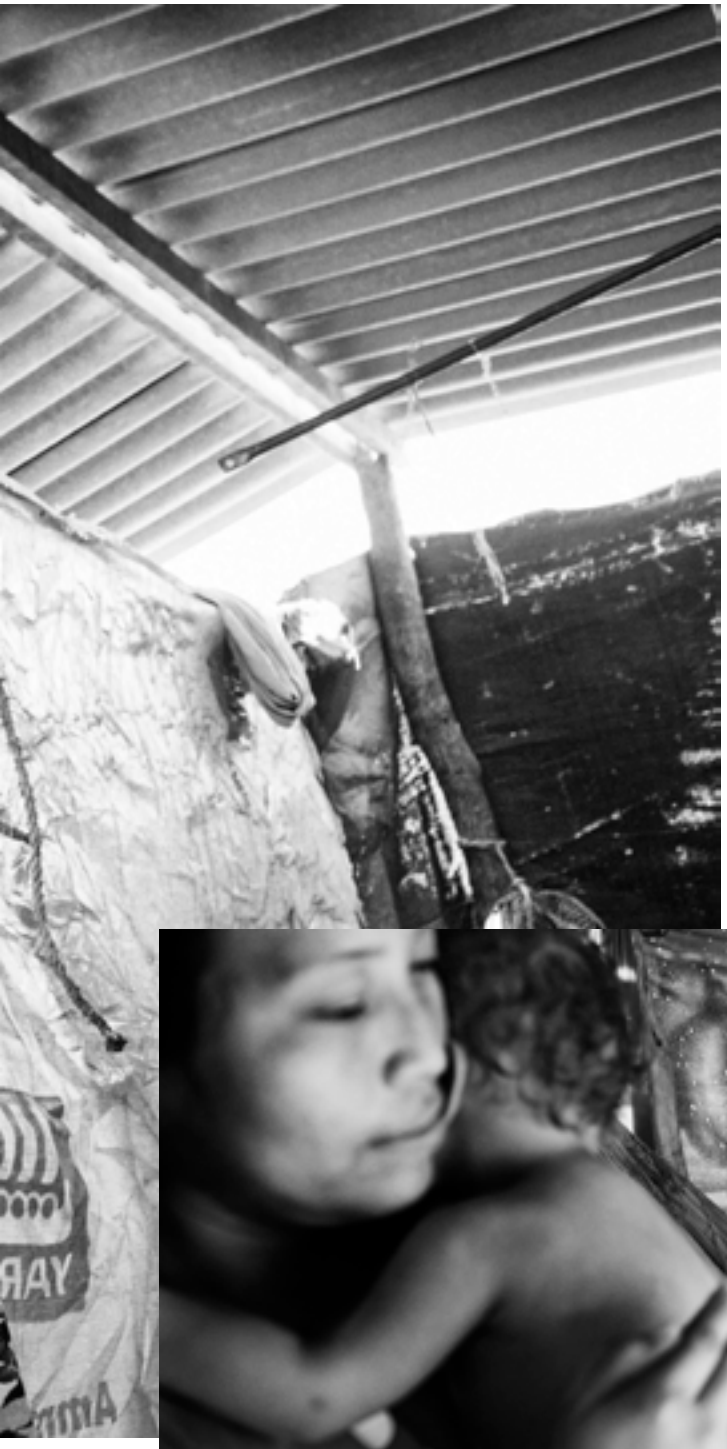
↓ Venezuelan migrants climb into a coal truck whose driver has offered them a ride. They've crossed from Venezuela into north-eastern Colombia and are now attempting to reach Bogotá. "This is an epic journey," says Rosso. "People walk such long distances, and they don't know where they're going. Children grow up on the move. The journey can last months." **La Donjuana, Colombia, 2018**

← A Venezuelan woman builds a shack in the desert of La Guajira, near the Venezuelan border. Since 2018, tens of thousands of Venezuelans have moved to several large migrant camps, in harsh landscapes, on the outskirts of indigenous villages. Migrants "come into Colombia looking for better conditions, and what they find is one of the most impoverished regions of the continent," says Rosso. Lacking money to travel elsewhere, "they're waiting to see where to go or what to do." **Uribia, La Guajira, Colombia, 2019**

← Venezuelan children on the outskirts of a migrant camp in La Guajira. Children here lack reliable access to water, food, healthcare and education, and are at risk of exploitation by gangs controlling the border areas. Although La Guajira is extremely dry, Rosso explains, "when it rains, these camps flood. There is no sanitation, so can you imagine the living conditions for the children? They are unaware of what's going on, so they even play with dark water." **Maicao, Colombia, 2020**

↑ Residents of La Guajira fill tanks with water. A Bogotá-based NGO supplies water to 32 indigenous communities in the region. "Since the rivers dried up and there is no water, they have to rely on aid," says Rosso. "The trucks come every two weeks, so that water has to last." **La Guajira, Colombia, 2016**

↑ A 19-year-old Venezuelan named Jeiliza, who is seven months pregnant with her first child. After leaving Venezuela, she spent a year in one of La Guajira's migrant camps. There is no antenatal care for migrant mothers in the camps. Those on the move walk until they are physically unable to. Those in the camps either look for transport to a hospital or rely on indigenous midwives to assist with childbirth in the camp – starting the odyssey of a new member of the migrant generation. **Uribia, La Guajira, Colombia, 2019**



↓ A Venezuelan mother and her family inside their shack. Because of Covid-19 lockdowns, a local NGO closed its educational programme for migrant children. The struggle to keep children safe and clean puts added stress on caregivers. “The boys are doing homework by themselves,” says Rosso. “They really want to study.” **Uribia, La Guajira, Colombia, 2020**

↓ Indigenous Colombians walking through the tracks of bulldozers that destroyed their home, which they said was bought out from under them by a local gang. Threatened with violence and without access to water, agricultural families in La Guajira move within the region or migrate to cities, where they often end up living on the street due to lack of work. **Riohacha, Colombia, 2016**

→ A primary-school classroom in the Chamelecón neighbourhood of San Pedro Sula. Two months after hurricanes Eta and Iota struck Central America, the classroom was still covered with mud. The hurricanes prompted one of the decade's largest waves of migration to the USA. "The governmental response was very scarce," says Rosso. "This picture talks about children without showing children, it talks about climate change very directly, it talks about lack of access to education." **San Pedro Sula, Honduras, January 2021**

→ A Honduran girl stares out from inside a bus. A migrant caravan left Honduras in January 2021, two months after the devastating hurricanes. Refugees and migrants left home despite the fact that many borders were officially closed due to Covid-19. "I'm trying to make this story known through the emotion of the people," says Rosso. **The border between Honduras and Guatemala, 2021**

→ A woman and two young children cross the Rio Grande in Mexico and walk towards the US border. Asylum seekers often turn themselves in to American authorities to initiate a formal request for political asylum. However, due to public health laws during the pandemic, many of them will be expelled from the USA and sent back to Mexico. “Migration is a universal condition,” explains Rosso. “I thought I should not focus on a specific reportage but just embrace migration as a phenomenon of our time.” **Ciudad Juárez, Mexico, 2021**

↗ **Find this article online at earlychildhoodmatters.online/2021-4**

Climate change is forcing young children into high-risk urban slums

Farming families migrate to informal settlements, where they face new climate issues

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In 2013, a devastating drought in Kenya forced small-scale farmers across the country to abandon their land and move to towns and cities. This happened in a country where 84% of the land was already in zones classified as arid or semi-arid (International Organization for Migration (IOM), n.d.).

This drought wasn't a one-off. Since 2013, UN agencies have repeatedly raised alerts about low rainfall and associated indicators like malnutrition in Kenya (for example, the call for action in 2019 by the Food and Agriculture Organization, UNICEF and the World Food Programme). Flooding is also a concern in the Rift Valley, which cuts through the west of the country from north to south. Rising lake waters there have submerged homes and businesses (Baker, 2021).

For families around the world whose agricultural livelihoods have been devastated by changing and extreme weather, moving to urban areas is often the only option. In low- and middle-income countries like Kenya, these families often end up in informal settlements, also known as slums. Some of those affected by the 2013 drought moved to Mukuru, a large informal settlement in Nairobi.

Globally, approximately one billion people classified as "urban poor" – over a third of them infants, children and adolescents – live in informal settlements. These are neighbourhoods built without permission, and often in contravention of planning and zoning regulations.

Daily life is arduous in informal settlements. Most residents live in shacks made from poor-quality or inappropriate materials. These homes are not connected to water or sewerage networks, and they are often illegally connected to electricity networks. Often there is poor access to healthcare. Slum residents also lack housing security and are at constant risk of eviction.

Recent arrivals to slums are generally at even greater disadvantage than longer-term residents, who are more likely to have familial and social support systems in the neighbourhood. And since displaced people can usually bring little with them, they

gravitate towards the most marginal areas of informal settlements, where rents are cheapest.

Climate change makes daily life even harder

Having been forced by climate change to migrate to slums, families then find that climate change exacerbates the risks and challenges of living there.

The daily grind of being a parent in inadequate housing – trying to source clean water, deal with waste and excreta, and generally keep children safe and clean – can put extreme stress on mental health (Bartlett, 2021). Parents may become anxious and depressed, seriously affecting the quality of care they can give young children (Patel and Arthur, 2003).

"The daily grind of being a parent in inadequate housing – can put extreme stress on mental health."

Urban slums are often built on land that has been deemed unsuitable for more formal housing. The land may be polluted from previous uses, or at risk of landslides in prolonged periods of heavy rain (a risk which climate change exacerbates.) Heavy rain can also cause flash flooding in narrow streets blocked by uncollected waste, making some shacks uninhabitable and putting young children in particular at risk of drowning.

Slums are also disproportionately affected by extreme weather events because their housing is not solidly built to withstand the elements, and they lack adequate drainage and access for emergency vehicles. Flooding-related risks especially affect slums in cities that are frequently hit by cyclones or hurricanes, or located in coastal or water catchment areas or next to rivers (Bartlett et al., 2021).

Climate change also makes prolonged dry spells and heatwaves more likely. And in dry weather, fires can sweep quickly through densely packed housing. In dense urban areas, rising temperatures can also lead to heat stress, and increase vector- and water-borne diseases. Heat worsens air pollution too, further exacerbating conditions in informal settlements where unpaved roads and inadequate sanitation generate dust and airborne faecal matter.

All of this particularly affects very young children due to their immature organs and immune systems, their more rapid metabolism, and their physical susceptibility to dehydration and toxins. They're growing up in conditions that are detrimental to their wellbeing and long-term development.

A movement for change

There is, however, a movement for change. Grassroots networks of the urban poor are growing all over the global south. They are often based on savings groups, which provide the means for the urban poor to upgrade their homes. Many use data collected by community members to negotiate with local government, finding ways to work collaboratively to upgrade infrastructure and services in their neighbourhoods.

↓ Abandoned, partially submerged buildings, on foreshore of Lake Baringo, Kenya. Water in Rift Valley lakes has risen since 2011

Photo: Jack Makau/Muungano wa Wanavijiji

Photo: Vlad Karavaev/Shutterstock.com

One such movement is Shack/slum Dwellers International (SDI), a federation active in 33 countries. Over the past decade their work has increasingly focused on reducing the impact of climate change on residents of informal settlements. SDI now includes resilience building in its discussions with municipal authorities.

In Kenya, informal settlements tend to be viewed narrowly as a housing issue. But SDI is trying to change that, through a participatory planning process for the Mukuru informal settlement. They helped develop a plan to show the government how to change a neighbourhood using climate-resilience strategies, not just by focusing on housing (Sverdlik et al., 2019).

Climate change is reshaping everyone's world. As plans become reality in Mukuru, some of their newest residents – families displaced there from across the country – may have a chance for a safer future.

↗ **Find this article online at earlychildhoodmatters.online/2021-5**

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Rising heat poses dire risks to small children

Under-4s are especially vulnerable to dehydration and heat stroke

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Early in his career, the academic Vivek Shandas worked at a summer camp in Oregon. The experience of watching children play outdoors in the heat, for long periods, gave him a first-hand view of a problem that increasingly concerns him and other climate experts: the impact of extreme heat on young children.

"You'd get a large number of kids running around, and you'd become aware that some of them are very sensitive to the heat, they hit a threshold of illness a lot quicker than adults," said Shandas, a climate adaptation professor at Portland State University. "There's this idea that kids are so resilient, they can bounce back from anything. But with heat it's not quite that simple – the body can cross limits and suddenly the child is at risk of organ failure."

The risks faced by very young children, those aged 4 and under, are the most acute of all, according to the US Centers for Disease Control and Prevention. These children are often far more active than adults and they heat up more quickly. They also don't sweat as much, which makes it much harder for their bodies to cool down. Dehydration is another potentially fatal risk during extreme heat, especially for babies and young children, according to UNICEF (2015).

Young children's developing organs are vulnerable to heat stroke once their body temperature goes beyond what the child's system can regulate – about 107 ºF (41.6 ºC), according to Shandas. The child may become dizzy, nauseated or begin vomiting. Their skin can become cold and clammy, and muscle cramps can take hold. In extreme cases, organs – such as kidneys – can fail, causing death. "This is why babies and other small children should never be left in cars in the heat," points out Dr Claire McCarthy, a paediatrician at Boston Children's Hospital.

More and more children are at risk of their physiological limits being breached. According to a recent UNICEF report, an estimated 820 million children – over one-third of children globally – are already exposed to heatwaves (UNICEF, 2021). Children's vulnerability can increase by fluid loss through the use of certain medications, or conditions such as diarrhoea. Other risks include caregivers dressing children too warmly for the ambient temperature, and poor ventilation, since many buildings are ill equipped to deal with high temperatures, especially in poorer countries or places traditionally unused to extreme heat.

"I do get concerned about internal impacts not fully visible on the outside," said Shandas. "Young kids really do need an adult nearby reminding them to drink some water, to get in the shade for a bit and to have a rest."

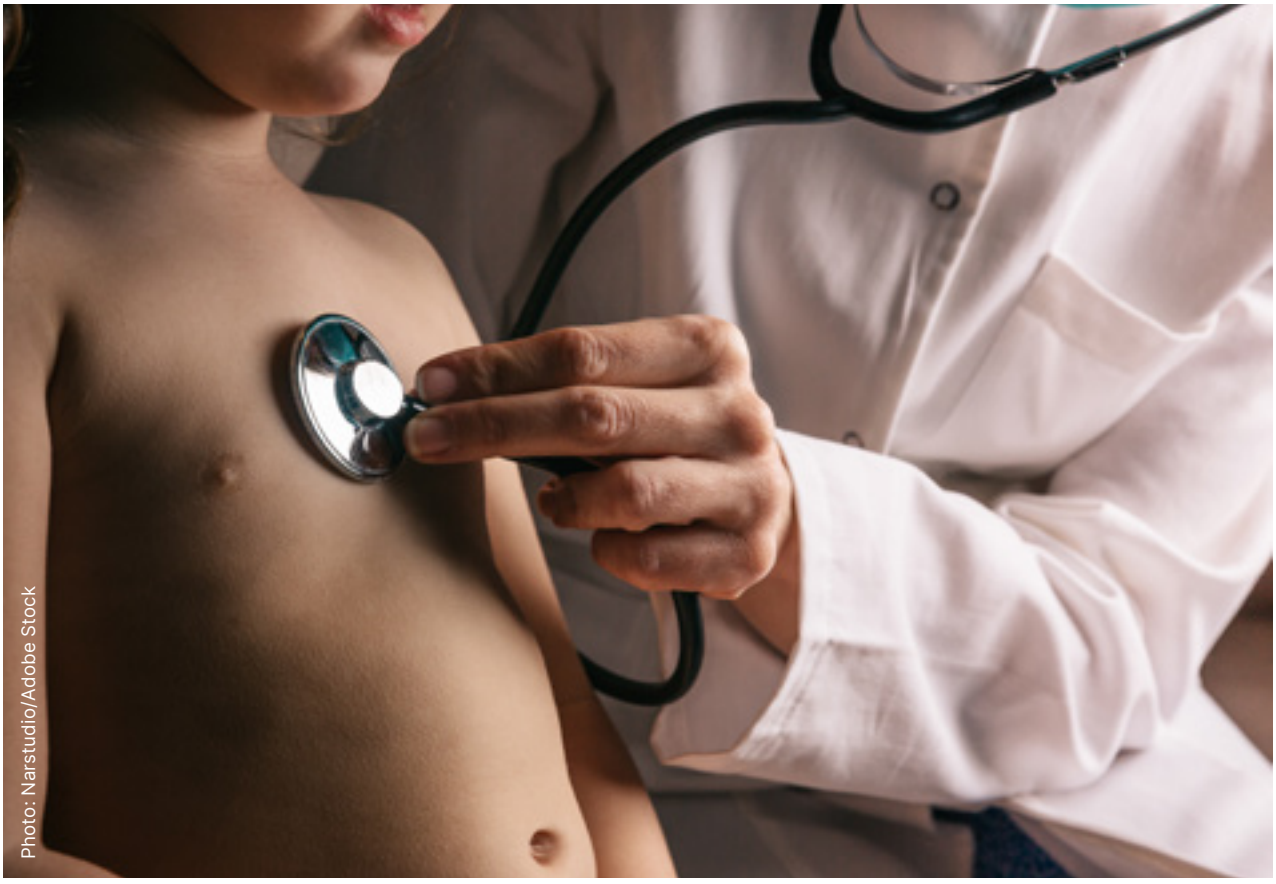

Photo: Narstudio/Adobe Stock

Long-term impact of heat

Other effects of heat aren't immediately apparent. According to the UNICEF report, children in South-East Asia exposed to above-average temperatures in their early years typically go on to attend fewer years of schooling than they would have otherwise.

Separate research in the USA found that heat compounds existing inequalities. A study in 2021 found that black students are much more likely than white students to experience a drop in academic performance when temperatures rise above 80 °F (27 °C). This is in part because black households are less than half as likely as white households to have central air conditioning (Park et al., 2021).

Scorching heat can also heighten the impact of air pollution on young children. It causes fumes emitted by cars, trucks and industrial facilities to form ozone, a ground-level pollutant that – when inhaled – can inflame the cells that line the upper airways and lungs. This cocktail of heat and air pollution can cause respiratory problems in healthy adults. Young children are at even higher risk because their lungs are still developing.

The dangers from heat begin even prior to birth. Much is still unknown about the exact mechanism through which extreme heat affects expectant mothers. But a growing body of research links heat exposure in the first trimester, when major organs form in the foetus, with certain birth defects.

"The dangers from heat begin even prior to birth."

Studies also link heat exposure in the second or third trimester – a time of rapid growth for the foetus – to early birth or stillbirth. For example, one study (Sun et al., 2019) estimates that the risk of pre-term birth increased by 2.5% in the four days following

a day with extreme heat. Extrapolated, this means that there would be 150 excess premature births for every one million deliveries. Separate research in 2015 across 19 African countries found that average birthweights were 0.9 g lower with each additional day that a pregnant woman experienced an average air temperature over 100 ºF (38 ºC) (Grace et al., 2015).

And, as Bruce Bekkar and Nathaniel DeNicola explain in this edition of *Early Childhood Matters* (page 34), their review last year of 68 studies found a strong link between heat, air pollution and adverse pregnancy outcomes, especially in women with certain pre-existing conditions such as asthma.

Climate change will bring more heatwaves

Deadly heatwaves are increasing due to the climate crisis. Scientists have warned that certain parts of the world – such as the tropics and the Middle East – could experience levels of heat and humidity that exceed the limits of human endurance (Frangoul, 2016; Milman, 2021). Meanwhile, countries with historically cooler climates will have to get used to once unheard-of temperatures, such as the recent heatwaves in parts of Europe and north-west USA.

"We are going to see more places impacted by heat, which will really affect the ability of people to find cooling resources. It will strain governments to provide that," said Shandas.

> "Parents may not be asking about heat policies much now, but increasingly that will be the question many of us will be thinking about."

He adds that while attention is often focused on older people, children should be equally top of mind. "You see a parabolic curve where people aged from around 20 to 60 are able to cope pretty well with heat, but those age 75-plus struggle. And children, especially if they have a health condition or no cooling facilities, are on that same tier of risk."

"Heat mitigation policies will be needed for properties and schools and summer camps and anywhere else children are. Parents may not be asking about heat policies much now, but increasingly that will be the question many of us will be thinking about."

↗ **Find this article online at earlychildhoodmatters.online/2021-6**

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Climate change threatens newborns in the USA

Black mothers are at especially high risk of pre-term delivery, low birthweight and even stillbirth

Photo: Courtesy Olga Kashubin/Shutterstock

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In October 2015, the American Academy of Pediatrics published a landmark technical report on the risks faced by the world's children due to climate change (Ahdoot et al., 2015). The paper included the World Health Organization's startling conclusion that "more than 88% of the existing burden of disease attributable to climate change occurs in children younger than 5 years".

The implication – that so much harm would be focused on the very young – was a wake-up call for paediatricians and those who care for pregnant mothers. Was the climate crisis already endangering birth outcomes in the USA? At the time, the American College of Obstetrics and Gynecology (2018) had a position statement on climate change that noted "negative obstetric outcomes", but no large reviews had addressed this question.

With colleagues, we decided to explore the medical literature from 2007 onwards. We discovered a large volume of data on pregnant women's exposure to higher temperatures and to two types of air pollution related to climate change: fine particulate matter and ozone. Our initial explorations suggested that these exposures were frequently associated with pre-term delivery, low birthweight and even stillbirth.

For the next three years we analysed this data, applying rigorous exclusion criteria to try to clarify the extent of the association. In 2019, the *Journal of the American Medical Association* (JAMA) put out a call for papers on climate and health.

← Pregnant women on a climate march in Sydney in December 2020. Researchers found a strong link between air pollution and heat exposure and the risk of pre-term birth or stillbirth.

