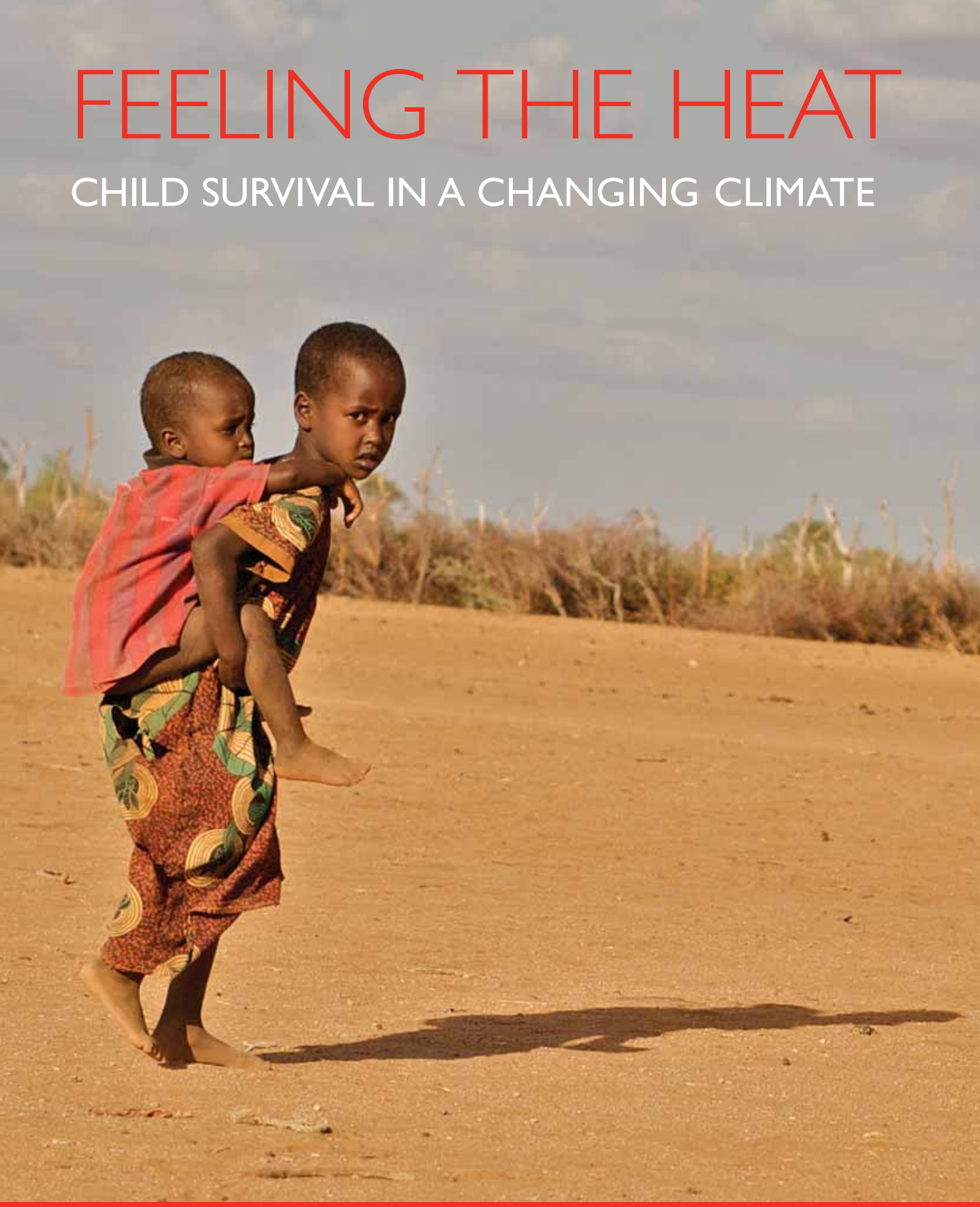
FEELING THE HEAT

CHILD SURVIVAL IN A CHANGING CLIMATE



Save the Children

FEELING THE HEAT

CHILD SURVIVAL IN A CHANGING CLIMATE

The International Save the Children Alliance is the world's leading independent children's rights organisation, with members in 29 countries and operational programmes in more than 100. We fight for children's rights and deliver lasting improvements to children's lives worldwide.