Although pregnant women and newborns were not among the vulnerable groups they listed, we decided to submit our findings.

In early 2020, we assembled the final results and were astonished. Of the 68 papers that met our criteria, 57 (84%) found a statistically significant association between at least one of these environmental exposures and birth outcomes. These were large studies, with a mean of over 560,000 births per study and a total of 32 million US births. We found positive associations in regions across the country.

On air pollutants, 19 of the 24 studies that looked at pre-term delivery found a significant association. This was also true for 25 of the 29 studies that looked at low birthweight, and 4 of the 5 studies that looked at stillbirth. On heat exposure, 9 of the 10 studies showed similarly strong associations with each of these birth outcomes.

We could not estimate the degree of increased risk, due to the diverse methodologies used. However, the level of agreement among such heterogeneous studies is itself strong evidence for an overall connection between climate change and adverse birth outcomes. In sum, this large and growing volume of data asserts that climate change, through its effects on air pollution and heat, is already threatening newborns throughout the USA.

"Of the 68 papers that met our criteria, 57 (84%) found a statistically significant association between at least one of these environmental exposures and birth outcomes."

Black mothers are especially at risk

JAMA published our study (Bekkar et al., 2020) on 18 June 2020, at the height of the Black Lives Matter movement in the USA. This timing resulted in wide media attention for another aspect of our findings: over half of the studies on air pollutants noted that minority mothers were at higher risk of bad birth outcomes. Black mothers were most often found to be at higher risk: they were mentioned more than twice as often as the next most-mentioned group, Latinas.

"Minority mothers were at higher risk of bad birth outcomes."

Our observation of apparent racial health disparity resonated with the previously known increased risk of black maternal mortality in the USA (National Partnership for Women & Families, 2018).

Our research was confined to studies of the US population, but other reviews that included non-US populations have found compatible results on both air pollution and heat exposures (Li et al., 2017; Zhang et al., 2017).

Other papers have also identified likely mechanisms by which these inputs could result in pre-term or low-birthweight infants as well as stillbirths (Saenen et al., 2015; He et al., 2018; Iodice et al., 2018). For example, Casey et al. (2018) found that when fossil fuel-powered electricity plants in California were shut down, rates of preterm delivery fell among pregnant women living nearby. This is evidence of a cause-and-effect relationship, rather than a mere association. It also suggests that reducing exposures can bring nearly immediate benefits.

New research published since last June echoes our findings and clarifies critical windows during pregnancy, degree of risk, and the apparent synergism between air pollution and heat, which often occur together (Qiu, 2020; Kwag, 2021; Sexton, 2021).

Determining the best interventions

Looking forward, more research is urgently needed to better measure individual exposures to heat and air pollution, identify high-risk populations, and determine how best to intervene. In the USA, a bill

Photo: Weergeven/Adobe Stock

currently before the House of Representatives[1] would provide research funding, improve physician training to detect environmental risk factors, expand public health messaging, and provide financial assistance for those who need it, to help reduce exposures at home.

Local-level efforts to replace fossil fuels with renewable energy for both transportation and electricity generation are likely to yield substantial public health benefits well beyond pregnancy outcomes. Efforts are underway to harness healthcare professionals as "trusted messengers" to advocate for these policies and for other measures that can reduce pregnant women's exposure to air pollution and heat (ecoAmerica (n.d.); Medical Society Consortium on Climate & Health (n.d.)). As climate change advances, it is critical to prevent future generations from being "weakened from birth", a process that appears to have already started.

"Efforts are underway to harness healthcare professionals as "trusted messengers" to advocate for these policies and for other measures that can reduce pregnant women's exposure to air pollution and heat."

1 H.R. 957, a Bill to direct the Secretary of Health and Human Services to establish a grant programme to protect vulnerable mothers and babies from climate change risks, and for other purposes (the "Protecting Moms and Babies Against Climate Change Act"), introduced in the US Congress on 8 February 2020. Progress may be followed at: https://www.govtrack.us/congress/bills/117/hr957

↗ **Find this article online at earlychildhoodmatters.online/2021-7**

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Air pollution and stunting: evidence from Indonesia

Fine particles harm children's physical, cognitive and emotional development

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Indonesia's Ministry of Health estimates that stunting affects 32% of the country's children under the age of 5. Recent research by Vital Strategies, a research consultancy, reinforces the evidence that air pollution significantly increases the risk of stunting. The risk begins in the womb as mothers inhale $PM_{2.5}$ – fine particulate matter, less than 2.5 microns in diameter, the most dangerous form of air pollution – and it continues throughout childhood (Vital Strategies, 2021).

Beyond diminished height and physical development, stunting has long-term impacts on children and their communities, including impaired cognitive and social-emotional development and reduced economic productivity. Our research adds to the weight of global studies linking air pollution to a variety of health impacts at different life stages – from pre-term births and lower birthweight (Bose et al., 2018; Bekkar et al., 2020), to childhood lower respiratory infections and lung diseases, and lifelong increased risks of chronic respiratory illness, cardiovascular disease and diabetes (Vital Strategies and UNICEF, 2018).

Indonesia is the country with the highest burden of disease due to poor air quality levels in South East Asia. Air pollution caused an estimated 190,000 deaths in 2019, and that is before considering the added impact of haze episodes due to pollution from regional forest fires. The impact is likely to be significant: a study following a cohort of children whose mothers were pregnant during the 1997 fires found that they were on average 3.4 cm shorter than their peers at age 17 (Tan-Soo and Pattanayak, 2019).

> "The risk begins in the womb as mothers inhale $PM_{2.5}$, the most dangerous form of air pollution – and it continues throughout childhood."

Young children living in many low- or middle-income countries are disproportionately affected by $PM_{2.5}$ pollution, in part because it is common to use solid fuels for cooking or heating: infants and toddlers spend much of their time with their mothers, often in close proximity to the stove. But whether it comes from stoves, traffic, industry or tobacco, $PM_{2.5}$

pollution has similar chemical composition and is expected to have similar adverse effects on child health.

Child health as a climate advocacy lever

Funded by UNICEF, Vital Strategies is currently conducting an impact assessment study on the health and economic burden of air pollution in Indonesia under various future scenarios, and the health and economic benefits of actions to control pollution. Preliminary results suggest that the current national policy landscape would not be enough to reverse troubling trends in air quality in Indonesia by 2030. This will result in an increasingly heavy toll on the health of children and adults, and on the economy.

The societal benefits of accelerating clean air cut across many Sustainable Development Goals. However, communication around emissions is frequently focused on the long-term damage to the planet rather than immediate risks to human health. Most strategies to reduce emissions have short-term benefits for child health in particular. This can serve as an advocacy lever to motivate and prioritise personal, community, and governmental action.

Policies designed to mitigate climate change should include indicators for air quality and health, which consider issues of equity given differences in those who are most vulnerable and likely to be affected. Similarly, investments in clean air should be integrated into strategies to improve children's health.

Photo: Muhammad akis dharmaputra/EyeEm/Adobe Stock

We urgently need better data to inform policy solutions, and collaborative public and private investment in clean fuels and emission-reduction technologies. Effective action can not only mitigate climate change in the long term, but reduce the immediate risk of stunting for millions of children in Indonesia and around the world.

"The societal benefits of accelerating clean air cut across many Sustainable Development Goals."

Impact of air pollution at different life stages

prenatal	birth	early childhood	lifelong impacts
			
Reduced growth	Pre-term birth and low birthweight	Decreased lung growth, reduced lung function, lower respiratory infections, including pneumonia, and developmental effects	Chronic respiratory and cardiovascular disease

Source: Vital Strategies

↗ **Find this article online at earlychildhoodmatters.online/2021-8**

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interview

“A newborn baby is effectively a smoker in Delhi”

Activist and mother Bhavreen Kandhari has been campaigning against air pollution since 2003

Bhavreen Kandhari is an Indian activist who trained as a copywriter, and is the mother of 17-year-old twins. She helps to run campaigns including #DelhiTreesSOS, #ExtinctionRebellionIndia and #FridaysForFutureIndia. In 2020 she joined a pan-Indian movement called Warrior Moms, which now operates in 14 Indian states. She lives in New Delhi.
In conversation with journalist Pamela Druckerman

When did you start noticing New Delhi's air pollution?
When I got married, my husband had to travel abroad for his work and I often joined him. In other countries, I seemed to breathe more easily and felt more active. In India I was more sluggish.

The big change happened after my twin daughters were born in 2003. I started to notice that, like most children in India, they constantly had runny noses or coughed continuously for months or even years. Yet when we left India for a holiday, it would magically vanish.

Surely others noticed this too?
In those days it seemed nobody would talk to me about it. The elders in our families would say it was probably an allergy, and they would play down colds or coughs that didn't get better. No one knew about the AQI [Air Quality Index] or polluted air in India.

Schools didn't understand or care either. When the AQI was 250, I would call to ask them to cancel sports matches. They would reply, "let them play, nothing happens". Even our national cricketers and other professional athletes played matches on those days. Marathons happened at 300 AQI. I had to tell my daughters that they could not play basketball when the AQI was bad, and that would upset them.

What was the Indian government doing?
At that time there were not many studies. There was no National Clean Air Plan or monitoring, just the Central Pollution Board, which was a defunct body, and hasn't changed much even now.

There was always denial. Those years, we were just trying to convince the government that air pollution existed. The authorities acknowledged that water was polluted, but not air. We weren't even talking about the sources of the pollution.

What made people start to take notice?
One day in 2016 there was a crazy smog in Delhi. Everything was hazy and there was no sun and you were choking. That was the first time ever the schools were shut down in Delhi because of air pollution. Nowadays this is very common.

Parents were angry and about 300 came to protest – the first time I had seen such support. We were criticised by the media, who saw us as an elite movement arriving in SUVs. After that we had many more protests, but there was no way to convince the government because we were just ordinary citizens. We needed experts to explain that air pollution really existed, so we started connecting with doctors and scientists.

These experts have now produced many studies about how air pollution affects young children. What do we know?
Studies show that every single organ of the body is affected by air pollution, it's not only the lungs. There's asthma, other breathing disorders and damage to the nervous and reproductive systems. The damage begins when a women conceives; a newborn baby is effectively a smoker in Delhi. These studies come from valid sources. When we learned all this, the whole campaign got more aggressive. Doctors and scientists were speaking, and we were advocates, sharing their findings.

And poor children have it even worse?
Many rich schools have air purifiers, but the government schools obviously cannot afford that. There are also children whose families live on huge landfills. They're breathing even worse toxic air, with carbon monoxide and methane.

What's your strategy for combating this?
India has laws in place. Article 21 of the constitution guarantees the Right to Life and therefore the right to clean air and water. We are just asking the government to implement that. So we start with our own locality by questioning whether authorities are following the law.

We also make complaints using social media like Twitter. If we don't complain and report violations, we cannot demand action. Therefore, Warrior Moms has launched a campaign called "KnowYourRights", where details of violations are shared with mothers, who can then complain to authorities themselves with ease.

For example, during the Diwali Festival, firecrackers cause air pollution. Warrior Moms, along with citizens, made over 5,000 complaints. This resulted in police action, but of course there were no arrests. Eventually the government will have to act. It's costing our children their health, and otherwise why have laws?

Photo: Bhavreen Kandhari

"Our children's lungs are being damaged and it is not reversible."

Who are your fellow activists?
It is mostly young parents. We help each other, everybody using each other's resources. They say, "my office will help you" or "my daughters will help you". Some interns and lawyers are always there to give support for legal action.

How has Covid changed things?
When Covid hit, we saw blue skies! This proved that human activity causes air pollution, which is what we had been trying to tell the government for so many years. Everyone is talking about lungs now. We always wanted people to wear masks for air pollution when they were going out, but we could not convince them before. Now everybody is wearing masks, not realising that air pollution is a bigger killer than Covid.

The media were congratulating me after so many years of fighting back. I told them it wasn't going to last, and that the moment we are back in aircraft and cars it will all come back, industrial pollution will return. We need to work on the sources of pollution, and not on post-pollution remedies that don't help.

So the government is finally taking notice too?
We are talking more about it, but the action is still very limited. In Delhi, the most polluted capital in the world, we are prioritising cutting down trees and construction in the name of development. In the rest of the country, forests are being destroyed to make way for mining.

Every year there are the debates between central and state governments, but without solutions. We continue to breathe poison. Air pollution is a silent killer which nobody wants to believe in. It's an even bigger threat than Covid. Our children's lungs are being damaged and it is not reversible.

↗ **Find this article online at earlychildhoodmatters.online/2021-9**

How climate change affects pregnancy and early childhood in an indigenous Kenyan village

Bare pastures, sick livestock, less breast milk make life more precarious for mothers and infants

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Maasai communities in Laikipia county in northern Kenya have historically given new mothers a kind of maternity leave – several months off household chores and tending livestock so that they can focus on the wellbeing of their newborn baby and their own recovery from giving birth. But this tradition is increasingly breaking down – just one example of how indigenous mothers and infants are impacted by the changing climate.

To help us understand the effects of climate change, we asked our partner organisation IMPACT Kenya (Indigenous Movement for Peace Advancement and Conflict) to interview 15 women from Naatum Women's Group in Laikipia. The women explained how changing weather patterns have made life a great deal more precarious, affecting their health and wellbeing, and that of their young children, in significant and surprising ways.

The Maasai measure their wealth in cows, goats and sheep, and their diet consists almost exclusively of raw meat, raw milk and fresh animal blood. Climate change is making this diet and economy less sustainable. Drought has resulted in pastures becoming increasingly scarce, scattered and unpredictable. Animals have become weaker because they have to walk further in search of food. Some become ill or die due to heat stress.

Traditionally, nursing mothers were given first access to fresh animal blood, to ensure that they were sufficiently nourished. Nursing women also rely on traditional medicines and herbs, which have become scarce or extinct due to climatic changes. All this is making recovery from pregnancy, and the important early weeks and months of a newborn's life, more precarious.

Photo: Courtesy of IMPACT Kenya

As one interviewee said:

> *"In the early days, people lived far apart and the available resources were enough. Now we are so many and we continue straining the environment. The pasture is not enough, contributing to land and environment degradation due to overgrazing. Drought has contributed to death of livestock leaving many households stricken by poverty and despair."*

According to the interviewees, scarcity of resources means that women in the village now have to undertake heavy household chores until the last trimester of their pregnancy. Food insecurity puts them at high risk of nutritional deficiencies, given their increased nutritional needs during pregnancy and nursing. The lack of clean water within easy walking distance, and increased prevalence of water-borne diseases, are leading to more diarrhoea and other health conditions in infants.

Pre-term births and low birthweight are now common in Laikipia, the interviewees said. Poor nutrition means mothers no longer have sufficient breast milk, and the little milk from cows is sold or exchanged in the market instead of being given to young children, exposing them to malnutrition. As new mothers are increasingly called upon to supplement their family income, they have less time to attend to their young children.

The mothers in Laikipia are far from alone. However, while the United Nations Permanent Forum on Indigenous Issues (UNPFII) has identified climate change as posing particular risks to indigenous women around the world with regard to the rights to life, food, water and health, to date there has been

less attention to the connection between climate justice and mothers, infants and toddlers.

Indigenous women’s leadership

At Global Greengrants Fund, our understanding of this connection between gender and climate change has been evolving over the last decade, through our partnership with the Global Alliance for Green and Gender Action.[1] Through them, we have come to see how indigenous women around the globe are at the forefront of addressing the impact of climate change and environmental degradation, and how they must design, implement and scale-up their own solutions.

Indigenous women and girls are leaders in environmental adaptation, in part because socially defined gender roles often position them as stewards of the physical, economic, and cultural wellbeing of their communities. And since they are seen as being responsible for fetching water and managing land-based natural resources, they are disproportionately impacted by degradation of the environment that damages those resources.

Their leadership is key to protecting these resources. Global Greengrants Fund supports grassroots and indigenous communities in their response to the climate emergency. We have, for example, funded the women of Naatum Women’s Group to build resilient households that can help to adapt to climate change, through improved management of natural resources and by finding alternative ways for women to support themselves. The group has started collective income-generating activities including beekeeping, savings and lending associations, kitchen gardens for nutrition, and bead making.

These are low-carbon, environmentally friendly ways to increase economic opportunities and food security and to support new mothers and young children in the crucial first years. But the long-term developmental impacts on young children among these indigenous communities, and around the world, are worrying. Aligning the climate and childhood agendas, understanding their interconnections and strengthening the case for each has to be a priority.

As a grantmaker, it is critical that we take an intersectional approach that incorporates gender, age, disability or indigeneity. When we can better understand the links between different phases of life and climate change, we can respond more holistically to the challenges faced by indigenous women, their children and their communities.

1 More information about the Global Greengrants Fund and the Global Alliance for Green and Gender Action is available at www.greengrants.org and https://gaggaalliance.org

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Your discarded cell phone harms children, pregnant women and the planet

Millions working in the informal recycling sector are exposed to dangerous chemicals

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Mobile phones, tablets and laptops have become an essential part of life, but their improper disposal is part of a mounting problem. Electrical and electronic waste, known as e-waste, is the fastest-growing type of domestic waste in the world. It contributes to climate change and contains dangerous substances, exposure to which has been linked to a variety of health issues, including impacts on pregnancy, affecting healthy brain development and thyroid function. Children and pregnant women are especially vulnerable to these health issues as they are going through critical stages of sensitive development that, if disrupted, can have lifelong effects on their health.

E-waste includes any items with electronic components, from refrigerators to washing machines, as well as some toys, devices used in sport, and medical equipment (United Nations Environment Programme, 2019). In 2019, the world produced an estimated 53.6 million tonnes of e-waste, but only 9.3 million tonnes of this was properly collected and recycled, using appropriate safety equipment and infrastructure (Forti et al., 2020).

Some of the remaining e-waste is stored in warehouses, homes and garages. Some is dumped in landfills. The e-waste that causes the most harm is exported, often illegally, for recycling in the informal sector in low-income countries, with inadequate safeguards. When it arrives, women and children are among those who process it. They dismantle items by hand, potentially exposing children to sharp objects, and releasing hazardous metals such as lead. They burn and heat it, to retrieve copper and other valuable substances. And to extract precious metals such as gold, they perform acid leaching, using cyanide salt, nitric acid or mercury (Heacock et al., 2018). These activities can release some 1,000 different toxic substances into the environment (Widmer et al., 2005).

Photo: Courtesy of WHO/Abraham Thiga Mwaura

Informal e-waste recycling is illegal in many countries and is considered a form of hazardous child labour. Consequently, it is often hidden and there are very few precise figures on how many people work in e-waste recycling. Reliable estimates of the children involved are particularly sparse, but some as young as 5 have been observed working at e-waste sites in Ghana (Greenpeace, 2008). Worldwide, an estimated 18 million children work in the industrial sector, which includes waste processing, and as many as 12.9 million women are involved in the informal waste sector, including an unknown number of women of childbearing age (International Labour Organization, 2017; World Health Organization, 2021a). The lack of reliable data on children and pregnant women working with e-waste is one of the most significant challenges facing the health sector and policymakers when addressing the effects of informal e-waste recycling activities.

Children can be exposed even if they are not themselves engaged in recycling: through their skin from contaminated toys, corrosive substances and other items, such as clothing, brought home by parents working in e-waste recycling; by inhaling contaminated air; by ingesting contaminated food, water, soil, dust and breastmilk; and from transplacental exposure during pregnancy.

Action on e-waste can help both children and climate

Children and foetuses are particularly vulnerable to chemicals released through e-waste recycling activities because their organs and immune systems are still developing (Grant et al., 2013). The World Health Organization (WHO, 2021a) has recently published the ground-breaking report *Children and Digital Dumpsites: E-waste exposure and child health*. The report draws on original research conducted at e-waste recycling sites around the

world by scientists, academics and healthcare professionals. E-waste recycling is an emerging health issue and, although research in this field has expanded over the past ten years, most studies have been conducted in China and Ghana.

> "The lack of reliable data on children and pregnant women working with e-waste is one of the most significant challenges facing the health sector and policymakers."

Studies investigating pregnancy and child health have found associations between e-waste recycling activities and miscarriage, stillbirth, impaired neurological development and changes to thyroid function. These issues can cause potentially lifelong health problems. Additional health effects identified include changes to lung function and the respiratory system, including cough and asthma; changes to the cardiovascular system; and weakened immune system, including greater vulnerability to infection, reduced immune response after vaccinations, and higher rates of allergies and autoimmune diseases. A small number of studies have investigated the possible links between e-waste exposure and chronic diseases, such as cancer, cardiovascular disease and hearing loss; however, too few studies have been conducted to draw conclusions on these individual outcomes (WHO, 2021a).

Many of these problems may be latent, appearing only later in a child's life and placing significant long-term burdens on children, their families and health systems.

As well as harming children, informal e-waste recycling contributes to climate change. In 2019, improper disposal of refrigerators and air conditioners was responsible for releasing the equivalent of 98 million tonnes of carbon dioxide into the environment – or 0.3% of global energy-related emissions (Forti et al., 2020). This is partly because refrigerators and air-conditioners contain chemicals that emit greenhouse gases, and partly because when materials are not recycled and reused, new items are produced instead, generating emissions.

Action to improve e-waste recycling can therefore benefit both children's health and climate change. International and regional conventions, such as the Basel and the Stockholm Conventions and the Bamako and Waigani Conventions, already exist to prevent the transboundary movement of items containing hazardous chemicals, but not all countries have ratified and implemented them. Even where conventions have been ratified, they can be difficult to uphold due to lack of e-waste management training and infrastructure, or the practice of circumnavigating regulations by hiding or mislabelling e-waste among other items or registering e-waste as charitable donations. It is also difficult and time-consuming to check that individual electronic items function properly.

In 2019, 78 countries, covering 71% of the world's population, had some form of e-waste policy, regulation or legislation (Forti et al., 2020). However, countries also need to ensure that e-waste policies are effectively implemented and enforced, and must develop national e-waste legislation that incorporates health-relevant targets and eliminates child labour. Additional ways to address the problem include awareness raising and education on e-waste, and conducting research, including better data collection and surveillance of toxic exposure from e-waste (WHO, 2021a).

The WHO's Initiative on E-waste and Child Health sets out a range of goals to protect children and pregnant women. These goals include developing pilot projects promoting local health advocacy, collaborating with communities and building the capacity of primary health systems to address e-waste risks, especially in young children and pregnant women (WHO, 2021b).

↗ **Find this article online at earlychildhoodmatters.online/2021-11**

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Infographic: WHO

Helping families to cope with trauma in Lebanon

What Beirut's explosion can teach us about the impact of disasters on the mental health of young children

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On 4 August 2020 at 6:07 p.m., Beirut shook violently. A monstrous blast wave radiated through the city, shattering walls, glass and bodies. From around town and beyond, survivors saw a mammoth, reddish mushroom cloud hovering over the Port of Beirut.

The blast was caused by 2,750 tonnes of ammonium nitrate, which had been unsafely stored in Beirut's port. The BBC described the event as "one of the largest non-nuclear explosions in history, far bigger than any conventional weapon". Over 200 people died, thousands were seriously wounded and some 300,000 were left homeless. Financial losses reached USD 10–15 billion.

It's harder to put reliable figures on the environmental and psychosocial impact.

But I've seen this at first hand. As a family therapist who specialises in trauma, I've been helping parents of young children cope with the mental toll of the blast. Since climate change will cause many natural disasters, the experience of Lebanese families – and their severe trauma after a different kind of disaster in 2020 – illustrates what's at stake.

My office in Beirut is four blocks from the blast, and was heavily damaged. The pressure of the explosion obliterated door frames and shattered windows and aluminum doors. Fortunately, I was on vacation and didn't have any sessions that day. My wife and I were 40 kilometers away, in our family mountain apartment, and we still felt our building shake.

The immediate aftermath

The explosion came amid many other problems in Lebanon: an acute economic crisis; a collapsing currency; the disappearance of basic necessities such as electricity, water, medication and gas; and six months of lockdown and social alienation due to the global Covid-19 pandemic.

I quickly found myself – both voluntarily and inevitably – sucked into the post-explosion relief effort. I joined a hotline set up by a consortium of organisations in Beirut to manage the immediate psychological impact. I also wrote advice sheets for the general public and shared these via Whatsapp and Facebook, to explain how parents should deal with post-explosion symptoms.

At that point, my advice was chiefly centred on teaching people how to identify trauma symptoms, deal with children's intrusive flashbacks and give them other basic mental first aid. For example, I advised

people to channel their anger into actions, such as volunteering with relief efforts. And I told them to move in with families and friends, to avoid ruminating on the blast, and to feel connected and safe.

Three weeks after the explosion, my office was restored to an acceptable state, and I opened my clinic. In the first six months I took on 29 new cases (in addition to my regular clients) including teenagers, adults and parents of young children. For everyone, my aim was to manage the combined psychological stress of the explosion, the nation's political instability and its disastrous economy.

Parents I treated reported that their young children had numerous symptoms of hypervigilance: sleeping troubles, anxious attachment to caregivers, or hypersensitivity triggered by sudden noises or sirens. Stressed toddlers avoided areas and activities that they were engaged in at the moment of the explosion. They feared standing next to glass windows and even mirrors, or refused to leave home. Some children continuously acted out memories of the event, frustrating tired parents with never-ending stories referencing the explosion.

In one case, a 4-year-old girl had selective mutism after the blast. My recommendation for her perplexed and anxious parents was to avoid highlighting the young girl's communication problems, and to focus on calming her nervous system through enjoyable activities.

I noticed that young children were mirroring their caregivers' mental states. Many parents had experienced the Lebanese Civil War as children or teenagers, and displayed typical symptoms of acute re-traumatisation: panic, denial, bursts of anger towards negligent and corrupt authorities, anxiety about their financial and physical insecurities, and fear for the future of their children. Many felt severe helplessness and were desperate to leave the country.

The lasting consequences

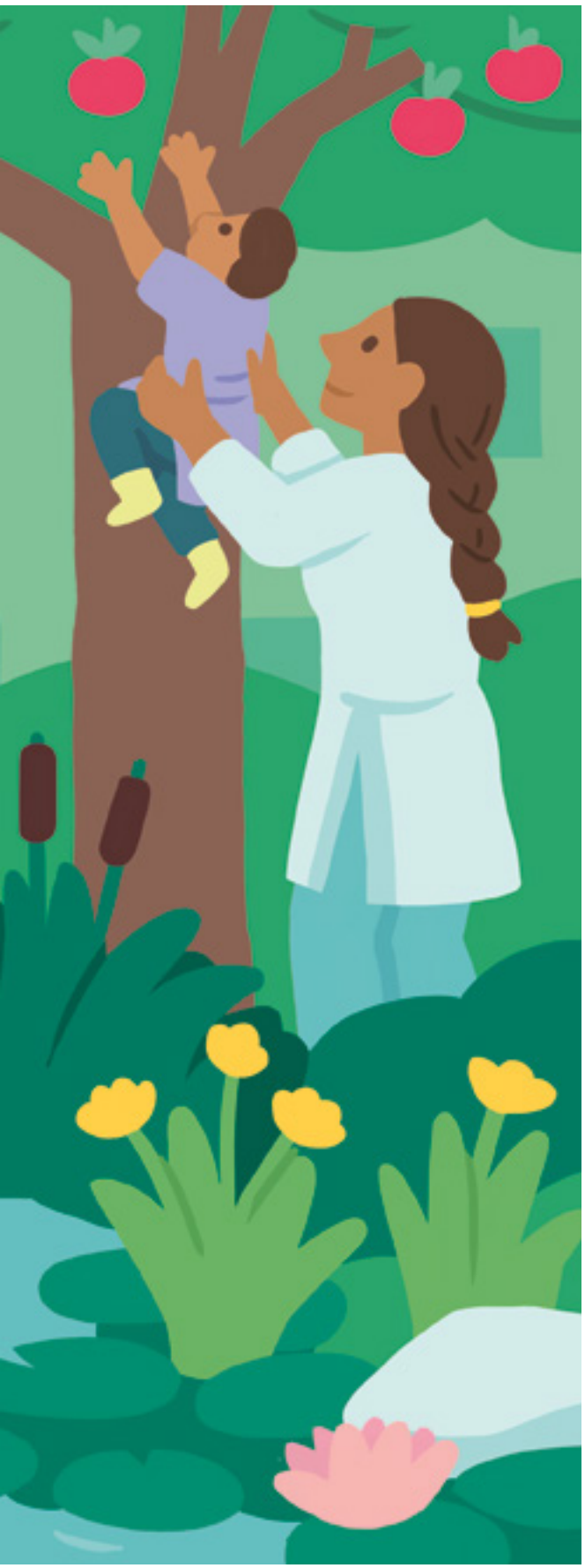
A year after the explosion, Beirut is still suffering. Parents' anxieties have not subsided, and the stress they display today is transferred onto their children. Clear and present dangers, and possible future hazards, leave parents feeling unsafe, and children feeling agitated. The acute onset of trauma triggered by the explosion has combined with ongoing stress about economic insecurity.

By January 2021, I was burnt out by the surge of new patients at my clinic, the repeated exposure to stories about my town being obliterated, and the palpable, severe anxiety that parents and children displayed. I managed to go with my wife on vacation to Albania – one of the few countries we were permitted to visit during the pandemic. In Albania there was no terror, no sudden explosions, no devalued currency, no sorrows about the past, no present uncertainties or fear about the future, and no one remotely associated with the explosion.

> "It's harder to put reliable figures on the environmental and psychosocial impact."

It did me good. Today, I'm back in Beirut. I'm unsure whether it's wise to stay here, but at this pivotal moment, the city's inhabitants need mental health support. A year after the explosion, Beirut still suffers from multiple traumas, and so do its young children. Perhaps we'll eventually be able to think about climate change, which could cause many more preventable disasters, and more trauma for parents and young children. For now, however, Beirut is struggling to cope with other issues.

↗ **Find this article online at earlychildhoodmatters.online/2021-12**



New Approaches

Compelling ideas from around the world to combine climate action and healthy child development

Reclaiming green space in Lima

In a crowded city, natural spaces bring people together and protect against climate change

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The city of Lima faces an enormous challenge. Its population has grown from 8.2 million to 9.6 million in the last ten years. As the city expands and density increases, it becomes more challenging to ensure citizens' quality of life.

Green areas in Lima have been replaced by grey infrastructure in the form of roads, sports facilities and shopping malls, among other developments. The World Health Organization (WHO) recommends 9 m^2 of green space per citizen, but Lima now averages just 3.5 m^2 per inhabitant, and less than 3 m^2 in most districts. We desperately need more access to nature.

So in December 2019, we launched an ambitious initiative to revitalise public space in the capital. Limeños al Bicentenario (marking 200 years since Peru's proclamation of independence) is a programme that aims to transform public areas with low-cost interventions such as planting trees and greenery, and creating places for adults to sit and young children to play. It also aims to build social cohesion by engaging residents to maintain these newly renovated areas while simultaneously improving the city's resilience to climate change.

Since the project began, we have developed 11 sites covering over 19,000 m^2. We have planted 237 trees, installed 270 pieces of urban furniture such as benches and play equipment, and inspired 510 people to volunteer. Limeños al Bicentenario has also formed connections with a Lima95 initiative called *Salidas seguras* – meaning 'going out safely' – which brings caregivers with young children together in groups, to give them more confidence to explore the city's public spaces.

The renovated areas are attractive for infants and toddlers, who can explore shrubs and greenery planted at their height, and interact with sensory materials such as rocks and gravel. The new spaces also serve adults, who can sit and talk in the shade of trees. Unlike many public spaces in the city, these are designed to be accessible for elderly and disabled people.

Limeños al Bicentenario is also helping to make Lima better able to cope with climate change. We have identified heatwaves, droughts, floods and mass migration as the major climate-related risks facing our city. The growth of grey infrastructure at the expense of green areas has worsened the risk of

heatwaves in particular. The urban heat island effect is estimated to add up to 3.5 ºC in parts of the city during periods of very hot weather.

To mitigate this, we aim to plant 4 million trees by 2030. Trees also help to reduce air pollution, which in Lima averages 2.8 times the WHO's recommended level. We carefully choose plant species that grow well in our climate, such as the Peruvian pepper tree (*Schinus molle*), yellow elder (*Tecoma stans*), crimson bottlebrush (*Callistemon citrinus*), sea hibiscus (*Hibiscus tiliaceus*) and flame tree (*Delonix regia*). In the past many parks have used grass, which is not ideal because it requires a lot of water.

Three examples of Limeños al Bicentenario

All the interventions of the Limeños al Bicentenario initiative aim to improve habitability, manage the environment and encourage social cohesion. We approach these aims in various ways, depending on the needs of each neighbourhood. Here are three examples.

Monserrate Canal The old canal had long ago fallen into disuse and been filled in. This left a collection of informal houses – home to around 40 families – cut off from the rest of the neighbourhood, effectively marginalising them. The renovated space has now become an extension of the neighbourhood plaza, connecting the marginalised community to the other homes. We planted trees and shrubs and installed play structures. We also held workshops for local people on caring for urban greenery and exploring nature through art. The aim is to encourage families with young children to get to know each other and organically form a network of mutual support.

Lomo de Corvina Many neighbourhoods in Lima have communal kitchens, a practice imported by migrants from the Andes. These are shared spaces where several women get together to cook meals which they sell at a low price, earning a livelihood while providing affordable food. The practice grew in popularity during the Covid-19 pandemic. One communal kitchen typically feeds over 100 families. In a space next to one communal kitchen near the

"Limeños al Bicentenario aims to build social cohesion by engaging residents to maintain newly renovated areas while simultaneously improving the city's resilience to climate change."

Photo: Courtesy of Reinier van Oorsouw/Bernard van Leer Foundation

Photo: Courtesy of Reinier van Oorsouw/Bernard van Leer Foundation

coast in the south of the city, we combined sensory play elements for children – such as wind chimes and telescopes to look at the boats on the ocean – with creating an urban vegetable garden. We provided training for the women who run the kitchen on making compost with food waste, planting crops and organic pest control. This intervention has been especially well received, and we are now replicating it in six other areas of the city. Being close to the communal kitchen, where local women are cooking, makes the space feel safe for young children. It reduces organic waste, produces healthy low-carbon food, and encourages citizens to interact and develop a shared identity around a vision of local sustainability.

Teniente Paiva People used to park their cars in this cul-de-sac near a main road in heavily built-up central Lima. We have turned this into a pedestrian area with colourful murals and a variety of wooden street furniture for toddlers to play on and adults to sit on and rest. Alongside 13 trees and 900 plants and shrubs, there are seven planters where a group of local residents are growing lettuce, radishes and squash. Since the renovation in April 2021, it has become a popular meeting place for older people as well as for caregivers with young children.

As Mayor, I recognise that our experiences of recovering public spaces within the Limeños al Bicentenario programme are allowing us to learn about the incredible stories of citizens who love their city. For example, in Teniente Paiva I was able to meet Charo, a resident committed to improving the quality of life of her family and neighbours. Under her leadership and with the municipal team, we took a street that had been invaded by cars and transformed it into an accessible, recreational and active public space. Nowadays the neighbours in Paiva can enjoy flowers, vegetables and trees that are growing fast and attract birds. Families with babies, small children and elders get to know and learn from each other, by playing, exercising and talking. The city is alive when its citizens, starting from the youngest ones, enjoy and love it.

↗ **Find this article online at earlychildhoodmatters.online/2021-13**

In Addis Ababa, learning through outdoor play

A major early childhood initiative supports climate action

Jantirar Abay
Deputy Mayor
Addis Ababa City Administration, Ethiopia

In Ethiopia's capital, Addis Ababa, the imperative to invest in the early years is clear: our population is expected to exceed 6.5 million by 2027 (World Population Review, 2021) – and 20% of that population will be children under the age of 6. We have planned a bold, holistic approach to improving early childhood development in the city in preparation for this wave of growth.

When we started, climate change was not uppermost in our minds. But it soon became clear that the two issues were linked, and we could achieve a double win by preparing our children for the future while achieving environmental benefits for the entire city.

The programme we designed is called Children: The Future Hope of Addis Ababa Early Childhood Development Initiative.[1] It is a commitment to provide universal access to comprehensive early years services to all 1.3 million children under 6 years old who will live in the city by 2027, with intensified support for vulnerable children in 330,000 low-income households. Evidence consistently shows that investing in early childhood development is one of the most effective methods to break cycles of poverty in vulnerable societies, bringing long-lasting dividends (Heckman, 2008; World Bank, 2018).

The initiative includes parent coaching, health and social support services for vulnerable families, expanding daycare centres and pre-primary education, and establishing a world-class centre of excellence to support the development of the early childhood workforce.

> "It soon became clear that the two issues were linked, and we could achieve a double win by preparing our children for the future while achieving environmental benefits for the entire city."

A major part of the initiative focuses on increasing opportunities to learn through play, which is important for children's development of motor,

1 *Children: The Future Hope of Addis Ababa Early Childhood Development Initiative* is supported by the Bernard van Leer Foundation and Big Win Philanthropy. Information about this initiative is available at: https://www.bigwin.org/nm_pent_bigwp/wp-content/uploads/2020/07/Ethiopia_12pp_A4_WEB.pdf


Photo: Courtesy of UNICEF

cognitive and social and emotional skills (UNICEF, 2018). We are investing in new public spaces that integrate nature to create healthy environments that will contribute to children's mental and social development. For example, the city's Green Development and Environmental Protection Commission will select ten sites for play areas, aiming to reach 25,000 children every quarter. Every new public housing complex will also include the construction of a play area.

> "We plan to plant trees and seedlings along roadsides, to offer shade and contact with nature for toddlers walking with their caregivers."

We are also revitalising existing urban spaces, transforming them into green areas or squares that are safe to play and spend time in. This includes 30 "open roads" on Sundays where children can play without concerns about traffic. We plan to plant trees and seedlings along roadsides, to offer shade and contact with nature for toddlers walking with their caregivers.

Realising the co-benefits of investing in children and climate

As we designed the programme, we realised that these interventions would also address a whole suite of issues that we had not previously thought of as directly linked to early childhood development, including environmental impact and climate change.

The initiative's green spaces for play were not planned for environmental reasons, but they have the potential to make a real difference to climate change – especially as we aim to scale-up the Future Hope of Addis programme to the rest of the country and inspire similar programmes across the continent.

This element of the initiative runs complementary to one of the four pillars of the Ethiopian government's Climate-Resilient Green Economy strategy (Climate Action Tracker, 2021), namely the adoption of energy-efficient technologies in transport, industry and the built environment, along with reducing agricultural emissions, protecting and expanding forests, and expanding renewable electricity generation.

We continue to develop our own approach and to learn from implementation. We hope that others can benefit from our experience by more intentionally including climate change in children-focused programmes and investment in the early phases. Research increasingly points to the potential for education to benefit climate action, by improving both understanding of the challenge and the skills to envision new solutions (The Key, 2020). In particular, the Brookings Institution makes the case that educating girls can have a big impact on climate change by reducing the population growth rate (Kharas, 2016).

Our goals are ambitious. We aim to transform Addis Ababa by improving its environment and services to create friendlier, greener and more open public spaces for children, their parents and caregivers. By investing in the infrastructure of early childhood, we aim to ensure that our young population will grow up healthier, stronger and more capable of playing a positive role in the subsequent improvement of their city, their country and the planet.

↗ **Find this article online at earlychildhoodmatters.online/2021-14**

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Making every child feel that the city genuinely cares

How prioritising childhood is transforming Jundiaí, Brazil

Luiz Fernando Machado
Mayor of Jundiaí
Brazil

Jundiaí is proud to call itself the "City of Children". The path we took to reach this point began with the political decision to value and prioritise childhood. As a father myself, I already keenly understood the importance of policies and services that support young children and families. As a public official, I also knew the challenges related to climate and environmental issues. By the end of my mandate as Mayor, I wanted to be able to guarantee a safe, healthy and vibrant childhood for all children in my city.

Soon after I took office in 2017, the administration began to closely observe and consider the early years of life for children in Jundiaí. How are we welcoming each baby who is born or arrives here? In which ways are we following the baby's development throughout their first few years? In our Master Plan, we devoted a chapter to policies for children. Early in my term, we began investing in parks and public spaces that encourage free play and contact with nature.

Jundiaí now has a dedicated early-childhood team, the Intersectoral Technical Group for Child-Related Policies, made up of technicians drawn from different departments such as Education, Culture, Urban Planning and Environment. This team develops public policies designed to make every child feel that the city genuinely cares for their wellbeing.

Listening to children

In 2019, we set up the Children's Committee of Jundiaí. Every two weeks, we convene a group of boys and girls from all around Jundiaí, who discuss their needs and experiences as urban residents. We listen to their opinions, and have made a public commitment to implement their ideas, to improve the city.

A number of these ideas also address climate change and air pollution, such as slowing down the speed at which vehicles drive past schools, and planting more trees.

Jundiaí's early-childhood team has already implemented 40 initiatives in areas such as health, assistance, education, culture, mobility and city planning. They have also established an observatory for early childhood, collecting data on 80 indicators.

A major milestone for the city was the creation of the Children's World Park (*Mundo das Crianças*). Opened in December 2020, the 170,000 square metre park aims to meet the city's goal of making nature an

Photo: Courtesy of Prefeitura de Jundiaí

essential element of children's development. It allows them to learn through play, with non-structured toys, water activities, and prompts for caregivers to engage in positive interactions with children. The park also contains thousands of native species of trees, helping the city's climate adaptation and fulfilling the environmental commitments of permanent preservation of the city's dam.

Supporting healthy childhoods and cities in the pandemic

During the pandemic, we implemented the *Desemparedamento da Infância* ("unwalled childhoods") project. Unprecedented in Brazil, the project encourages schools to hold classes outdoors and in contact with nature. It values educational, cultural, and sporting activities in the open air, in decentralised areas, and in the vicinity of public schools, and seeks, through the relationship and experiences of children with nature, cognitive, sensory and emotional development. The initiative has led the city to be nominated for international awards.

The city has also joined the *Pé de Infância* ("childhood footsteps") programme in Brazil, a behaviour change initiative connected to hundreds of visual interventions such as stickers, posters and paintings at bus stops, in squares and avenues, on school walls and public buildings, as well as digital options including videos and mobile messages.[1] Its primary aim is to encourage young children to occupy and play in these urban spaces, and for adult caregivers to interact with children by singing, playing, and telling stories.

1 For more about the *Pé de Infância* programme, including a video with subtitles in English, please visit https://pedeinfancia123.com.br

Photo: Courtesy of Prefeitura de Jundiaí

Meeting the challenges of change

The city of Jundiaí has almost completed its Early Childhood Municipal Plan. For the first time, children participated in the creation of this Pluriannual Plan through the Children's Committee. The plan earmarks resources and funding for policies aimed at children, between 2022 and 2025.

"For health and climate reasons, it seems logical to prioritise children and families – as pedestrians – over cars, on city streets. But this has met with fierce opposition."

We are changing our viewpoint and practices, but we face many challenges. Big changes can sometimes cause initial unease and distrust. For health and climate reasons, it seems logical to prioritise children and families – as pedestrians – over cars, on city streets. But this has met with fierce opposition.

Listening to our children and observing our city, we know that other major investments and changes are urgent and necessary. These include planting trees, improving air quality and protecting Serra do Japi, the city's environmental reserve. We must ensure that children of all ages have more and more healthy spaces to play. And we must provide them with a better quality of life and greater access to health, education, culture and leisure.