This report was written by Lydia Baker, with support from colleagues at Save the Children.

Published on behalf of the
International Save the Children Alliance by
Save the Children UK
1 St John's Lane
London EC1M 4AR
UK

First published 2009

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Registered Charity No. 1076822

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Cover photo: Mandera district, north-east Kenya. Food shortages caused by persistent drought and high food prices, coupled with the lack of adequate medical facilities, are threatening the lives of young children throughout Kenya. (Photo: Colin Crowley/Save the Children)

Typeset by Grasshopper Design Company
Printed by Park Communications Ltd

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CHILDREN UNDER PRESSURE

Abdi, 4, fell perilously ill in early 2009. He lost a third of his weight and came down with a life-threatening case of malaria. As part of Save the Children's community outreach nutritional programme in Wajir, north-east Kenya he was given life-saving high-nutrient food and medicine, and made a steady recovery.

Food shortages caused by persistent drought, coupled with a lack of adequate medical facilities, are threatening the lives of young children like Abdi throughout Kenya. Kenya has experienced a drought for four consecutive years, from 2005 to 2009 – every year of Abdi's life. His family is now dependent on food relief and is only able to eat two meagre meals a day.

Climate change is playing a role in chronic drought in Kenya and in other persistent and recurring disasters around the world. The percentage of the earth's land mass that suffers from severe drought conditions has trebled in the last 10 years from 1% to 3%. By 2020, this figure is predicted to be 8% and 30% by the end of the century.

Abdi, four, waits as his mother prepares a meal of boiled maize for her two children in their home in the Mandera district of north-east Kenya.

COLIN CROWLEY/SAVE THE CHILDREN

FOREWORD

Climate change presents many risks and threats to children from especially poor families. This report reminds us of the close connection between climate change and the other challenges facing poor children, such as poverty and rapid urbanisation. Danish development assistance focuses on finding solutions to these problems in cooperation with our partners.

All support to developing countries, be it humanitarian assistance or development assistance, must strive to build on capability and ownership. This is even more important in the light of the increased challenges posed by climate change. I therefore strongly agree with the conclusions of the report, that children should be treated as a resource for change and not only as victims.

The scale of the problems facing children in the poorest countries is huge. Every year nearly 9 million children die before their fifth birthday and 98% of them are born in the poorest countries of the world. These children are dying from diseases like diarrhoea, malnutrition and malaria – diseases that could be prevented and treated. This is not acceptable. It is even more worrying that the diseases affecting children the most are already occurring more frequently because of climate change. Climate change contributes to more extreme temperatures, and more frequent and intense droughts and flooding. I am concerned that the risk of children becoming the victims of climate change and environmental disasters is greater than ever.

The new Danish Humanitarian Strategy focuses on the most vulnerable people and tries to build climate change adaptation and catastrophe preparedness into our assistance at local level. The chance of survival for a child in a changing climate will increasingly depend on how much climate change affects the vulnerabilities that already exist and how well the communities are able to adapt. This report reminds us what could be done to protect the children.

Children are not responsible for climate change. But they may ultimately be the ones suffering the most and in risk of not surviving. I urge all governments to recognise what is at stake for the children of the world and join the Danish government in protecting the children's chances of survival in spite of climate change. I hope and trust that in Copenhagen in December 2009 we will agree to an ambitious climate agreement with a strong development focus. Now, more than ever before, the decisions we make today will affect the generations of tomorrow.

Ulla Tørnæs
Minister for Development Cooperation
Government of Denmark

EXECUTIVE SUMMARY

Climate change is the biggest global health threat to children in the 21st century. Without concerted action, millions of children will be at increased risk from disease, undernutrition, water scarcity, disasters, and the collapse of public services and infrastructure. No one will be immune to the effects of climate change, but one of the largest groups to be affected will be children under the age of five.[1]

The evidence is clear and mounting,[2] yet the link between climate change and child survival struggles to command public and political attention. It is vital that governments and the public understand what is at stake. Tackling the issues young children face as a result of climate change must be made a priority.