↗ **Find this article online at earlychildhoodmatters.online/2021-15**

Tactical urbanism focused on children can help cities adapt to climate change

Udaipur offers an early example of how to begin

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In 2019, Udaipur's city government took on a challenging project: to map how well the city's built environment meets the needs of infants, toddlers and caregivers. Their findings, shared in the Urban95 baseline assessment report (ICLEI South Asia et al., 2020a), pinpointed the need to redevelop open green spaces, and make them accessible for walking, cycling and electric vehicles. While the interventions that have since been implemented primarily aim to make Udaipur more child-friendly, many will also help the city adapt to climate change.

Udaipur is a historic city, founded in 1559, with just under half a million inhabitants. Its hot, dry climate is alleviated by its network of lakes and over 200 parks and green spaces, which make the city picturesque and popular with tourists. However, rapid urbanisation has reduced the city's green cover per resident by 45% since the 1970s.

The Urban95 report found that Udaipur's blue–green areas need better maintenance and must become easier for families to access. Over 75% of caregivers surveyed said they would like more green cover and shade in the city. More than 80% said they feel unsafe while walking on Udaipur's streets or accessing shared transport, both because the air is polluted by diesel-fuelled auto-rickshaws, and because vehicles travel at dangerously high speeds.

"Udaipur's blue–green areas need better maintenance and must become easier for families to access. Over 75% of caregivers surveyed said they would like more green cover and shade in the city."

Udaipur was one of the first Indian cities to focus its development approach on its youngest citizens through the Urban95 programme. Municipal leaders began implementing initiatives in October 2019 together with the city government (Udaipur Municipal Corporation) and ICLEI SA (Local Governments for Sustainability South Asia).

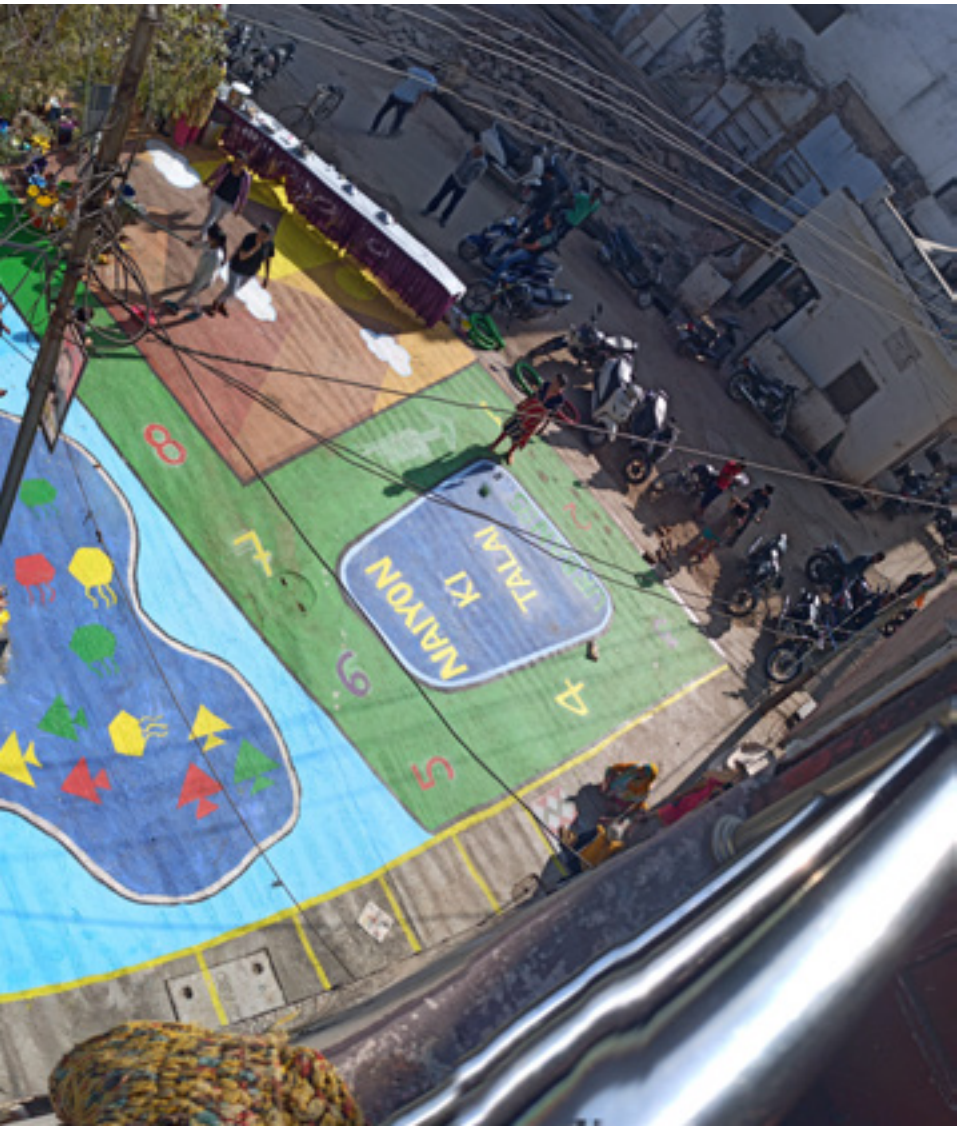
These initiatives included the following:

Traffic calming In a "tactical urbanism" intervention – a quick, low-cost temporary project designed to demonstrate the potential for permanent change – brightly coloured markings were painted on the

road outside a school at Vidya Bhawan Crossing in late 2019. This led to more children and caregivers walking to and from school, as they felt safer while crossing streets. This in turn resulted in fewer vehicles coming to pick up and drop off children, contributing to reduced carbon emissions and better air quality around school buildings (ICLEI South Asia et al., 2020b).

Reviving public squares This tactical measure in the old city of Udaipur demonstrated how a 'dead' public square could be revived by reorganising it to encourage community play and interaction. The square at Naiyon Ki Talai Chowk used to be used haphazardly for parking vehicles and dumping garbage. Designating a clear space for parking led to the rest of the square becoming a vibrant and lively community space where people could bring their children. It also helped to improve the environment as people switched from dumping their garbage to using municipal waste disposal and recycling services (ICLEI South Asia et al., 2020c).

Improving green pockets Part of Meera Park in Bhatiyani Chowhatta, a large community park, had fallen into disrepair through lack of maintenance. It was overgrown with weeds and used for dumping garbage, which led to unpleasant smells. Most of its infrastructure was broken, including the access path, rides, benches and lighting. The Urban95 team



"Cities need encouragement, inspiration and support to find solutions that will both make them more resilient to climate change and improve urban life for young children."

← Activated public space at Nayion Ki Talai Chowk

engaged local people to rejuvenate the space into an attractive park, which started to be used not only by the community in the immediate vicinity but also by residents from nearby areas. Better upkeep of the plants and vegetation, and improved awareness about proper waste disposal, helped to improve the surrounding environment and microclimate (ICLEI South Asia et al., 2020d).

Planting saplings at a festival for children A two-day festival in a city park demonstrated the demand for green open spaces for young children. After being redeveloped, the Manikya Lal Verma park at Dudh Talai was opened with a festival. The event attracted over 1,300 children and caregivers, who participated in activities such as storytelling and planting seeds and saplings, which will contribute to the greening of Udaipur. The storytelling sessions also conveyed messages about the environment and climate change (ICLEI South Asia et al., 2020e).

Udaipur's work to become more child-friendly has been recognised by the Government of India as an example for other cities. In addition to the Urban95 report, it also developed a climate-resilient city action plan, based on an assessment of emissions from different sectors and vulnerability to climate change. Udaipur recently ranked 32 out of 126 cities in the Indian government's Climate Smart Cities Assessment Framework. Based on the above

↑ Traffic calming measures outside Vidhya Bhawan Pre-primary School

experiences, and as part of its participation in other national government programmes such as the Nurturing Neighbourhoods Challenge and Streets for All, the city of Udaipur has allocated a separate budget for improving green areas and planting more trees.

India is urbanising quickly, and its population is young. Many Indian cities have the scope to improve infrastructure for young children, including schools, healthcare and play facilities, as well as the broader environment. Cities need encouragement, inspiration and support to find solutions that will both make them more resilient to climate change and improve urban life for young children. Udaipur offers an early example of how to begin.

↗ **Find this article online at earlychildhoodmatters.online/2021-16**

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Building “the secret city” for children

Planners in Israel use voluntary guidelines to urge climate- and child-friendly measures

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Urban planning can support the development and wellbeing of children and caregivers. It’s also vital for mitigating and adapting to climate change. Many interventions – from planting trees to improving public transport and walkability – can promote both aims, while also making public spaces more vibrant for everyone. But how can urban planners get the guidance they need to reach these goals?

With both children’s wellbeing and environmental sustainability in mind, Israel’s Ministry of Education tasked our firm with developing national guidelines for urban planners. Until then, the Ministry’s guidelines had covered mainly the planning of schools and kindergartens. Now, the Ministry sought to expand its role to represent infants, toddlers and caregivers outside of classrooms – in streets, libraries, parks, housing developments, open spaces and mobility infrastructure as well.

Developing the guidelines

We began by working with a child development specialist to translate psychological insights into spatial guidelines. For each topic, Dr Dana Shai, head of the Center for the Study of Early Emotional Development (SEED), presented us with several psychological principles.

Some were general, such as the importance of the connection between child and caregiver for the child’s ability to relax, learn and develop. This holds true whether you are planning a public park or a bus station. We reviewed all the guidelines with the notion that a place could not be child-friendly if the caregiver feels bored, left out, stressed or uncomfortable about engaging with the child.

> “Urban planning can support the development and wellbeing of children and caregivers. It’s also vital for mitigating and adapting to climate change.”

Other principles were specific to aspects of the urban environment. For example, when planning areas for transportation, we should remember that young children are always present in the moment – they lack an adult’s understanding of being temporarily in transit. That means every such area should engage children, and enable their caregivers to have a valuable experience with them.

With these ideas in mind, we looked at existing planning regulations. We highlighted those that support children and caregivers, and suggested changes to those that aren’t in their best interest.

Photo: Courtesy of Gavrieli-Segal planners

At many points, there was a strong overlap between the needs of small children and the goal of environmental sustainability. For example, one of the guidelines we developed was placing natural vegetation and artwork at children's eye level, to create what we call "the secret city".

But young children can enjoy the secret city only if they spend time on the streets, walking from place to place. And in Israel's main metropolitan area, over 50% of journeys by children aged 4 and under are in private cars. Young children are rarely taken on public transport.[1]

So planners need to address mobility issues too, bringing benefits both to children and to the environment. Travelling by bus offers more opportunities for a caregiver to talk and interact with the child, and gives families more quality time together. It's also more sustainable: Israel's traffic congestion is considered the worst in the OECD (OECD, 2021), and having fewer cars would reduce carbon emissions and air pollution.

Facilitating change by encouraging discussions

In the next phase of developing the guidelines, we put together a committee of planning professionals from government, local authorities, academia and NGOs. Similar projects offered various models, from an external experts-led process to centralised, mandatory government regulation.

We chose a hybrid model, developing voluntary guidelines together with the committee. We hoped this would help to insert new points of view into Israel's urban planning activity.

1 Data is based on a survey conducted by government contractors Netivei Ayalon Ltd for the metropolitan area of Tel Aviv-Yafo during 2016–2017.

The committee model did indeed facilitate a process of change. At our first meeting we asked each participant to share stories about his or her connection to children in cities. Mothers, fathers, grandparents, uncles and aunts all shared first-hand experiences of moving around their cities with young children in tow.

In another meeting dedicated to parks, we faced a trade-off between children's safety during play and the importance for child development of taking risks and experimenting. Although the Israeli kibbutz was one of the first settings to introduce the idea that children need to play and experiment with all types of materials and products to stimulate their imagination (Friedman, 2021), in general Israel has a safety-driven culture. Our public parks nowadays are mostly predictable and unchallenging, with play installations that are shiny, colourful and synthetic. (See also the interview with Ram Eisenberg on page 82.)

Our committee included representatives from the national standards institutions, the Ministry of Education, and local authorities. With their input, we were able to identify reasons why parks had not included more challenging and engaging play installations. And we realised that we might not need to change regulations to force parks to introduce more challenging areas, but only recommend – with supporting evidence – that parks should also include seasonal vegetation, topographic elements, loose materials and even animals.

Since our guidelines are voluntary, we cannot oblige authorities to adopt them. However, we found that the open nature of the process encouraged free discussions. This helped to carve out solutions and facilitate agreements and understanding between the various stakeholders. During participatory sessions and activities, many ideas came up, practical tools were developed and partnerships were formed. Based on this, we hope that implementation will follow.

Three key takeaways

Our project enjoyed two big advantages: families are immensely valued in all sectors of Israeli society, and most of the population lives in urban areas. Still, based on our experiences from developing the guidelines, we can identify three key lessons for others interested in promoting child wellbeing and climate action.

First, working with diverse partners from government, local authorities, academia and NGOs helps to facilitate concrete discussions about opportunities and constraints.

Second, connecting children's wellbeing with issues such as walkability, transport and housing helps to link children's interests to relevant planning activities.

And finally, developing voluntary guidelines offers a flexible opportunity for officials to re-evaluate existing regulations and dream of new possibilities.

↗ **Find this article online at earlychildhoodmatters.online/2021-17**

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interview

“There are huge risks in raising children under what amounts to protective house arrest”

Richard Louv believes connecting to nature should be an everyday event

Richard Louv is a journalist and the author of ten books, including *Last Child in the Woods: Saving Our Children From Nature-Deficit Disorder* and *The Nature Principle: Reconnecting with Life in a Virtual Age*. His books have been translated into 20 languages. He is co-founder and Chairman Emeritus of the Children & Nature Network[1], a nonprofit that helps children from all backgrounds access the natural world. He lives in Julian, California.
In conversation with journalist Pamela Druckerman

Why is nature so important for children aged 5 and under? What is "nature-deficit disorder"?
Research indicates that – for children and adults – experiences in the natural world offer great benefits to psychological and physical health, and improve the ability to learn. Time spent in nature can calm children, help them focus, and reduce symptoms of attention deficit hyperactivity disorder. It can also improve cognitive skills, lower the risk of child obesity, and help reduce myopia.

"Nature-deficit disorder" is not a medical diagnosis, but a useful term – a metaphor – to describe what many of us believe are the human costs of alienation from nature, as suggested by recent research. Nature is obviously not a cure-all, but it can be an enormous help, especially for kids who are stressed by circumstances beyond their control.

What do you mean by "nature" exactly? Does it need to be a wild forest, or just a playground with some trees?
A natural environment may be found in wilderness or in a city. It can be a park, a quiet corner with a tree, or several pots with vegetables growing outside the door, even a peaceful place with a view of the sky and clouds. Even in densely urban settings, nature can often be found.

Connection to nature should be an everyday occurrence, and if we design our cities to work in harmony with nature and biodiversity, it will become commonplace.

1 To find out more about the Children & Nature Network, its partnership with the National League of Cities, its work for green schoolyards, and to explore its resources, including the research library, visit www.childrenandnature.org

You write that, within the space of a few decades, the way children understand and experience nature has radically changed. Why did this happen?
The causes include increased automobile traffic, poor design of communities, dumped toxins and habitat destruction. Technology is not in itself an enemy, but the more high-tech our lives become, the more nature we need – and toddlers are now using tablets and other devices.

You also say that there's now excessive vigilance about children's safety. How is this impacting children's connection to nature?
Yes, there's a media-amplified fear of strangers. Some neighbourhoods are dangerous, but most are not as dangerous as news and entertainment media lead us to believe. Families, schools and communities try to play it safe, creating supposedly "risk-free" environments that actually create greater risks later.

We need to think in terms of comparative risk: while there are risks outdoors, there are also huge risks – psychological, physical and spiritual – in raising future generations under what amounts to protective house arrest. Child obesity is just one of them. Loneliness is another.

What are some practical ways to give young children and their caregivers more access to nature?
Currently the Children & Nature Network is partnering with the National League of Cities, which represents over 19,000 mayors of cities, towns and villages in the USA. Our goal is to help cities become nature-rich, good places for children and families – and good for nature itself.

But much of the progress we need to make comes down to personal choices. As parents and educators, we can spend more time with children in nature. This can be as simple as planning regular walks around a local park, going on a picnic, or learning how to garden in containers on the back stoop. Make getting outside in a natural area an intentional act – a healthful habit, if you will – that becomes part of your life.

If we can put soccer practice on our calendars, we can put nature adventures there, too. It's never too

Photo: Courtesy of Engin Gerçek/Studio Majo

early – or too late – to teach children or adults to connect with the outdoors.

Do you see signs of progress?

When I wrote *Last Child in the Woods*, I could find only about 60 studies I felt confident in citing. Today the Children & Nature Network's research library has over 1,000 research abstracts. That's part of the good news that has accumulated, along with dramatic growth in the number of nature-based preschools and a fast-growing green schoolyards movement, among other advances.

How can we inform kids about climate change without, as you have written, "associating nature with doom"?

The American Psychiatric Association describes eco-anxiety as "a chronic fear of environmental doom". *The Lancet* explained in 2020 that "symptoms associated with climate anxiety include panic attacks, insomnia, and obsessive thinking". All of this is felt by children.

Data alone seldom moves people from awareness to action. Young people certainly need to know about threats to the environment, but they also need direct experience in nature for the joy of it, and to make their knowledge about the environment less abstract. They may know a lot about climate change and the felling of the Amazon rain forest, but too often they can't tell you what lives in the vacant lots or lakes or parks in their own area.

Connecting ourselves and our children directly to nature is a way both to deal with the impact of loss of nature, and to plant the seeds, sometimes literally, of a nature-rich future.

↗ **Find this article online at earlychildhoodmatters.online/2021-18**

Transforming Rotterdam's schoolyards

Ten years of turning asphalt playgrounds into green spaces

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Imagine that you live in a three-room apartment with your father, mother, two brothers and two sisters. Your mother doesn't like you playing outside – there are too many cars driving too quickly, and she's afraid of older children who bully or use drugs. So after school you play games on your mother's phone, at home. You're full of energy and frustrated to be stuck in a small inside space, so often you end up fighting with your siblings.

Increasingly, this is the reality of family life for many young children. As city populations grow, neighbourhoods often become more dense. This intensifies economic pressure to build on the green urban spaces that still exist.

All this has a direct impact on children. Those who miss out on outside play lack opportunities to develop their social skills – creativity, fantasy, risk assessment, getting along with others, building a social network. When young children lack the space and autonomy to play with others, it can delay their development – socially, emotionally and physically. Lack of diverse physical activities can hold back motor development too. Using a screen all the time can lead to problems with vision, muscles and posture.

A first attempt to build Rotterdam's green schoolyards

About ten years ago, I began work on a project in Rotterdam that tackled these problems. We developed new, green schoolyards that were available to neighbourhood children during and after school hours. We hoped teachers would also experiment with giving lessons outside.

Back then, almost all schoolyards were made of paving stones or asphalt, and surrounded by stark metal fences with no plants growing through them to soften how they looked. Schoolyards were closed after school hours, even though most neighbourhoods lacked sufficient public space for children. In surveys, children described them as "boring", but nevertheless mentioned them as one of their three favourite places.

After the first iteration of our green schoolyards project, it became clear that we had underestimated the need for maintenance and management. At some schools the greenery was trampled, or the schoolyard was taken over by weeds. Because of vandalism, most of these yards were eventually closed outside of school hours.

“Adults shouldn’t be so focused on safety, especially when it inhibits a key aspect of children’s development: learning how to deal with risk.”

Photo: Marieke Odekerken

Taking lessons into account in round two

We learned our lessons, and seven years ago we developed the current green schoolyard concept, which is also financed by the Municipality of Rotterdam. We started by conducting trials in a small number of schools.

In this new iteration, before granting a subsidy to a school, we asked them why they wanted one: what was their vision? They had to write down how they would manage and maintain the schoolyard, and open it to the neighbourhood after school hours, at weekends and during holidays. We made an appointment with them to discuss the project before making a decision.

The subsidy covered the costs of year one, but thereafter the school needed to have a plan to manage the schoolyard themselves. Most of the schools already had a budget for maintenance of their old schoolyard, which covered bicycles, toys and other objects. Now they needed to repurpose it for another vision. At the same time they could organise a team of children, parents, neighbours and teachers to take care of the easier aspects of maintenance, which gave them a greater sense of ownership.

We also wanted to inspire more teachers to give lessons in the improved schoolyards. We found that teachers enjoy outdoor classes, but they need support to be creative without relying on book-based teaching, instead using their own green spaces as a living learning landscape. I have seen the vision and policy of the school boards change after seeing the benefits of learning outdoors: children experience much more, become interested in things and ask questions, and teachers can work with a wider range of learning styles.

Another challenge was getting school directors to fully support the project. At the start, many emphasised what could go wrong, including concerns about children’s safety. We responded boldly, explaining that adults shouldn’t be so focused on safety, especially when it inhibits a key aspect of children’s development: learning how to deal with risk.

This second attempt, which incorporated early learning, proved the concept and gradually other schools approached us to participate. We formed a selection board, to choose schools based on their motivation: Why do they want a green schoolyard? Do they understand what it entails? We discussed key issues from the start. How would they provide outdoor lessons? Do they have the time and the financing to open the schoolyards to the neighbourhood, and to sustain this over time?

Schoolyards and climate change

As the project grew, we also began to experiment with how the schoolyards can enhance adaptation to climate change. Dense urban neighbourhoods with a lot of concrete get hotter during heatwaves, and are at higher risk of flooding during heavy rain. Open, well-designed green spaces can help mitigate multiple climate risks.

Green schoolyards work best with a variety of plants, to attract diverse birds, butterflies and bees. Schoolyards should be places where teachers want to hold lessons, and where parents want to spend time playing with their children or chatting with neighbours. For local children, they should be the "green living room" of the whole neighbourhood.

"As the project grew, we also began to experiment with how the schoolyards can enhance adaptation to climate change."

We've learned that, in an ideal schoolyard, children can interact in a playful way, learning with all their senses. There are trees to climb for views of the whole space, running water to build dams, hills to roll down, flowers to smell, and spaces for hide-and-seek. Successful schoolyards need an element of risk to enable adventure, but they should also be relaxing and enjoyable.

Green schoolyards have the potential to serve multiple functions: They are an inspiring learning environment; a challenging play space; a meeting area for residents; and a green space to improve resilience to extreme weather. These varied roles mean that they can be funded from diverse municipal budgets. Funding for green schoolyards in Rotterdam came from the city's budgets for Youth and Education, City Management, Child-Friendly Neighbourhoods, Climate Adaptation and Health.

There is still room for improvement. Some schools could hold even more classes outdoors, if teachers were given the necessary support and encouragement. Others could make better use of the space to strengthen collaboration with neighbours and community groups, for example by organising ways to make local people feel welcome in the schoolyard and get used to thinking of it as 'their' place.

Currently, 37 Rotterdam schools have green schoolyards[1]. We are now working with Rotterdam and other Dutch cities to craft a formal policy statement, explaining how green schoolyards work best. Our goal is for school boards to automatically include green schoolyards in new schools, and to view financing for these projects as essential. We hope neighbourhood residents, especially caregivers with young children, come to feel a sense of ownership and responsibility for these spaces, and see them as essential to the wellbeing of their communities.

1 To view information about green blue schoolyard, visit: https://brainbuilding.org/implementation/zoom-in/green-blue-schoolyards/

↗ **Find this article online at earlychildhoodmatters.online/2021-19**

Learning from Prinsenland

How a child-friendly Dutch neighbourhood looks three decades on

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In the autumn of 1989, the director of the Dutch Social Housing Society (MVV) asked me to draw up an urban development plan for 550 houses in Prinsenland, an expanding neighbourhood in the north-east of Rotterdam. Mecanoo was then a young, emerging architecture practice and I was one of its founding partners.

At the time, urban expansion schemes were often repetitive and neglected the provision of public spaces. We interpreted the Prinsenland project as a manifesto against that kind of monotony. Our ambition was to create a diverse collection of buildings that focused on a unique, varied and well-used public realm.

We designed a community with car-free zones, suitable for young children to ride their tricycles or scooters or play marbles, just in view of the home. We included communal gardens for slightly older children to play, away from the direct vision of their parents. As the children in the neighbourhood grew older, they could move on to explore the larger playing fields beside the lake, before coming to discover the whole city as their playground when they were adolescents.

The children who grew up there have now moved on, so how did this original concept age? To keep learning and understanding, I like to revisit my projects. I recently did so with Prinsenland. I wanted to understand how people perceive it nowadays, what still works from the original design and what we can learn from it. Children learn with every step they take. When it comes to designing neighbourhoods and cities, we should do the same.

The vision for Prinsenland

Our original objective was to create a district with a high tactile factor, in both the architecture and the public spaces. In my eyes, when designing a community, a tree may be more important than a brick. I did not want a neighbourhood filled with concrete 30 × 30 cm city paving stones, but one with a variety of materials, textures, scents and colours that residents could enjoy, and that would inspire a strong narrative imaginative force. I wanted a neighbourhood that you would not forget if you grew up there as a child – the period in which you really develop your senses.

The amount of time children spend playing outdoors, their ability to move around independently, and their level of contact with nature are strong indicators of how a city is performing. These are also vital components of children's mental, physical and emotional development. From our perspective as designers, we should be always designing for the senses – creating places that are varied, colourful and tactile. We should also be designing for multiple generations. When a place is safe for children, it is safe for older people too. Although we designed with children in mind, the place was also intended to be attractive for everyone: a place where you could smell the spring, see the colours of autumn, and experience the changes of all the seasons.

Photo: Courtesy of Mecanoo

Our masterplan was arranged around four identical quadrants, each with a green backbone running towards the Ringvaart Lake. The strict division of the land into strips is transformed by an architectural choreography in which carefully detailed blocks of flats, organised in angular positions, create new spaces through changes in direction. Residential paths run between the strips, interrupted by four collective gardens, each designed in a different landscape style: French, Dutch, Japanese and English.

“Children learn with every step they take. When it comes to designing neighbourhoods and cities, we should do the same.”

For each garden we selected different paving, street furniture, play objects, plants and trees. Each landscape was designed to be interactive, and to provoke different senses. For example, we envisaged that if you ride on your tricycle over the path of concrete blocks that are sunk into the grass of the Japanese garden, you would hear not only the bumping noise of your tricycle but also the rustling of the bamboo. You could then climb on the large, angular rocks and play with the flat gravel.

In the English garden, you could skate on the winding path between gently rolling hills, play miniature golf, and feel the prickly thorns of the plentiful roses. If you climbed onto the farmyard fences in the Dutch town, with its pollarded willows, you would see black and white cows and a red bull. In the French garden, you could play on old paving stones beneath a roof of sycamore leaves. Further on we placed a big sandpit, with Parisian benches around it and a fence to keep the dogs out.

→ Vision for Rotterdam South (*Perspectief op Zuid*)

Prinsenland revisited

When I returned to Prinsenland earlier this year, I saw a beautiful neighbourhood that remains true to its original values. It is still a pleasant space to explore, play and live in. However, it appears that fewer families and young children run through these sensory realms nowadays. The tactile materials we carefully considered now appear aged and in need of refreshing. The public space is not currently maintained to the level we would want.

In the original vision, we helped to create a management plan to maintain the quality of the public realm. However, in practice, this has not been actively followed. The original clients for our work were the municipality, a housing corporation and residents, and all the houses were intended for rental occupancy. Now some have become privately owned and some land has been converted to private gardens, impacting the quality of public space. The housing corporation has also been through numerous changes and mergers, which might have contributed to these issues.

As a designer, you complete a project, then step away. You hope for longevity and continuity of the original ambition, but this is always a challenge to sustain over many decades. The neighbourhood, context and people change over time. Now, together with the residents and the current housing corporation, we are looking to see how we can activate a new maintenance plan for the public spaces.

Illustration: Courtesy of Mecanoo

Climate change and neighbourhood design

At Prinsenland, we focused on creating a wonderful composition of public spaces for children of all ages and at all stages of their development. Climate change was not on our minds when we were designing new neighbourhoods in 1989, but it is now a fundamental consideration in city making. We now routinely question how to tackle climate change at the scale of a neighbourhood and in the city as a whole. How can we make aspects of climate adaptation such as nature, play, food production, biodiversity and connectivity fundamental components of designing cities?

We are currently exploring these questions through our ongoing collaboration with the Bernard van Leer Foundation, to further develop our vision for Rotterdam South (*Perspectief op Zuid*) in line with the Foundation's Urban95 programme. As with Prinsenland, we are looking to challenge norms and create more pleasant, inclusive communities.

One such initiative is the adaptive reuse of an existing 10-km stretch of water defence infrastructure, which runs through many neighbourhoods in Rotterdam South. It currently forms a barrier in the city; we'd like to reimagine it, instead, as the longest park in the Netherlands. *"Het dijkpark"* could weave through local

neighbourhoods, connecting them to each other and the nearby city waterfront, instead of separating them as it does now. It could become a living laboratory for healthier lifestyles, providing play spaces for all ages and nurturing social connectivity, climate resilience and biodiversity.

Het dijkpark will not be a public space within a particular neighbourhood, but one of Rotterdam South's main public corridors – a vital artery of the city, pulsing with children and families. Like our original vision for Prinsenland, we want to create vibrant and sensory public spaces that can develop and flourish alongside the children and families who grow up using them.

More information about the Prinseland development can be found here: www.mecanoo.nl/Projects/project/75/Urban-Design-Residential-Area-Ringvaartplasbuurt-Oost-Prinsenland

↗ **Find this article online at earlychildhoodmatters.online/2021-20**

interview
& photo essay

“Play is all about allowing natural curiosity and exploration”

Toddlers can stack, splash and wander in Ram Eisenberg’s parks

Photo: Ram Eisenberg

↑ "This used to be an asphalt car park in the middle of the city. We laid earth on top and planted grass and constructed a freshwater stream. Every day at 5 p.m. the water flows for one hour, creating a theatrical event." **Kiryat Sefer Park, Tel Aviv**

Ram Eisenberg, 59, is founding director of Ram Eisenberg Environmental Design, a landscape architecture firm based in Haifa, Israel. He specialises in urban playgrounds, parks and gardens that give a feeling of "designed wilderness", using found materials and input from local residents. Eisenberg is an Assistant Professor of landscape architecture at Technion – Israel Institute of Technology and has been practising landscape architecture for 25 years.
In conversation with journalist Pamela Druckerman

What do children need to play?
What a child needs changes at different ages. We see the play realm as two emotional–spacial circles: a circle of safety and a circle of discovery. In very young children, up to age 1, those two circles completely overlap. What these children mostly need is for the parent to feel comfortable.

As they grow, very young children become more interested in the textures of their immediate environment, exploring by touch. Toddlers don't really explore play structures, which are mostly designed for older children. They play with earth, with leaves, with ants; they climb steps; they discover. Play is all about allowing natural curiosity and exploration.

Photo: Yaron Zelnik

← "Young children like to walk and climb. Stairs can be wonderful play structures. The key is to make everything in a park accommodating so that children can discover ways to play with it." **Flowers Hill Park, Herzelia**

↓ "As children grow, their movement ability grows and their independence grows. They start to move in larger circles, but always returning to the parent, their rock of safety, going on their discoveries and then back." **Letters Hill Park, Beit Shemesh**

Photo: Ram Eisenberg

What is wrong with today's playgrounds? How do you design differently?

Today's play safety standards are very strict, which results in a standardisation of elements, and a clear-cut separation between what is for play and what isn't. Formal play structures are made of plastic and steel, often in bright colours "attacking" the eyes, and dull in textures and other sensory stimuli. Even when they try to provide other stimuli – such as sounds – it is also usually very artificial.

I generally include some formal play structures in the parks I design. These are necessary to meet the standards and they're what people expect to find in a park. Children usually run to these familiar structures first, and only later do they discover the non-formal play treasures I hide for them, in full sight, in the rest of the park.

In my parks, I intentionally leave natural areas untouched and accessible. I use stone outcrops, plants and scented herbs. I do this as much as I can, to provide for richer sensory experiences besides the visual.

Colourful play structures are not what interests small children. They're very interested in details. They like different-sized pebbles, and having things they can go through to experience being on the inside and the outside, or on one side and the other. This is very rich and time-consuming play.

↓ "Young children, at 2–3 years old, can sit in one place and really get into something – like building with a collection of stones and twigs." **Kiryat Sefer Park, Tel Aviv**

Photo: Ram Eisenberg

Photo: Ram Eisenberg

↑ "Used material has time embedded into it so it's already rich in itself – like logs, or living trees. These objects aren't standardised , there are no two trees that look alike. Children find the details and look at them." **Kiryat Sefer Park, Tel Aviv**

You carried out an observational study at one of your own parks to see how children used it. You also observed your own grandchildren at play. What did you learn?

One parent had a 5-year-old, and they came to the park every day. For the first five weeks, the child wanted to go to the slide. Then all of a sudden he lost interest in the slide, and they walked to a place which he called "the maze." But I didn't build a maze. The park has a community garden, and there are little paths between the different kind of herbs. He loved to hide and play there. Then he discovered the pool – a small pond with green string algae. Now he wraps stones in algae and makes sushi!

What children really need is loose materials, things they can touch and order. When my granddaughter was 2 she liked to sit on the ground with her cup and collect stones. It's all about imagination. Children need to be able to explore and create things with their hands.

↓ “This waterfall is all made of concrete debris which was there when we started working. The contractor kept wanting to take them away, and I kept saying ‘No no no, I will use them!’” **Kiryat Sefer Park, Tel Aviv**

Photo: Ram Eisenberg

Photo: Yaron Zelnik

↑ “Even play areas that are meant for toddlers are very artificial. I am especially against very strong colours, which I think are more for mayors, who want their investment to be seen. They don’t interest children at all.” **Flowers Hill Park, Herzelia**

What made you want to design playgrounds?
I grew up in a kibbutz where I could go anywhere, touch things, explore, be in nature. It was very open. I had the kind of childhood that I want other children to have.

Photo: Ram Eisenberg

↑ “A child can just step onto the stone and walk into the wilderness, but they don’t have to. If their family doesn’t want to, they just continue along the path.” **Letters Hill Park, Beit Shemesh**

→ "Children love to explore boundaries, so every boundary is an opportunity for play." **Gan Haem, Haifa, designed by Muller-Blum**

Photo: Yaron Zelnik

In your parks you design for play “at the edges”. What does this mean?

Children are attracted to boundaries – the edge between the realms of safety and exploration. So we design parks with very rich boundaries to explore. A boundary can be between anything – different textures, soils, plants.

How is your design work linked to climate change? Does this impact children?

We are the problem, our culture is the problem – the way we consume the environment as if it is a commodity. I can't say that I know how to solve the climate problem. But I do think that we need to develop new ways of thinking and living, and to step outside our current cultural way of being. It would be too simplistic to say that the children who play in these parks will save the planet. But I hope they will grow up to appreciate the planet. If you lack sufficient exposure to these kinds of experiences, you are in a high-risk situation. At least I'm giving them a chance.

↗ **Find this article online at earlychildhoodmatters.online/2021-21**

↓ "Children who spend time exploring and playing in nature learn to appreciate it." **Kiryat Sefer Park, Tel Aviv**

Photo: @Itay Tal

Shielding young children from air pollution in Latin America

A new programme installs monitors and shares data, hoping cities will then change policies

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Currently some 750 children aged 4 and younger die annually in South America because of lower respiratory tract infections caused by outdoor fine-particle pollution, mostly from the burning of fossil fuels.[1] The same pollution causes many more young children to be sick, increases asthma incidence, or reduces development of their lung function. Many of these lifelong impacts begin in utero.

At Aires Nuevos, a project formed in 2020, we've learned that the first step towards data-driven decisions that address these illnesses and deaths is to measure the quality of the air that children breathe. Many Latin American countries – and most cities – do not have a single monitoring station. The latest World Health Organization Assessment on Air Quality in 2018 showed that Argentina, Brazil and Peru had between 0.02 and 0.08 pollution-measuring sites per million people. This compares to between 2 and 4 per million in Canada and the United States. Latin American cities that do measure air quality typically do not make their data accessible to the public.

Between 2014 and 2018, the government of President Michelle Bachelet in Chile expanded the measurement of air quality across the country and used the resulting data to develop a national decontamination strategy.

Monitoring air quality, then following up with strategies for atmospheric decontamination, seems to make an enormous difference. Between May 2014 and December 2018, a key measure of pollution, $PM_{2.5}$, decreased by between 25% and 49%. Over the same period, the number of children up to age 4

Photo: Courtesy of Aires Nuevos

1 To find out more about Aires Nuevos, visit: www.airesnuevos.org

who visited the emergency room due to respiratory symptoms decreased by 28%, and cases of bronchial obstruction fell by 74%.

Aires Nuevos was born out of these findings. At the end of President Bachelet's administration three years ago, she founded a non-profit called Horizonte Ciudadano. In 2020, in partnership with the Bernard van Leer Foundation and the Children's Investment Fund Foundation, Horizonte Ciudadano created Aires Nuevos, a 90-member network of Latin American leaders, to reduce children's exposure to polluted air.

It is the first project in Latin America to engage citizens in measuring air quality, with the aim of minimising the effects of air pollution on young children. In collaboration with the Centro de Acción Climática at Pontificia Universidad Católica de Valparaíso, Aires Nuevos takes the same approach across Latin America that led to good results in Chile: improve measurements, then use the resulting data to generate solutions.

↓ Cities involved in the Aires Nuevos network

How Aires Nuevos works

Currently, Latin America's few official air quality monitoring stations are usually required to be located away from roads and other known sources of pollution, to prevent the readings from being skewed. However, children do not breathe air under such criteria! They breathe whatever air they encounter on their way to and in schools. A general assessment of air quality in a city is useful, but it needs to be complemented with location-based readings that have a specific focus on children's exposure to pollutants.

To date, Aires Nuevos has delivered a total of 111 air quality sensors to municipalities and universities in eight countries: Mexico, Uruguay, Peru, Brazil, Argentina, Ecuador, Chile and Colombia. We've succeed in installing 95 monitors in 28 cities. Once they are installed, these sensors enable us to visualise the effects of air pollution on the health and development of almost 1.5 million children aged 4 and under.

Already we've seen that having more nuanced data can inform policy. A good example is the Chilean

Illustration: Courtesy of Aires Nuevos

Photo: Courtesy of Ruslana Lurchenko/Shutterstock

city of Coyhaique, which is estimated to be the most polluted in Latin America. Due to concern about air pollution, the city usually forbids schoolchildren to participate in physical education classes in winter, despite the fact that 27% of the region's children are overweight. But real-time data from our sensors showed that air pollution peaks at night, when households burn wood. Pollution is much lower between about 10 a.m. and 3 p.m. We are currently using this data to work with Coyhaique's municipal government, health services and schools to assess the best time for children to exercise outdoors.

Across Latin America, Aires Nuevos uses a bottom-up strategy that aims to make local residents feel connected to the issue of air pollution, and invested in the effort to protect children from it. To raise community awareness, our sensors generate real-time information on air pollution, which anyone can then view on the IQAir website or read using the IQAir app.[1] In Mexico and Chile, we have already begun offering education on air pollution in communities with sensors.

In each city, Aires Nuevos has also established working groups that bring together political actors, university researchers and communities. Using the data generated by the sensors, these working groups will assess the effects of specific local policies, which might include diverting heavy diesel traffic away from the vicinity of schools; prohibiting vehicles from idling; and using nuisance regulations to curtail emissions from local industry.

Early evidence suggests that banning vehicles (including school buses) from idling near schools could have an especially significant effect. Looking to the longer term, evidence is building for accelerating the phase-out of internal combustion engines and moving toward zero-emission vehicles.

Above all, we want to demonstrate to Latin American countries and cities that action on air pollution is both necessary and feasible. Installing air quality monitors where children play and learn can be the first step towards making other crucial changes.

↗ **Find this article online at earlychildhoodmatters.online/2021-22**

Toxic air and inequality in a London borough

The experiences of babies and young children can help create awareness in government

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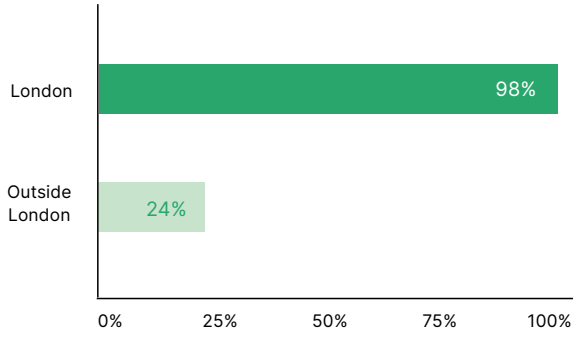
Nine-year-old Ella Kissi-Debrah died in Lewisham, a borough of London, in the winter of 2013. Her mother fought for seven years to learn what had happened and in 2020 a coroner concluded that Ella – who lived close to a major road – had been killed by an asthma attack resulting from a spike in air pollution. It was the first time that the UK had officially recorded air pollution as a cause of death (Laville, 2020).

Recent research shows that 25% of UK pupils attend schools where air pollution is over the World Health Organization's limit, and the problem is most severe in London (Earthsense, 2021; Global Action Plan, 2021). But within a city, there is often a significant difference in pollution levels from one street to the next.

In November 2020, I carried out research on air quality and health in my borough, Lewisham. It is the seventh most deprived of London's 32 boroughs, according to the UK government's latest Indices of Deprivation report, which looks at factors such as income, education, health and crime (Lewisham Council, 2019).

Centric Lab, a public health research organisation in London, produces street-level maps of air pollution and other kinds of environmental stressors. As part of the research mentioned above, we overlaid these maps with other data showing levels of deprivation, numbers of residents aged 5 years and younger, and

Toxic air at school: children are four times more exposed in London than in rest of UK



% of schools in areas that exceed World Health Organization guideline limits for air pollution.

Source: Mayor of London

location of services. Overlaying information helped create a better understanding and enable a more nuanced evaluation of the neighbourhood in terms of urban health with a focus on young children. The maps revealed that a large number of early years providers and primary schools are in highly polluted areas, illustrating the unequal distribution of exposure to pollutants, a concept described by the Centric Lab as "biological inequality".[1]

Separate research conducted by the Environmental Defense Fund and published in 2021 reaches a similar conclusion. It demonstrates that air pollution is significantly higher at schools in more deprived communities of London, and schools with higher intakes of black, Asian and minority ethnic children (Slater, 2021).

1 Information about the research work conducted by Centric Lab and its partners can be found at www.thecentriclab.com/research

Findings and recommendations

Our research shows how important it is to improve understanding of the experiences and behaviour of babies and young children in their neighbourhoods, and where they are located in relation to pollution, in order to be able to better address this issue at a policy level.

In addition to monitoring a group of caregivers' movements to determine their level of exposure to air pollutants during a day, we conducted a survey of parents and carers in Lewisham to find out how much they know about the danger that air pollution poses to their individual health and the health of their babies and toddlers. We found a high level of awareness. Respondents could accurately identify areas where pollution was high and were willing to change their behaviours – for example, by adding time to their daily walking routines so that they could use routes where the air was cleaner.