Today, most child deaths occur in the world's poorest countries and communities. Children are dying from a small number of preventable and treatable diseases and conditions, including diarrhoea, malaria and malnutrition. An estimated third of the entire global childhood disease burden is attributable to changeable factors in food, soil, water and air.[3] These diseases and conditions are predicted to worsen with climate change. For example, climate change will accelerate the spread of malaria in various parts of the world. By making access to clean water even more difficult, it will be harder to tackle diarrhoea, one of the biggest killers of young children. Dirty water and unsafe sanitation is a major secondary cause of child mortality. Climate change will increase the number of disasters like floods, droughts and cyclones that put children's lives at risk. And it will have very severe consequences for food security and nutrition. One-third of deaths of children under five are linked to undernutrition. Climate change will make it much harder for poor families to give their children a nutritious diet.

Because the effects of climate change on children are so significant, national governments and the international community must work together to chart a way forward. First, the effects of climate change on children need to be documented and recognised. This information will be vital in identifying appropriate interventions to support children to adapt to climate change. Second, interventions to adapt to the effects of climate change must focus on children's needs. Measures to strengthen health and social systems, to improve food security and reduce malnutrition through social protection, and to promote child-centred disaster risk reduction will become increasingly vital in a future altered by climate change. Finally, as it is still possible to avoid the worst predictions of climate change, governments must commit to a bold and binding international agreement to reduce greenhouse gas emissions.

Save the Children makes the following policy recommendations:

1. Donors and national governments should strengthen and 'climate proof' health, water and sanitation systems in developing countries with high levels of child mortality.

2. Donors, national governments and multilateral institutions should increase investment for and support to social protection strategies that have proven effective in tackling malnutrition and poverty among the poorest families.

3. Adaptation to climate change should involve children and support interventions that have been proven to respond to their needs and priorities. Children have the right to participate in decisions that affect their lives, and as such, adaptation planning, particularly national adaptation programmes of action (NAPAs), must involve children in identifying appropriate interventions.

4. Donors, national governments and the UN should ensure that the humanitarian system is fit for purpose and ready to cope with increased demand.

5. Donors and national governments should put multi-hazard early warning systems in place to alert officials to both slow- and rapid-onset disasters, as well as epidemics, before they reach full emergency levels.

6. Investments in disaster risk reduction by donors, national governments, the UN and multilateral institutions should be child-centred and ensure that children participate in identifying appropriate interventions.

7. National governments must sign a binding agreement in Copenhagen in December 2009 to reduce greenhouse gas emissions by 80% by 2050.

INTRODUCTION

Every year, nearly 9 million children die before they reach the age of five. The vast majority of these deaths – 98% – occur in low- or middle-income countries, and children from the poorest and most marginalised communities are dying in disproportionate numbers.[4] Most children die from a small number of diseases and conditions, including malnutrition, pneumonia, measles, diarrhoea, malaria, HIV and AIDS, and various neonatal conditions.[5] More than half of these deaths, 4.7 million, occur in sub-Saharan Africa, and 3.8 million occur in South Asia.[6] Due to high levels of poverty, exposure to disease and dependence on natural resources, these two regions are the most vulnerable to variations in climate in the short and the long term.[7]

Climate change is no longer a distant, futuristic scenario, but an immediate threat. Though its effects play out differently around the world, overall, it will have a negative impact on people's health and wellbeing. While it is difficult to say with certainty how many children are directly affected by climate change now and how many will be affected in the future, a recent report from the Global Humanitarian Forum estimates that today, 325 million people are seriously affected by climate change.[8] Four billion people will be vulnerable to the future effects of climate change and 500 million will be at extreme risk.[9]

Scientists agree that specific trends such as rising temperatures, rises in sea levels and more frequent natural disasters will profoundly affect children's lives, as will the 'slow-moving disasters', including gradual environmental degradation and decline of vital ecosystems associated with climate change. Reduced rainfall and rising temperatures will create hostile environments in which to grow staple crops. Production of rain-fed crops is predicted to fall by as much as 50% by 2020 in some parts of Africa. In parts of Asia, a decrease of up to 20% is expected, which could reduce children's access to food and increase food prices, as well as reduce the nutritional quality of available food.[10] Freshwater sources will dwindle, with 1.8 billion additional people facing water stress by 2080, reducing crop yields and increasing water-borne disease.[11] And more frequent and severe disasters, which will take their greatest toll on poor countries, will facilitate the spread of disease and undermine the health and social systems that are critical for child survival.