Photo: IRStone/Adobe Stock

Our research specifically suggests the following:

- **Local areas need hyper-local data to come up with targeted solutions.** Exposure to air pollution differs markedly from street to street. Targeting interventions where they can make the most difference requires hyper-local data, combining demographics with metrics on health, pollutants and vulnerability.
- **Residents will respond to information to minimise their risk.** People are aware of the danger that air pollution poses to their health, and are willing to adapt and lengthen their journeys to experience less pollution. Making hyper-local data publicly available – with strong engagement to ensure the information reaches those who are most vulnerable – will help to inform individual decisions.
- **Urban planners need specific understanding of how young children and caregivers move around a neighbourhood.** The youngest children are at the most extreme risk from air pollution, and – with their caregivers – they use a range of neighbourhood services and amenities frequently and unpredictably. Local-level policy needs to be informed by more in-depth research into where, how and when these groups move around an area.
- **Air quality improvements should be combined with broader policy on early childhood.** There are ongoing efforts across London and the wider UK to improve both child-friendly urban planning and air quality, but these agendas are often not sufficiently aligned. Local areas can and should devise strategies that combine hyper-local solutions to air pollution with the provision of space for young children to play, connect to nature and interact with others.

Raising awareness on the health impacts of air pollution does lead to tangible political action. The Mayor of London has committed to extending the ULEZ (Ultra Low Emission Zone) from October 2021. Another significant legislative change in the UK is the amendment to the Environment Bill to adopt the World Health Organization's guideline limits for air pollution – creating more pressure on the UK government to set a more ambitious air quality target.

No child in 2021 should die from asthma. Urgent action is required at the municipal and government levels to prevent further deaths being caused by air pollution. Clean air is a fundamental human right.

↗ **Find this article online at earlychildhoodmatters.online/2021-23**

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Improving indoor air quality in Mongolia's kindergartens

Pollution in childcare buildings regularly exceeds WHO guidelines

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Air pollution is a major problem in Mongolia's cities, especially during the long, cold winters. Between October and March, night-time temperatures average below –10 °C and can reach as low as –40 °C. People traditionally burn coal to keep warm. The use of fossil fuels for heating and energy has a direct impact on Mongolia's CO_2 emissions, which have grown from 5.1 million tons in 1970 to 35.9 million tons in 2019. These emissions are responsible for the build-up of air pollution within buildings and in the city as a whole.

As young children are especially vulnerable to air pollution (Rees, 2017), UNICEF Mongolia investigated indoor air quality in kindergartens – where children aged 2 to 5 typically spend eight or nine hours every weekday. In partnership with Washington University in St Louis and Mongolian University of Science and Technology (MUST), we installed measuring equipment in 29 kindergartens in the Bayanzurkh district of the capital, Ulaanbaatar – home to 1.5 million people, half the country's population – and Bayankhongor, a provincial capital with a population of just under 100,000.

The devices measured air quality 24 hours a day, and uploaded the data to an online server. We found that the $PM_{2.5}$ levels exceeded World Health Organization guidelines in all the buildings most of the time. Total volatile organic compound (TVOC) emissions – from materials used in construction, repair and maintenance – were also alarmingly high.

↓ A classroom with air ventilation system in a newly built kindergarten by UNICEF Mongolia

↑ WASH facility of newly built kindergarten, Bayanzurkh district, Ulaanbaatar city

Separately, we supported assessments of 44 kindergartens and health facility buildings. In 40 of them, we found that the ventilation system did not work at all. We also discovered that all the kindergartens were operating beyond their capacity, with some having enrolled up to four times too many children. Among other issues, this overcrowding makes indoor air quality worse. We organised capacity-building training for the kindergarten managers, and each will develop a plan to improve indoor air quality (UNICEF Mongolia, 2018, 2019).

“To improve air pollution in Mongolia, electricity and heating demands need to be powered by clean energy.”

The government is taking the problem of air pollution seriously: it banned the burning of raw coal in the summer 2019, and air pollution in the winter of 2019–2020 decreased by 41% from the previous winter (Ariunbold, 2020). However, refined solid fuels can still be burned, and over 4,000 cases of carbon monoxide poisoning were reported – including at least 12 fatalities, of which six were children. For long-term solutions to improve air pollution in Mongolia, electricity and heating demands need to be powered by clean energy.

Showcasing new construction methods

UNICEF Mongolia has showcased how air quality can be improved by retrofitting a kindergarten in Bayankhongor, and building three new kindergartens in the Bayanzurkh district of Ulaanbaatar. These kindergartens had better insulation, ventilation and air filtration, as well as electric heating systems. The government has since installed electric heating in all kindergartens in Ulaanbaatar city.

In partnership with MUST, we also developed a pilot programme called CHIPS – cooking, heating and insulation products and services – for the families living in *gers*, traditional Mongolian dwellings also known as yurts. CHIPS replaces traditional coal-fired stoves with electric cooking and heating technology, as well as improving both insulation and ventilation. Data from the pilot, which covered 230 households in Bayankhongor province, showed that households were more comfortable, safer and healthier. The electric heating saved time and labour, with no need to refill the stove in the middle of the night. Improved insulation also decreased the need for heating, thereby cutting costs.

We are working with and across government departments to scale-up both initiatives. The Ministry of Environment and Tourism has approved the CHIPS programme for government "green loans". With the support of parliamentarians, we are working with the Ministry of Construction and Urban Development to develop new national codes on building design for kindergartens, schools and health facilities, including ventilation systems. It is believed that better health outcomes from the improved environments will justify the increased costs.

↗ **Find this article online at earlychildhoodmatters.online/2021-24**

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Streets for Life: lowering urban speed limit benefits children and the climate

A growing cultural change in attitudes toward cars

Photo: Courtesy of FIA Foundation

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Reducing urban speed limits to 30 km per hour may seem like a dull, technical policy proposal, and on its own it will not solve all problems. But it can be the key to unlocking a range of responses to make our streets safer, healthier and more engaging for young children and their caregivers, while also benefiting the climate.

Coupled with other policy measures to encourage cycling and walking, low-speed streets encourage people to give up their private vehicles – or not to start using them in the first place. Walking and cycling are much safer when vehicles are travelling slowly: the risk of death in a collision with a vehicle dramatically decreases at traffic speeds below 30 km/h (Jurewicz et al., 2016). The FIA Foundation – a charity with an international membership of motoring and motorsport associations – is backing the Streets for Life campaign, which has 30 km/h urban speed limits as its flagship recommendation.

In addition to the increased safety brought about by reducing urban speed limits, a societal shift from car use to walking and cycling can also improve the general health of a population, through both greater exercise and improved air quality (UN Environment, 2016). It also helps to mitigate climate change: if all cities increased cycling to the levels of the best performers (around 15–20% of trips), urban carbon emissions could fall by an additional 7% by 2030 and 11% by 2050 – saving 300 megatonnes of global CO_2 emissions (Institute for Transportation & Development Policy (ITDP) and University of California, Davis, 2015).

More broadly, the campaign to lower urban speed limits can also be a starting point for wider conversations to shift people's understanding of the place of cars and children in the city. Many of today's attitudes date back to the 1920s, when a cultural revolution began to transform the streets of the industrialised world as motor vehicles rapidly gained hegemony over people (Norton, 2008).

Amid rising public concern about the huge and increasing toll of dead and maimed pedestrians – disproportionately children and young people – motoring advocates in the 1920s set in motion a social and political re-engineering of attitudes.

Photo: Edward Echwalu

From being seen as a public space for all, streets were reframed as a public utility for motor vehicles. “Pedestrians” became “jaywalkers”. For children, streets shifted from being seen as a playground to a forbidden no man's land.

> “For children, streets shifted from being seen as a playground to a forbidden no man's land.”

Even today, the first impulse of many well-meaning politicians or road safety advocates is to seize on child education as the solution. In effect, the message to children is “streets are for cars, stay safe by removing yourself from the public realm”. This has the unfortunate effect of putting the blame for road accidents on vulnerable potential victims, rather than asking what systemic change is needed so that children of all ages can feel free to play in and explore their streets.

Cultural transformation in the 2020s

Like the 1920s, there is potential for the 2020s to be a culturally transformative decade for attitudes towards motor vehicles and urban streets. This time, motoring organisations have the opportunity to play a positive advocacy role.

The FIA Foundation has launched an advocacy hub to back local Streets for Life efforts and in parallel we are supporting, with other organisations, the National Association of City Transport Officials Global Designing Cities Initiative to design “Streets for Kids” (GDCI, 2020). To inform our advocacy we commissioned researchers from the Overseas Development Institute (ODI) and the World Resources Institute (WRI) to examine how and why decisions on transport planning and budget allocations are taken in major cities of the global south (ODI, 2018). They found that overemphasis on individual behaviour of potential victims has the effect of transferring responsibility away from policymakers and making it harder to achieve meaningful systems change.

Inevitably, when wealth and privilege are challenged there is a backlash. But polling undertaken by YouGov for the FIA Foundation shows that measures to reclaim streets for children are broadly popular (FIA Foundation, 2020). There is growing momentum for a safe and zero-carbon agenda of low speed, creating urban streets where traffic and people can mix.

The Streets for Life campaign was launched in May 2021 by the United Nations, the World Health Organization (WHO) and a global coalition of NGOs. It sees default 30 km/h urban speed limits, wherever pedestrians and cyclists come into regular contact with motor vehicles, as the key to unlocking wider changes in how streets are used. Streets for Life’s Call to Action – signed by UN agency heads including Dr Tedros Ghebreyesus of the WHO, Henrietta Fore of UNICEF and Inger Andersen of the UN Environment Programme – makes clear the connection between action to make local streets

more livable, and action for the planet (Child Health Initiative, 2021). It emphasises the needs and rights of children.

Bogotá leads the way

Bogotá was among the cities examined by the ODI and WRI for the political economy research we commissioned (ODI and WRI, 2018). It has bucked the national Colombian trend in road traffic facilities by taking a safe system approach to urban transport planning, explicitly connecting and explaining the various social functions of transport.

Managing urban vehicle speed is at the heart of Bogotá's approach. The city has also established a 500-km cycle path network, which has contributed to a ninefold increase in cycling as the activity becomes more accessible and pleasurable for children and families. The carbon value of cycling in the city has been found to be the equivalent of at least 55,000 tonnes of CO_2 a year (C40 Cities Finance Facility, 2018).

Many other cities across the world are taking similar action (WRI and World Bank Global Road Safety Facility, 2021). At the beginning of a critical decade for climate change, the Sustainable Development Goals and the growth of cities, the Streets for Life campaign seeks to amplify their efforts. Cities can achieve multiple environmental and social benefits by investing in a people-centred agenda to create a network of walking and cycling connections, combined with public transport and planning policies to bring services close to neighbourhoods.

With more than half of the urban space anticipated to exist by 2030 yet to be built, we must prioritise the cause of shared and equitable access to our streets and public space, safe walking and cycling, and space for children to play and live. Getting this right is essential to the vision of an "ecologically safe and socially just" world (Raworth, 2017) that animates the Sustainable Development Goals. The road towards a revolution for people and planet begins on low-speed streets.

↗ **Find this article online at earlychildhoodmatters.online/2021-25**

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Building safe sidewalks to save children's lives

Nairobi and other African cities expand walking and cycling

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It's inexpensive, unsurprising and incredibly low-tech, yet it can help the environment and dramatically change and save lives: the simple sidewalk. Walking is a low-carbon method of mobility that enhances urban quality and facilitates social cohesion. Enhancing the walking environment in cities, through safer sidewalks and other measures, reduces the risks of injury or death for children in particular (World Health Organization (WHO) and UNICEF, 2004), and facilitates the shift to environmentally friendly modes of transport.

We often hear that cities in the global north are increasing their investments in walking and cycling, but there is momentum in Africa too – in Nairobi especially, but also elsewhere across the continent. Smart road design – including safe sidewalks, can have a hugely positive impact.

In Nairobi, investment in infrastructure ramped up in early 2021, when Nairobi Metropolitan Services announced a plan to invest almost 1.5 billion Kenyan shillings (around EUR 11 million) in over 100 km of new paths for pedestrians and cyclists. This followed Nairobi's 2015 decision to reserve 20% of its transport budget to improve walking and cycling infrastructure. This was the first such policy in the region.

These new changes come in response to a dramatic problem. Road traffic accidents are the leading cause of death for people aged 5 to 29 (WHO, 2018). Globally, they kill more people than HIV/AIDS or tuberculosis – although no statistic can truly measure the impact of grief on a family that lost a child. More than a quarter of deaths in road traffic accidents are pedestrians and cyclists. And many of those deaths could be prevented with better design of sidewalks.

"Children also absorb 30% more black carbon from exhaust fumes than adults, because their height places them lower to the ground and closer to the pollution source."

Because of their small size, children are most at risk from road traffic. It can be difficult for children to see vehicles, or for drivers to see children. Compared to adults, children also have more limited social and cognitive development, and they have softer heads, making them more susceptible to serious head injuries. Children also absorb 30% more black carbon from exhaust fumes than adults, because their height places them lower to the ground and closer to the pollution source.

Photo: Courtesy of UNEP

Transport is critical in the daily lives of children and caregivers, as they need to move around to access schools, play spaces, healthcare, childcare and food. When they feel unsafe walking or cycling, the result is a vicious circle: more people choose to drive, adding to traffic and the sense of danger for others, and worsening public health through greater air pollution and lower levels of exercise.

In a May 2021 report, the Institute for Transportation and Development Policy (ITDP) and UNEP point out that streets designed for walking and cycling also help to reduce greenhouse gas emissions and improve climate resilience. The more people walk or cycle instead of using motorised transport, the more emissions are saved. Walking and cycling infrastructure also complements well-designed public transport systems – for longer journeys across a city, it is more attractive to use public transport when access points such as bus or tram stops are easy to reach on foot or by bike.

Involving communities in road design

But just as critical is a shift in mindset. Children and caregivers are usually overlooked in the process of designing roads and sidewalks. Roads are often built through communities without consulting residents about their needs.

Influencing how governments think about the challenges and solutions is a long-term task. The UNEP Share the Road Programme is currently working with city governments in Rwanda, Zambia and Ethiopia to build stakeholder consultation into the design and planning processes.

The UNEP *Global Outlook Report on Walking and Cycling* (UN Environment, 2016) recommends five ways for cities to approach the introduction of design standards in consultation with citizens so that streets are more child-friendly, reducing air pollution and keeping babies and toddlers safer from traffic.

The WHO has identified enhancing road infrastructure as one of ten strategies for keeping children safe on the road (WHO, 2015). The United Nations target of a 50% reduction in the number of road traffic deaths by 2030 cannot be achieved without large-scale, rapid action.

> "The impact of well-designed streets can also be wonderfully positive for early childhood development – providing healthy spaces to play and run, clean air to breathe and time to connect and be social with other children and adults."

We need to prioritise simple, low-cost solutions to design and build safe and comfortable sidewalks, in consultation with local communities. These solutions can transform neighbourhoods and entire cities, while increasing climate resilience.

The impact of well-designed streets can also be wonderfully positive for early childhood development – providing healthy spaces to play and run, clean air to breathe and time to connect and be social with other children and adults. And a street that's safe for a child is safe for everyone.

The UNEP *Global Outlook Report on Walking and Cycling* recommends five steps for prioritising walking and cycling:

- **Take the first step** Introduce a national or city walking and cycling policy to set the vision and showcase commitment.
- **Budget for walking** Invest in designing and building good-quality, comfortable and safe sidewalks rapidly and at scale.
- **Measure the miles** Set quantifiable and measurable goals, then collect the data needed and evaluate progress and impact.
- **Work together** Access and mobility affect everyone, so include diverse stakeholders in your planning and implementation. Ask users where they walk or ride and what they need. Pay particular attention to more vulnerable users, such as women, children, older people and those with mobility challenges. Don't try to replicate what other cities or countries do without taking your local context into account.
- **Do as you say** Political will is not only about developing and implementing policies, but actively championing walking and cycling as modes of equal status to private cars. For as long as active mobility is seen as a low-status alternative, it will not receive the road space, budget and attention it deserves.

(UN Environment, 2016)

↗ **Find this article online at earlychildhoodmatters.online/2021-26**

Photo: Courtesy of FIA Foundation

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Education and Activism

Building movements that put children at the heart of the climate conversation

interview

“My mother’s early years triggered her love for the environment”

Activist Wanjira Mathai on inspiring children, growing food, and continuing her mother’s work

Wanjira Mathai, 49, is the Vice President and Regional Director for Africa for the World Resources Institute of Washington DC, USA (based in Nairobi, Kenya) and Chair of the Wangari Maathai Foundation. She has also served as Chair of the Green Belt Movement, the environmental organisation founded in 1977 in Kenya by her mother, 2004 Nobel Peace Laureate Wangari Maathai.
In conversation with journalist K.A. Dilday

Your mother, the Nobel Peace Prizewinner Wangari Maathai, started the Green Belt Movement when you were very young. What is your earliest memory of being involved with nature and the environment?
I always remember when we planted a flowering shrub. It's a plant that has purple, white and bluish flowers. And the reason I remember is that when that plant eventually grew, every day those flowers seemed to change colour. So, the shrub looked the same, but a flower that was white one day was purple the next. As a child I thought it was fascinating, and I remember thinking: "We planted that."

When did you know that preserving the environment would be your life's work?
I always say this work found me. I went to college in upstate New York. I studied biology and I did well in it, but there was never a thought to study environmental science. At that time, I thought I wanted to go into medicine. I wasn't thinking about the environment at all.

I did a master's degree in public health and worked for six years at the Carter Presidential Center on public health issues, focusing on disease eradication, epidemiology and understanding disease cycles, especially in the global south. I decided I wanted to learn how to communicate more effectively to change behaviour – that was really my motivation to do something different, but I didn't know what that was. I eventually decided to go home to take a break.

Everybody thought I was crazy to be packing up my life to return home with no job, no nothing. I booked a one-way ticket back to Kenya, and after a while my mother asked me to help her deal with the international affairs of the Green Belt Movement. It had been my intention to return to the USA after a year, but I got very absorbed in the work.

Only when I was inside the movement did I think to myself, "Wow, this is an amazing thing that's going on here." I understood my mother's motivation so much better and why she was so committed. This was the journey of her life, her life's work.

So for all those years, I ended up staying and working with my mother and travelling the world. When she passed away, in 2011, I felt such a sense of deep gratitude that I'd had that time with her. Working together every day around the world in some of the most beautiful places. I really had some of the most amazing moments in my life with her. I thought "This is it and I love what I'm doing."

What was it that made you go "wow?"
Women are often the custodians of food in communities, and nutrition we know is crucial for the early years. If children have a healthy start and eat healthy food then of course their development is influenced by that. And with the devastation and degradation of the environment comes interference with food systems. You start to see farming fail and people unable to grow the crops that they were accustomed to. A lot of crops, for example, are grown in marshy grounds, and if there's no more marshy areas you can't grow certain crops.

The Green Belt Movement was based around restoring land, securing food, securing water and ensuring fuel security. So, getting women to plant trees was a symbol of reclaiming your ability to manage what you have – your natural environment – and there was also a component of food and food security at a family level. The movement empowered women financially. And research has been done across the board that when women have the financial wherewithal, they invest the majority of it back into their children, their families and the community. And so when they win, a lot of people win.

The Green Belt Movement helped women understand that they didn't have to wait for someone else to produce food for them, they could actually do it in their environment. They could plant fruit trees, and before you knew it, you had fruit. They could plant fodder trees and feed their animals. So this whole idea of a very supportive connection to nature was very much what it was all about. That was beautiful.


Photo: Courtesy of World Resources Institute

Are there any environmental issues that you think are not getting enough attention?

Air quality is an important one. It's within our reach, especially in our cities. We need to make sure we continue to green our spaces so that we clean the air. It's so clear that when you devastate the environment, the quality of the air goes down.

There's also mobility: I'd love to see more inclusive cities. Most of the cities in my part of the world are still obsessed with vehicles. We still build cities for cars. We build pedestrian crossings for cars. We've got to reorient how we think, and I think part of the climate agenda is creating more inclusive cities where people can walk more, ride their bikes more, and access green spaces more easily.

What are your plans for the future to make a better world for those who come after us?

I really hope that with the work we do at the Wangari Maathai Foundation, and the work I am now doing with the World Resources Institute, we can inspire new leadership. One of the most important things for me is that we inspire youth leadership and that the next generation of leaders will have a deeper sense of purpose. **How can we push those good causes so we can really build together towards a more sustainable world?**

With my mother, I know that what triggered her love for the environment was her early years – how she loved playing in the river with the tadpoles, under the leaves of the arrowroots. She would spend hours and hours there. It was clear to us that if children were more exposed to the environment at a young age, they would have the opportunity to love nature too.

You know the statement: "You will protect what you love"? That's the way to get children in.

The World Resources Institute is a research organisation that works with governments and organisations to protect nature and improve lives. The Wangari Maathai Foundation advances the legacy of Wangari Maathai. The Green Belt Movement takes a grassroots approach to protecting the environment through tree planting, building climate resilience and empowering communities – especially women and girls – to expand democratic spaces, protect and restore nature, and create sustainable livelihoods.

↗ **Find this article online at earlychildhoodmatters.online/2021-27**

Don’t say “It’ll be all right”

and other tips for talking to children about the climate crisis

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The bad news about climate change has reached children: they hear about it in news reports, school lessons and everyday conversations. They also realise that we adults aren’t doing enough to fix it. In a UK survey of 2,000 children aged 8 to 16, nearly three-quarters said they were worried about the planet; one in five said they’d had a nightmare about climate change; and 40% said they didn’t trust adults to solve it (Atherton, 2020).

In a separate study of 10,000 people aged 16–25 in ten countries, 75% said the future is frightening because of climate change, and some 65% said the government is failing young people and lying about the impact of its actions (Marks et al., 2021).

Information about climate change – and the attendant anxiety – no doubt reaches younger children too, so parents and caregivers need to help them process it. But how can we talk to small kids about climate change without making them feel powerless, apathetic, or even severely anxious?

Based on my own research in Sweden for the book *Prata med barn om klimatet* (Talk to children about climate), and my work in climate communications and the global parent-activist movement, I’ve concluded that we need to start talking to children about climate change at an early age, but in age-appropriate ways. The main reason is described above: odds are, they’re already thinking about it.

We should encourage the smallest children to play in nature, to show that we value their connection to plants and animals; 7- to 8-year-olds are ready to gently hear more complex information, but linked to their own lives and the communities around them.

Photo: Halfpoint/Adobe Stock

Ten tips for talking to children about climate:

Don't:

1 **Expose very young children to climate-related news for adults.** Seeing extreme weather events and other human tragedies unfold can be terrifying, especially for young children. Instead, look for age-appropriate news, stories or books to explain the topic.

2 **Say that young people will solve the climate crisis.** The next few years are critical. Action needs to be taken long before most of today's youth become adults, or can vote. It's up to adults to take the lead.

3 **Say that "everything will be all right".** Children will see drastic changes in the world around them as they grow up, and they have a right to the tools, knowledge and support to help them through future changes. Denying that there's a problem can make children feel they're not being heard, or that they're being lied to.

Do:

4 **Keep calm and keep it simple.** Tell the truth with equanimity, using age-appropriate language. Young children don't understand complex science. Instead, discuss climate through stories about people, places, nature and animals that they can relate to: Why is the arctic fox disappearing in northern Sweden? Should we cycle to school? What's important about worms?

5 **Offer hope.** Try phrases like "Yes, climate change is a serious problem, but humans created it in the first place, so we can also solve it. In fact, we already know how to make it better. But it'll take lots of people to do it." Describe the people, organisations and companies working to improve the situation.

6 **Discuss solutions.** The younger the child, the more important it is to talk about solutions. Make a point of looking for – and talking to your child about – positive developments around you, and ask what they'd like to do to pitch in.

7 **Take action together.** Offer various options, such as taking part in local litter clean-ups, identifying and supporting a green organisation, or writing to a local politician about the need for better cycle paths. Climate action helps young people manage their anxiety, and creates empowerment and a feeling of agency. It's also good to normalise sustainable behaviour and active citizenship from an early age.

8 **Connect with nature.** Children benefit emotionally and cognitively from being in nature, and it's key to pro-environmental behaviour later in life. Make the outdoors part of your everyday life by, for example, walking a dog in the woods, growing herbs in a window box, or going to a park. Discuss how humans are part of nature, and encourage children to help animals in distress.

9 **Process your own feelings.** Allow yourself to "feel the science" and name your emotions. Talk about your deepest fears with other like-minded adults, to avoid projecting too much negativity when you're talking to children. Remember that difficult feelings are a healthy sign that we've understood the situation, and can help us find strength to take action ourselves.

10 **Make space for children's emotions**. They're often natural-born planet stewards who want to keep the world happy and healthy. Allow them to express their concerns about nature, animals and the planet. Use drawings to help them put their feelings into words. By processing feelings and information together, both children and adults can – paradoxically – become more hopeful, and more energised to keep working for change.

Photo: Wojciech Waskiewicz

↑ For Mother's Day Night of Museums, the Polish climate–parent group organised an open-air ourothermother exhibition. The event included discussions and workshops/activities for children on creating recycled toys and caring for plants. Warsaw, Poland

"We need to start talking to children about climate change at an early age, but in age-appropriate ways."

↗ **Find this article online at earlychildhoodmatters.online/2021-28**

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Abu Dhabi incorporates climate change into children's learning journeys

Building environmental awareness from pre-primary to university

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Environment Agency – Abu Dhabi
United Arab Emirates

In Abu Dhabi Emirate, capital of the United Arab Emirates (UAE), many stories are unfolding. One of the most noteworthy is that of a young country, undergoing rapid social and economic development, addressing climate change by putting the youngest in its population at the heart of its efforts.

Abu Dhabi recognises the magnitude of the threat from climate change and is determined to meet it head-on. Through its multiple impacts on basic human needs – such as food, water and shelter – climate change is by far the biggest global health threat of the 21st century (Costello et al., 2009; Ministry of Climate Change and Environment (MOCCAE), 2021). Children are particularly at risk (Ebi and Paulson, 2007; Xu et al., 2012; UNICEF, 2015).

While the emirate's contribution to global warming through greenhouse gas emissions is relatively small overall in comparison to other developing communities (Environment Agency – Abu Dhabi (EAD), 2019), its per capita emissions are among the highest in the region. Abu Dhabi has initiated numerous high-level strategic actions to address the issue (Government of Abu Dhabi, 2014; MOCCAE, 2017). A review of these initiatives indicates that there are significant co-benefits regarding impacts on health. The initiatives aim to reduce emissions, which will also result in improved air quality: by 2035 it is estimated that this will result in the avoidance of 3,219 premature deaths and 82,853 fewer healthcare visits (Abu Dhabi Global Environmental Data Initiative, 2015). Strategic actions include the mitigation of emissions through initiatives such as mangrove planting, mass transport, and solar and nuclear energy projects.

Even more is being done at the grassroots to address the impacts of climate change on children as young as 4 years old. Clean air is especially important for young children, as they need to be outdoors to be physically active and play. Physical activity is fundamental for children's health and development (Marmeleira and Duarte Santos, 2019). According to the World Health Organization, it can reduce symptoms of anxiety and depression. Thanks to outdoor play, children progressively gain mastery

Photo: Courtesy of EAD photo library

over their bodies, improving their gross motor skills such as running, jumping, skipping and climbing (Little and Wyver, 2008; Little and Sweller, 2015). Research shows that outdoor environments are more conducive than indoor environments to improving children's motor skills (Flôres et al., 2019). When children play in natural landscapes, the risk of asthma seems to decrease. Preschoolers are twice as active and less sedentary when outside, reducing their chances of developing obesity (Tandon et al., 2018).

Grassroots activities to benefit children

The EAD has been engaging young people through a variety of outreach programmes for years, raising awareness of environmental issues and promoting behaviour change among other actions. The most noteworthy of these programmes are the Enviro-Spellathon, Sustainable Schools Initiative, Sustainable Campus Initiative, and Connect with Nature.

Enviro-Spellathon promotes eco-literacy among children aged 4–11 years. Over 90% of Abu Dhabi's schools are registered (91.7% in 2019), and 1,814,297 students have benefited since 2001 by becoming more aware of environmental issues. Enviro-Spellathon brings children closer to their environment by including it in their curriculum, raising awareness and appreciation of the environment as they learn to count and spell.

Originally launched in hard-copy book format, with a Braille version, the programme is now available through an app featuring 18 games, 12 animations and nine interactive animations with voice-overs.[1] Versions are available in English and Arabic.

Sustainable Schools Initiative (SSI) has been running since 2009, with a focus on turning awareness into action among students aged 12–17 years. Also known as *Al Madaris Al Mustadama*,

1 The Enviro-Spellathon app is available at: https://www.ead.gov.ae/en/join-the-movement/schools-and-campuses/i-Enviro-Spellathon

this initiative is implemented in 150 schools by EAD, supported by UAE's Ministry of Education and the Abu Dhabi Department of Education and Knowledge, and sponsored by bp plc (formerly known as British Petroleum). The initiative has been so effective that the United Nations cited it as an example of a global best practice.

SSI uses a participatory approach to increasing environmental awareness while building capacity in school communities to reduce their environmental footprint and increase their environmental handprint.

From 2009 to 2020, SSI has generated 2,163 eco-club projects and engaged 272,703 students on environmental field trips to locations such as Al Wathba Wetland and Ramsar Site, one of the first sites in the region to appear on the International Union for Conservation of Nature (IUCN) Green List. In the academic year 2018–2019, 59,537 students benefited from SSI through activities such as the School Green Audit and student eco-projects, resulting in 100 tonnes of CO_2 saved. The children gain a greater understanding of their environment, and learn behaviours to protect the environment and how to engage with the local community.

Over time SSI has evolved to become self-sustaining by building capacity among teachers through a training-of-trainers programme, institutionalising the School Green Audit as an official Quality Conformity Council standard for auditing the environmental footprint of schools, and automating the uploading of audit results through an online interface.[2]

SSI has been awarded numerous accolades including Green Middle East Award for Best Environmental Awareness and Education Project in 2013. In 2015, the UN Environment Programme declared SSI an innovative model for education in sustainable development and recommended it be applied around the world. In the same year, the UAE Ministry of Climate Change and Environment adopted SSI for north emirates schools through the Ajyalna initiative. In 2017, SSI was recognised by the Global Environmental Education Partnership as a global case study in environmental education.

Sustainable Campus Initiative (SCI) expanded the SSI from schools to universities. Running since 2014 and focusing on ages 18–35, the emphasis is on turning ideas into action. SCI is sponsored by Borouge, and aims to increase sustainability practices, promote awareness and knowledge, and elicit proactive behaviours to protect college and university campuses in the UAE. The main objective is to strengthen and build leadership capacity amongst the emirate's young people to address issues of environmental sustainability and be agents of change.

Similar to SSI, the SCI programme includes elements such as Green Audit, Sustainability Action Projects (in the community) and, perhaps most importantly, the Green Youth Majlis (GYM), which facilitate dialogue and the sharing of ideas and best practices among young people. The GYM is a forum that brings together innovative ideas and projects to enhance sustainable communities for future generations. It has received acknowledgement from various international parties including the World Summit in Japan.

Connect with Nature (CwN) has been running since 2018 and focuses on ages 15–30. Aware of the need for young people to reconnect with their natural heritage, EAD partnered with Emirates Nature–WWF and the International Fund for Houbara Conservation to create a programme encouraging young people to discover the natural wonders of the UAE while also building the leadership skills necessary to uphold the legacy of the late Sheikh Zayed bin Sultan Al Nahyan.

The programme comprises three pillars: **Re-wild**, encouraging youth to go out and connect with nature and explore new places; **Re-think**, encouraging youth to challenge the status quo and make a positive contribution; and **Lead**, encouraging youth to become environmental changemakers by joining CwN's youth leadership.[3]

2 To find out more about the Sustainable Schools Initiative, visit the online interface: https://sustainableschools.ead.ae/SSI/

3 Information about the Connect With Nature movement can be found at: https://connectwithnature.ae/

"There is growing evidence of the impacts of climate change and its potential to jeopardise the health of our children."

Abu Dhabi and the seven Cs

In the book *A Parent's Guide to Building Resilience in Children and Teens: Giving your child roots and wings*, Kenneth Ginsburg describes the "7-C plan" for building resilience in children (Ginsburg, 2006).

Abu Dhabi achieves this by providing information to young people that raises awareness of environmental issues (including climate change), building **competence** and **confidence**. SSI helps students build a **connection** with their environment through field trips and helps them build **character** and a sense of value through **contribution** by devising and implementing projects in the local community. SSI also requires students to assess their school's environmental footprint and devise projects to mitigate its impact, building their **coping** and **control** skills. Through a comprehensive approach to youth engagement, Abu Dhabi helps young people build their 7-Cs of resilience to climate change and environmental impacts.

There is growing evidence of the impacts of climate change and its potential to jeopardise the health of our children. However, there is also optimism that concerted effort, at both the strategic and the grassroots levels, will help our children by mitigating the worst effects and building their resilience to climate change.

↗ **Find this article online at earlychildhoodmatters.online/2021-29**

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interview

“I firmly believe that we should engage with children when they are young”

In South Africa, Xoli Fuyani uses worm farms to teach 5-year-olds about the planet

Xoli Fuyani, 38, works for the EarthChild Project, an NGO based in Cape Town, South Africa, that teaches students in marginalised schools about health, self-development and the environment. She founded and runs an environmental education programme that brings worm farms to classrooms for children aged 5 to 9.
In conversation with journalist Pamela Druckerman

How did you get involved in nature education?
I am Xhosa; I grew up in Gugulethu, one of the first townships in Cape Town. In my teens we moved to a mixed-race area, Blue Downs. It was still during Apartheid, so there was a lot of unrest. I went to a multiracial school and I was one of the very few black kids. It wasn't fun at all; it was a culture shock. That's where my love of nature was cultivated. Nature became my place of solitude, where I could be myself with no judgement.

That also made me see the disparities in South Africa when it comes to accessing nature. In Blue Downs there are big trees and open spaces. In the township, there's just no space, no trees, back-to-back homes. Waste is very visible. Most of the time when we visited nature parks, we would be the only black family hiking or camping. Because of their lack of awareness, my black peers felt that going hiking was a white thing, and not for them. I come from a family of teachers, so I just knew I needed to change that narrative and share my love of nature. I was like: I need to be a bridge.

You studied environmental education, then joined a government programme to teach that in schools. What was it like?
That programme was adapted from Europe, so some examples were not relevant to us. So I came to understand the importance of educating children in their own culture, using indigenous languages. It was also very fear-based, with big words like "climate change" and "hole in the ozone layer". This was freaking out a lot of kids. And it didn't seem fair to be telling children in marginalised communities, "Hey, there's this big thing happening, do something!" They're already experiencing the effects of climate change and living the future that many fear.

How did you come up with the worm farm project?
I wanted a fun, hands-on experience, and I wanted to work with a real-life problem that the children saw every day. The majority of the kids I work with live in informal settlements, in shacks, so waste kept coming up. Waste management is the most present issue in every township. So we set up worm farms, which are basically two plastic crates, stacked on top of each other. The top one has about 1,000 earthworms.

What do the children do?
The kids feed the earthworms every week. They bring organic waste from home to feed the worms, such as fruit and vegetable peelings, teabags, paper. The farm needs to be kept moist, so the kids add water. Then they watch the worms process the food into compost. This mixes with the water and drains to the bottom crate, and becomes what we call the "worm tea". Once the farms have produced enough tea, we use it to grow a vegetable garden.

Why start with 5-year-olds?
Often the programmes running in schools would exclude lower grades, because they assumed younger kids wouldn't understand environmental concepts. But I firmly believe in engaging with kids when they are young, because they grow up learning how to come up with new, practical solutions.

"(Children in marginalised communities) are already experiencing the effects of climate change and living the future that many fear."

How do they respond?
At the beginning of the year they are all so squeamish! Most kids don't want to touch the earthworms. They are screaming, the class is a mess, they are running around.

We introduce a worm mascot called Zuki, a Xhosa name. Zuki is a precious, beautiful worm that absolutely loves the kids. Her mission is to help reduce waste

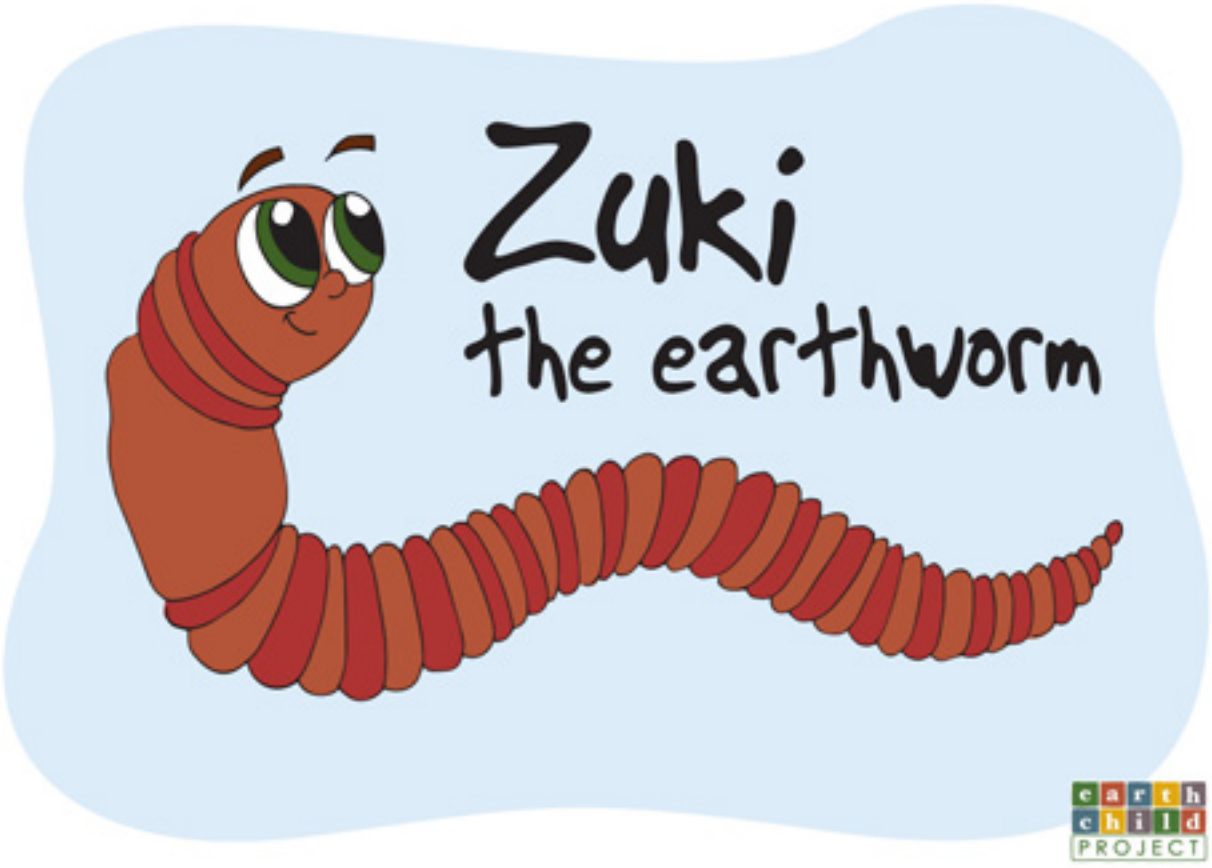

Illustration: Courtesy of EarthChild Project

to save our planet. Often the kids warm up and fall in love with Zuki, which then becomes our gateway to introduce real earthworms. They get very territorial with their worms, giving them names and personalities.

Then a world of imagination opens up. In our first lesson, "Becoming a Farmer", the kids pledge to become the best farmers ever. Each lesson has a theme. In another, they're fishermen, who have to fish out earthworms from the compost. They get to be worm doctors, troubleshooting problems like a strange smell. We also use sock puppets to discuss issues that come up, and we teach them about the earthworm's body parts.

Each lesson starts with a pledge and ends with a song, usually in Xhosa. When we teach the life cycle there's a song about two earthworms wiggling under the mud. They fall in love, they mate, and both earthworms fall pregnant – they're hermaphrodites!

How does the year end?

The class harvests the vegetables and makes a big salad. And then we feed all the offcuts back to the worms. It's a complete, full cycle for them to learn that nothing in nature is waste. Instead of letting organic waste go to a landfill site, the worms eat it.

The programme encourages the kids to take responsibility for living things, and teaches them how to grow their own food. They learn self-sufficiency, and see that there are other ways to nourish themselves besides shopping.

Do you discuss climate change?

We don't mention the words "climate change" to 5-year-olds, but we use local environmental issues to teach them about our planet.

Young kids often ask, "What can we do?" Having a worm farm in their classroom shows that they are stopping organic waste from going into landfill sites. We try to stimulate their curiosity and teach creative problem solving and reflection.

Our Worm Farming Programme is for kids aged 5 to 9. After Grade 3 they can join our extramural club called Eco-Warrior, where we explore, in greater depth, environmental issues affecting their community and school.

What's the scale of the Worm Farming Programme?
We currently work in eight schools in Cape Town, with about 14 classes in each school. Each school has a facilitator who implements our programme – someone who's young and fun and accessible to the kids, and understands the importance of hands-on learning.

What's next, especially for little children?
Our programme is growing; little kids are embracing it. Some have started their own worm farms at home. We are developing manuals that we'll be sharing on our website, so others can replicate our programme. A lot of what's available for kids about climate change is in English, so we hope to translate our lesson into indigenous languages.

The worm pledge, said every day at the start of class

We've joined together as classmates
To be the best farmers ever.
A year full of learning
While we become friends with
earthworms.

I promise to feed them veggies.
I promise to feed them fruit peels.
Watch them mucha mucha
As they make compost.

More worms will fill our farm,
Wiggling all around.
Friendships will grow
And the tea will flow.

Photos: Xoli Fuyani

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Plant-based diets: better for the planet but are they healthy for children?

Parents want to make informed decisions based on early-years research

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Environmental activists have helped to make plant-based diets more popular around the world. They point out that rearing animals for food is a significant source of greenhouse gas emissions. Researchers estimate that shifting to a plant-based diet could reduce emissions by the equivalent of up to 8 gigatonnes of CO_2 per year. That's equal to around 15% of the reduction in emissions needed to keep the global temperature rise below 1.5 ºC by 2050 (Roe et al., 2019).

There's a health argument too: studies have found that adults who follow vegan and vegetarian diets mostly get all the nutrients they need. And, of course, activists point out the benefits for animal rights.

But what about pregnant women, lactating mothers and young children? They have a greater need for energy, proteins and micronutrients. Are plant-based diets healthy for them too?

What the research says

Only a few studies have looked at plant-based diets and children, and their sample sizes are mostly small. One recent study of 430 children aged 1–3 in Germany found that those with vegetarian and vegan diets had similar physical development and energy intake to those with omnivorous diets (Weder et al., 2019). The main types of plant-based diets are vegetarian, which exclude meat and fish, and vegan, which additionally exclude dairy, eggs and sometimes honey.

But other research pointed to possible problems. A systematic review by Schürmann to evaluate studies on the dietary intake and the health status of vegetarian infants, children, and adolescents (from birth to 18 years), indicated that some children following plant-based diets had low levels of vitamins B_{12} and D. In addition, their growth and bodyweight were more likely to be below the 50th percentile, compared to children following diets that included animal protein (Schürmann et al., 2017). However, the researchers found that the evidence was too diverse to draw firm conclusions.

Separate studies of pregnant women in areas of Africa and Asia where diets rely predominantly on vegetables have shown low levels of vitamins B_{12} and D, calcium and zinc. A 2021 study in Israel found


Photo: Jon Spaull

that pregnant women following a vegan diet were more likely than omnivores to give birth to a newborn who was small for their gestational age (Avnon et al., 2021). Other researchers, however, have found that well-planned vegan diets can be safe during pregnancy and lactation (Sebastiani et al., 2019).