The effects of climate change on health, food security, access to clean water and livelihoods will, in turn, have an impact on existing trends such as migration and urbanisation, as well as on poverty and conflict – all of which affect child survival. People in the world's poorest countries – mostly women and children – will be hardest hit, making it even more difficult for them to cope and adapt. In addition, climate change has the potential to undermine resilience and push already poor families into deeper levels of chronic poverty, which can stay with them for generations and has long-term implications for children's survival. For example, the mortality rates for a child from the poorest 20% of households in many developing countries can be up to five times higher than a child from the richest 20% of households.[12]

While disease is directly responsible for the majority of child deaths, there is a host of secondary and structural causes that leave children vulnerable, including poor health facilities, lack of access to water and adequate sanitation, poverty, maternal education and inequality. Climate change will

interact with these causes and put children at further risk. It will also place additional pressure on fragile states, which struggle to provide even the most basic services to children and already rank among the highest for under-five child mortality. Eight of the ten countries with the worst rates of child mortality have recently experienced conflict, violence or political instability.[13]

Achieving all the Millennium Development Goals (MDGs) is essential for children. Three goals in particular – MDG 1, to eradicate extreme poverty and hunger, MDG 4, to reduce the under-five mortality rate by two-thirds, and MDG 5, to improve maternal health – are particularly important for child survival. But progress on achieving these goals has been slow, and at the current rate, many of the MDGs will not be achieved. Furthermore, climate change and its associated effects have the potential to reverse much of the progress made to date.[14]

A child's chances of survival will increasingly depend on how climate change contributes to existing vulnerabilities and how well communities are able to adapt. This report examines those vulnerabilities and identifies the adaptation measures that can be taken to benefit children.

THE DIRECT EFFECTS OF CLIMATE CHANGE ON CHILD SURVIVAL

Climate change is the biggest global health threat to children in the 21st century.[15] It is widely acknowledged that people in the poorest countries are most at risk – in fact, countries in sub-Saharan Africa and coastal regions of the Indian and Pacific oceans will be seriously affected. The impact of climate change on children in these areas and around the world will be far reaching: shifting disease patterns, growing numbers of people exposed to disease, as well as increasing caseloads for already overstretched and under-resourced health and social systems.

The effects of climate change on children need to be further documented in order to inform appropriate adaptation plans for developing countries as well as building on interventions that have proven successful in tackling child mortality. Understanding the links between climate change and the diseases and conditions that kill children in large numbers each year – including diarrhoea, malaria and malnutrition – is the first step.

DIARRHOEA AND WATER-BORNE DISEASES

It's hard to imagine how diarrhoea, a disease that in developed countries is considered a trivial and minor health concern, can still cost the life of a child. Yet every year, 2 million children under five years old die as a result of this easily treatable and preventable disease[16] – an estimated 85,000 of which are due to climate change.[17] Millions more children are affected every year, leaving them weak and further exposed to the effects of malnutrition.

Most cases of diarrhoea in children are caused by inadequate sanitation, poor hygiene, and unsafe drinking water.[18] Accessing clean water is already a daily challenge for more than 1.3 billion people around the world,[19] and if global temperatures increase by 2°C, an additional 1 billion to 3 billion people will experience water stress. This, in turn, will contribute to the growing incidence of diarrhoea and water-borne diseases.[20]

Extreme weather events such as flooding and drought, as well as changes in rainfall patterns, will also increase the prevalence of diarrhoea and water-borne diseases among children. Floods can contaminate groundwater supplies, which compounds the risk for people who already lack access to clean water and sanitation. Drought increases cases of diarrhoea as safe water sources dry up and people are forced to use contaminated water sources for cooking and drinking.

Estimates suggest that, due primarily to the effects of climate change, the caseload of diarrhoea is predicted to increase by between 2% and 5% by 2020 in countries with a per capita income of below $6,000.[21] In some parts of Africa, cases of diarrhoea could increase by as much as 10%. In addition, outbreaks of water-borne diseases such as cholera will become more prevalent. Diarrhoea and cholera are easily treatable with antibiotics and low-cost oral rehydration therapy, yet millions of children lack access to these lifesaving interventions.