For infants, some research suggests that, when breast-feeding is not possible, soy-based formula is a safe alternative to dairy-based formula for infant growth and neurological development (Vandenplas et al., 2021). However, cases of rickets and protein malnutrition have been linked to children drinking plant-based milk instead of cow's milk, as these products may have lower levels of protein, calcium and vitamin D (Vitoria, 2017).

What official bodies recommend

Official recommendations on plant-based diets in pregnancy and early childhood stress the importance of careful planning. The US Academy of Nutrition and Dietetics, a trade group, states that "well-planned vegan, lacto-vegetarian, and lacto-ovo-vegetarian diets are appropriate for any age, including during pregnancy and lactation" (Melina et al., 2016).

"Official recommendations on plant-based diets in pregnancy and early childhood stress the importance of careful planning."

The Committee on Nutrition of the European Society for Paediatric Gastroenterology, Hepatology and Nutrition, meanwhile, puts the case more cautiously in a position paper: "Vegan diets should only be used under appropriate medical or dietetic supervision and parents should understand the serious consequences of failing to follow advice regarding supplementation of the diet." (Fewtrell et al., 2017).

Early years professionals may need better education to help parents make informed decisions. A study of 360 families in Italy, published in 2020, found that nearly half of respondents did not think their family paediatrician was sufficiently well informed to give them guidance on weaning their children from breastfeeding straight onto a vegetarian or vegan diet. Over three-quarters of the parents reported the paediatrician's resistance towards alternative weaning methods (Baldassarre et al., 2020).

A position paper by the North American Society for Pediatric Gastroenterology, Hepatology and Nutrition advises: "In young children beyond the first year of life requiring a dairy-free diet, commercial formula may be a preferable alternative to cow's milk, when such formula constitutes a substantial source of otherwise absent or reduced nutrients (e.g. protein, calcium, vitamin D) in the child's restricted diet. Consumer education is required to clarify that [plant-based milks] do not represent an equivalent source of such nutrients."(Merritt et al., 2020).

What should parents consider?

Pregnant women and caregivers considering plant-based diets for children should be advised to ensure adequate intake of eight key nutrients in particular (Müller et al., 2020):

- **Iron** is crucial for the growth and development of a child's central nervous system. While many plant-based foods contain iron, it is more difficult for the body to absorb compared to the iron found in animal products. Phytic acid – found in some plant-based foods, such as legumes, seeds and whole grains – inhibits its absorption.
- **Zinc** supports the immune system. While some legumes and whole grains are rich in zinc, its absorption is also inhibited by phytic acid.
- **Iodine** is essential for physical and neurological development. It is mainly found in seafood and dairy products, although seaweed is also rich in iodine, and some salt is iodised.
- **Omega-3** and other essential polyunsaturated fatty acids are crucial for children's neurological development. These are mainly found in animal products, although there are plant-based sources including some seeds and legumes.
- **Calcium** is necessary for good bone density. Plant-based sources include leafy green vegetables, but it is mainly found in dairy products.
- **Vitamin D** is also critical for bone health. Its main dietary sources are dairy products and fatty fish, although some plant-based foods are fortified with Vitamin D, and the body also generates it from exposure to sunlight.
- **Vitamin B_{12}** deficiency in breastfeeding mothers can affect the neurological development of their infants. B_{12} is found almost entirely in animal products, so vegans need to rely on supplements or fortified foods.
- The **proteins** found in vegetables often have a less diverse composition of essential amino acids than proteins found in animal products such as meat, fish, dairy and eggs.

A sufficiently well-planned plant-based diet is likely to be able to overcome most of these concerns, although those following a vegan diet will always need additional vitamin B_{12} supplements, frequently also vitamin D supplements, and occasionally supplements for other micronutrients such as omega-3 fatty acids for pregnant women. Parents should also be aware that, because plant-based diets are high in fibre, children will feel full more quickly, so they might eat less at each meal.

> "Early years professionals may need better education to help parents make informed decisions."

Given rising interest in plant-based diets, and their clear benefits for the environment, more research is needed. Pregnant women, parents, caregivers and healthcare professionals need clear guidance, in order to make the best decisions for children.

↗ **Find this article online at earlychildhoodmatters.online/2021-31**

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Children are central to Brazil's climate change movement

The country's youth- and parent-led movements join forces for nature

Photo: Felipe Gabriel

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Greta Thunberg's principled stance has been instrumental in putting climate justice on the agenda during the past three years. Greta shares in a tradition of youth activism that also has roots in Brazil. Engajamundo, Brazil's youth-led climate movement, was behind the remarkable "Another World is Possible" youth speech[1] at the closing ceremony of the Paris Agreement negotiations at COP21 in 2015.

Youth-led movements such as Engajamundo have done more to raise climate justice as an issue than 30 years of continuous pronouncements by decision makers.

↓ Grey bubble in Ibirapuera Park, São Paulo, Brazil, as an urban intervention to promote awareness of the risks of air pollution to children

But change is most likely when it comes from coordinated effort: youth groups have been working with other climate activists in Brazil to advocate for climate change action. Recently, Engajamundo joined with Greta Thunberg's group, Fridays for Future, to file a lawsuit against the Brazilian government about a "carbon trick manoeuvre" in the country's commitment to tackle climate change (Observatorio do Clima, 2021).

According to the Greenhouse Gas Emission and Removal Estimating System (2020), around 72% of Brazil's greenhouse gas emissions come from land use – especially related to deforestation, mainly in the Amazon. There is a clear correlation between burning forests and children's vulnerability: pollution from fires hospitalised 10,000 children in May and June of 2019 in the Amazon region (Fiocruz, 2019).

Fighting for climate justice for children

Fridays for Future has inspired other stakeholders to create similar groups, from Artists for Future to Teachers for Future to Lawyers for Future. There is also Parents for Future, a movement already present in 19 countries.[2] Famílias pelo Clima, for example, is a group of Brazilian parents, formed in 2019 with

1 The speech by Raquel Rosenberg, a representative of Engajamundo, at COP21 in December 2015 can be viewed at https://www.youtube.com/watch?v=MVnGHzZexQk

2 More about Fridays for Future, Parents for Future and Psychologists for Future can be found at https://fridaysforfuture.org, https://parentsforfuture.org and https://www.psychologistsforfuture.org respectively.

the mission of supporting children's demands for a safe climate future. In a short time, the group has done astonishing climate litigation work to defend children's rights. It has just won the first stage of a case against the government of São Paulo state, seeking to force the state to consider the climate emergency in tax incentive policy for the car industry (Famílias pelo Clima, 2021).

> "Placing children at the centre of the climate change movement is a must as we discuss ways to achieve climate justice."

The narrative of children's rights at the centre of climate action is gaining momentum on the issue of air pollution, which threatens children the most. Free to Play Outside is a global campaign to promote awareness of the impacts of air pollution on children, including by visualising air pollution as a large grey bubble[3].

Building a healthy relationship between children and the planet

Climate activists who are parents often discuss how and when to start engaging their children in the cause, especially when children are facing climate anxiety and climate grief – for which there is also the movement Psychologists for Future, working to support children to cope with these feelings (Wu et al., 2020; Pikhala, 2020). Greta's own experience is typical: after a period of depression, her path to becoming a climate activist involved the idea of "constructive hope", facing environmental crises by finding positive meaning in taking action (Chawla, 2020; Tapper, 2020).

However, when children are still too young to understand the concept of constructive hope, there is something very important parents can do: give them as much time in nature as possible. Research shows a connection between contact with nature as a baby or toddler and going on to engage in pro-environment causes in youth and adulthood (Suttie, 2016). As the environmental educator David Sobel says: "Give children a chance to love the earth before we ask them to save it."

A good example of how this can be done comes from Latin America. The project TiNis (short in Spanish for "Children's Land") is a methodology created by Joaquín Leguía from ANIA Foundation in Peru and brought to Brazil by Alana Institute and the model Gisele Bündchen. Simply giving children three pots, or half a square metre of soil, and teaching them step by step how to care for plants, generates active empathy for all forms of life.[4]

There are, of course, many other benefits for young children from being in nature, from developing their social and motor skills to improving their physical and mental health. Yet currently children spend around 90% of their time indoors (Klepeis et al., 2018). Changing this will require action not only from parents but also from political leaders – especially from cities – to guarantee access to nature.

Placing children at the centre of the climate change movement is a must as we discuss ways to achieve climate justice, given that children are among those predominantly impacted by climate change. As Greta once said: "You stole my future." Now we owe it to children in Brazil and around the world to give it back.

3 Follow the campaign Free To Play Outside online at https://www.freetoplayoutside.org

4 Videos and downloads from TiNis are available at https://tinis.com.br

↗ **Find this article online at earlychildhoodmatters.online/2021-32**

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↓ Grey bubble installation in Niterói. The bubble was part of an event on Icaraí Beach to raise awareness of how traffic contributes to air pollution in the city and promote alternatives such as cycling

Photo: Courtesy of Raphael Monteiro

How I became a mother activist

Harnessing the power of parents in climate organising

Maya Mailer
Campaign Lead, Our Kids' Climate
Organiser, Mothers Rise Up
London, UK

One Friday morning earlier this year, when I'd normally be racing to finish work emails and buy groceries for the weekend, I found myself standing in torrential rain outside Lloyd's of London, one of the world's biggest insurers of fossil fuels.

I was with a group of parents and their small children, including my own 3-year-old. We held giant props that had taken months to build, among them three-metre-high pushchairs carrying papier-mâché planets, and an oversized Father's Day card addressed to Lloyd's chairman, Bruce Carnegie-Brown.

We were there to convey a vital, heartfelt message to Carnegie-Brown, himself a father of four: "Do what's right for all our children and stop insuring and investing in fossil fuels."

Meanwhile, thousands of others in our global network of climate–parent groups – from Argentina to Australia, Germany to Nigeria – were sending specially illustrated online Father's Day cards to Carnegie-Brown, via Twitter, echoing our plea to stop insuring fossil fuels.

As we sang and chanted in the rain outside the towering Lloyd's of London building, I gripped my 3-year-old's little hand and a shiver went down my spine. I felt the potential of parents to fight for their children, and for the right to live on a healthy planet.

Our action eventually resulted in influential media coverage and meetings with senior staffers at Lloyd's. These staffers suggested that we were having an impact, and said that they and Carnegie-Brown had been fielding questions from their own children about the climate crisis.

Waking up to the climate crisis

My journey into climate–parent organising started three years ago. As an aid worker and human rights campaigner, I'd met farmers in South Sudan who faced increasingly unpredictable weather patterns. But the climate crisis seemed secondary to the violent conflict they faced. I didn't yet understand that progress on human rights risks being destroyed by the climate breakdown.

A constellation of factors woke me up: the wave of youth strikes, the daring of Extinction Rebellion protests, and my 5- and 7-year-olds coming home from school with questions: Why was the world getting so hot? Why were so many animals becoming extinct like the dinosaurs? If the Arctic was melting and cars were polluting, why did we still drive one?

Then, by chance, I met some women who were planning a mother-led climate protest. Soon I was helping a team of volunteers organise a Mother's Day climate march in central London. We wanted to show solidarity with youth school strikers, while creating a safe space for families with much younger children. Despite having no budget, the march drew some 3,000 people, many of them first-time protesters, and most with babies and toddlers in tow.

That event generated global media coverage and was the beginning of Mothers Rise Up[1], a volunteer network of UK mums. We soon connected with Parents For Future UK and other climate–parent groups in the UK and globally.

The climate–parent movement

Over the past five years, the climate–parent movement has grown exponentially. Two sister networks – Parents for Future Global and Our Kids' Climate[2] – bring together some 60 groups from over 20 countries. There are even several grandparent groups. While these groups differ, we are united by some common aims and methods:

- appealing directly to policymakers as parents and grandparents, including by developing strategic campaigns targeting governments and the fossil-fuel industry
- deploying the moral and emotional voice of parents, as guardians of the next generation, building intergenerational solidarity
- elucidating the connection between air pollution, children's health and climate change
- emphasising how the climate crisis affects families who have contributed least to historical carbon emissions
- using storytelling, art, letter writing and nature to inspire and engage parents, teachers and young children
- giving voice to the youngest children, and advising parents on how to discuss the climate in honest but age-appropriate ways.

1 You can follow the Mothers Rise Up campaign at https://mothersriseup.org.uk

2 More about Parents for Future Global and Our Kids' Climate' can be found at https://parentsforfuture.org and https://ourkidsclimate.org, with their parent support fellowship at https://ourkidsclimate.org/climate-parent-fellowship/

"I felt the potential of parents to fight for their children, and for the right to live on a healthy planet."

Photo: Maya Mailer

Photo: Maya Mailer

The climate–parent movement has enormous potential. Parents are everywhere: in boardrooms, governments, factories, schools and voting booths. I've also seen the simple power of chatting at the school gates, to normalise the conversation on climate. Parents – especially mothers – can be inspired to sign petitions, share on social media, engage with local politicians and join climate actions.

> "Parents are everywhere: in boardrooms, governments, factories, schools and voting booths."

Although being a parent doesn't necessarily create a unifying identity, evidence is emerging that the parent-led frame on climate change has resonance across ideological boundaries. Research from groups like More in Common and Climate Outreach suggests that certain notions resonate across diverse segments of British society: protecting children; giving them access to nature; and pointing to a sense of intergenerational duty (Wang et al., 2020).

While men are increasingly joining in, the climate–parent movement around the world is predominantly led by women. Often they work full-time and then join post-bedtime Zoom calls. They push for climate change in their workplaces, and drag recalcitrant children to climate events. Some take the risk of leaving traditional jobs in order to start new climate networks and campaigns.

The scrappy, volunteer nature of this work has benefits: we have an authentic voice and local reach that big charities struggle to replicate. Most of us have never met in person, but we share genuine bonds of friendship and solidarity, forged through countless WhatsApp messages and campaigns.

But funding is a chronic issue, along with volunteer burnout. A handful of parent–climate groups are

national NGOs with paid staff. But most activists are unpaid, and also have the demands of work and child rearing, compounded by school closures and lockdowns.

Some much-needed funding is arriving. For instance, Our Kids' Climate and Parents For Future Global have created a fellowship to support parent activists around the world, financed by Equation Campaign, UMI Fund and NorthLight Foundation. We're also getting savvier about how we collaborate with existing organisations. We coordinated the Lloyd's of London action with InsureOurFuture, a group that seeks to persuade insurance companies to stop underwriting fossil fuels.[3]

Despite the challenges, I'll keep going, alongside thousands of other activists. We're campaigning for a just transition away from fossil fuels to clean energy and for a safer, fairer, brighter future for our children. These days, when my kids come home from school asking about the latest wildfire or smashed heat record, at least I can say: "I'm trying, with so many other parents, to protect you and our precious planet."

3 Updates on this campaign by Insure Our Future can be found at https://insureourfuture.co

↗ **Find this article online at earlychildhoodmatters.online/2021-33**

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Four tips for turning parents into climate activists

by Frida Berry Eklund and Jill Kubit

Parents can play a key role in pressing for action on climate change. They vote, they make household decisions as consumers, they're key players in their local communities and they often hold power in their workplaces. Here are four key lessons we've learned as climate–parent organisers:

1

Use personal storytelling and simple narratives. The climate crisis is often communicated in language that's offputting to some audiences – either because it's too scientifically complex, or because it comes across as strident. To inspire and motivate parents, tell personal stories using language that's emotional, empowering and acronym-free. Focus on the need to protect our children's health and their future.

2

Use photos showing parents and families doing climate-related activities. Show ordinary people engaged in sustainable behaviours and solutions. This motivates others to adopt the same habits, and signals to policymakers that the public is ready for change.

3

Focus on organising locally. Organisers are most effective when they communicate directly with friends, family members and their own communities in a way that speaks directly to their identities and values. Create projects, actions and campaigns aimed at engaging other parents in your own neighbourhoods, schools, faith communities and workplaces.

Photo: Mariana Menezes

"To inspire and motivate parents, tell personal stories using language that's emotional, empowering and acronymfree."

← A selfie of Mariana Menezes and her family at their first climate strike. It was one of the first posts for Familias pelo Clima, Brazil. The poster says: their future depends on what we do now!

Photo: Courtesy of Creatives4Climate

4

Create family-friendly ways to get involved. Parents are busy! Hold meetings and other activities at times that work for caregivers. Avoid school pick-up hours, dinnertime and bedtime. Encourage parents to bring children with them to climate events. Provide snacks, games and fun activities; or organise at playgrounds and parks. Remember that some parents aren't comfortable demonstrating in the streets. Offer actions that they can take at home, at their children's schools, or in their communities.

↑ Local community organiser brings the DearTomorrow storytelling project to the Saturday Night Market in order to engage families in discussions about the climate. Pittsburgh, PA, USA

About the authors

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↗ **Find this article online at earlychildhoodmatters.online/2021-34**

Five lessons from a youth climate activist

What I've learned from making my case to people, companies and governments

Almaaz Mudaly
Youth climate activist
South Africa


Photo: Almaaz Mudaly

I am Almaaz Mudaly, a 14-year-old grade 9 school student in South Africa, and a global youth climate activist.

I'm not alone: young people here and around the world are playing an influential role in climate change activism. The environment is a key issue for young people everywhere. I've been able to make my case to corporate executives, government ministers, and other students from around the world. I believe that including youth perspectives in decision making inevitably creates a greater focus on long-term, often existential issues.

How does an ordinary middle-schooler become a global climate activist? My earliest memory of caring about the environment was when I was around 4 or 5, and I overheard my mum explaining that, in our neighbourhood, we would have to begin separating our waste for recycling. I immediately started labelling our bins for paper, plastic and food waste.

My formal activism began when I was 11, with a science project to design an eco-friendly lunchbox. I was alarmed to learn that a large portion of our population can't afford a lunchbox that keeps food cool under the hot African sun. I set out to design a carbon-negative, cheap, highly insulated cooler box. I called it the "Ultimate Cooler" and it was easily accessible to people from all socioeconomic backgrounds. I won a bronze medal at the International Science Fair for my efforts. But my "wow" moment was understanding that to solve the climate crisis, we will have to tackle poverty, inequality and many other issues too.

Taking youth perspectives seriously

Unfortunately, I've discovered that youth activists aren't always taken seriously. In March 2021 I participated in a consultation with representatives of South Africa's largest companies (and in some cases its biggest polluters). I and other activists discussed our ideas about how to make the private sector more sustainable and inclusive. However, we were met with arrogance from the business representatives. They seemed to use "green-washing" techniques to avoid detailing their future plans and they didn't grasp the intersectional issues. In order to solve the climate crisis, youth, business, government and other stakeholders must find a way to collaborate and innovate together.

However, at other moments I have felt that we've had an impact. For example, in October 2020 I was the South African youth representative at the European Union Climate Diplomacy Week closing ceremony. This was attended by EU ambassadors, European diplomats, government officials, big business people

and others. Our delegation crafted and submitted a document outlining our suggestions on how to make a just, green transition. Our voice was heard.

I also work with young people in South Africa to write declarations on climate change, using Model United Nations-style debates. I do this through the South African Institute of International Affairs, which administers a very active youth programme. Based on our debates, we write declarations containing policy recommendations and forward our work to South African provincial legislatures, which consider them for inclusion in policies and regulations. This is a refreshing example of diversity in policy.

One of my most exciting moments as an activist was in April 2021, when young people from all over South Africa gathered virtually to develop the first South African Youth Climate Action Plan (SA YCAP). I am the High School Liaison for the SA YCAP and facilitated a national youth parliament in which over 100 young people from across South Africa, representing their respective communities, debated clauses for the SA YCAP.

The final policy document – written by South African youth – described how we believe the country should tackle climate change. We handed this over to the South African government in October 2021, and hope it will inspire youth-led climate action across the country.

We still have much to learn

Over the past three years, my work in these different forums has made it clear that we can solve the climate crisis, once we decide to do so.

But to maintain the gains, we'll need to understand the links between the environment, social transformation and economic equality. Developing countries like South Africa have the hard task of balancing economic growth with our response to climate change. For example, do you close a factory that's polluting the environment, when whole communities depend on the wages it provides?

Although we still have many questions to answer, we have already learned a lot. **Here are five key lessons from my journey as a youth climate activist:**

1 **Solidarity!** Although we come from different places and cultures, we must work together across generations and backgrounds to pressure governments, big business and civil society to act with urgency.

2 **Accessibility.** Make information accessible to everyone, in simple terms and in their own languages. It should be easy for ordinary people to know about the policies that affect them. Don't say "carbon sequestration" when you can say "taking carbon out of the air".

3 **Creativity.** We must convey knowledge and information using creative methods, both traditional and novel, such as storytelling, that even non-scientists can understand. People who feel the dire effects of climate change might not realise what's causing it. Very few understand what limiting global warming to 1.5 ºC really entails. We South Africans know, from experience with Apartheid, the power of using theatre and art to convey strong messages.

4 **Equality.** Inequality within the education system must be reduced. There should be a universal basic curriculum on climate change. If we don't understand the issue, we can't contribute meaningfully.

5 **Voting.** Children can't vote, but our futures will be impacted by decisions made today. I believe that we need to change this, and call for youth to be allowed to vote. If I vote, my government will have to listen to me. The criteria for voting are based on age, not on any other important factors. We have to think past a person's age and rather consider their ability to understand and contribute in society. It will then become incumbent on the schooling system to prepare the child to vote in a meaningful way.

I see a bright future, we just need to work together with a clear goal! Climate change can be an opportunity. Environmental researchers and activists have only begun to explore solutions. On our quest for a healthier planet, we could open up new fields of science. That's what I'm looking forward to.

↗ **Find this article online at earlychildhoodmatters.online/2021-35**

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