MALARIA AND OTHER VECTOR-BORNE DISEASES

Evidence suggests that climate change, combined with changes in land use, population growth and deforestation,[22] will contribute to increases in vector-borne diseases such as malaria and dengue fever. Malaria already kills a million children each year, 80% of whom are children under five, and 2.5 billion people are at risk from the disease.[23] In Africa, a child dies from a mosquito bite every 30 seconds.[24]

Rising temperatures can increase the geographical range of vulnerable areas as well as altering the seasonality of vector-borne diseases.[25] In some areas where temperatures were previously low enough to keep malaria at bay, such as the Kenyan highlands, the average temperature has risen to a level that increases the risk of transmission.[26] Overall, an additional 260 million to 320 million people could be affected by malaria by 2080 because of its movement into new areas.[27]

Other vector-borne diseases are also on the rise such as schistosomiasis, leishmaniasis and dengue fever. Based on current population and climate change projections, an additional 2 billion people will be at risk of dengue transmission by 2085.[28] If all children in high-risk countries were to sleep under an insecticide-treated net, the threat of vector-borne diseases would be substantially reduced.[29]

HUNGER AND MALNUTRITION

As climate change takes hold, those countries already struggling to feed their people will be among the hardest hit and more children than ever before will be affected by hunger and malnutrition. This is particularly worrying for children in sub-Saharan Africa and South Asia, which have the world's lowest birth weights and highest prevalence of underweight children.

The magnitude of the problem is already shocking: malnutrition contributes to the death of 3.2 million children each year. More than 178 million children around the world suffer from malnutrition, and a third of all children under five in developing countries are chronically malnourished or stunted.[30] Thirteen million babies are born malnourished, and these babies are eight times more likely to die than a baby with a good birth weight.[31]

Climate change will affect nutrition and food security in a number of ways: through greater water scarcity, more frequent disasters, reduced food production and salinisation of agricultural lands.[32] The impacts of climate change on food security and nutrition are predicted to be most severe in countries with low economic growth and high levels of malnutrition.[33] By 2020, crop yields from rain-fed agriculture in some countries in Africa, including Burkina Faso, Malawi and Kenya, could fall by 50%.[34] In tropical and subtropical regions of Asia, harvests of rice and maize could fall by up to 40%.[35]

People also rely heavily on markets to supply their food needs at an affordable price. Research from nine developing countries has found that around 75% of rural households and 97% of urban households are net food buyers.[36] The poorest families in countries with high levels of malnutrition spend around 80% of their income on food;[37] even so, this is often not enough to provide their children with a healthy, diverse and nutritious diet. These families are especially vulnerable to market fluctuations and price hikes.

These types of fluctuations are particularly worrying, as climate change is predicted to be a driver in pushing up food prices in the future as a result of its adverse effects on agricultural production. The 2007–08 food price crisis is estimated to have forced an additional 100 million people into poverty and increased the number of children suffering permanent cognitive development and limited physical growth due to malnutrition by 44% – a staggering figure.[38] This crisis was linked to a number of inter-related causes, including, but not exclusively, increased demand for energy intensive food types such as meat and dairy, increased use of food crops as a biofuel, and

THE REALITY OF MALNUTRITION

India has the highest number of children dying in the world – nearly 2 million Indian children under five die every year and the country is home to one-third of the world's undernourished children. India has also been highlighted as one of the countries most at risk from climate threats, including drought, flooding and agriculture loss, which are likely to have a damaging impact on children's health and nutrition.

Praveen lives in Rajasthan, north-west India. She has lost a son to malnutrition, and one of her daughters is partially blind after falling sick. She is a mother of eight and says her children are constantly getting ill. She would like more support but isn't sure what help she needs or how she might get it.

"My child was five months old when he died. He was my sixth child and was malnourished. I'm not sure why he died. He had a bad cough and cold and was very weak. I didn't give him any medicine, and he then passed away really suddenly. I don't know who to go to if I need medicine. My children have all fallen ill at some point but I've never given them anything.

"I do have faith in doctors. I just know that illness and bad health happens to some children, and that my child just happened to be one of them."

Save the Children has launched a project to make mothers more aware and knowledgeable of key health issues and services available. The project aims to support the government's effort to make health and nutritional services available to everyone, especially in vulnerable communities like Praveen's.

KATE REDMAN/SAVE THE CHILDREN

Praveen with her two youngest daughters

drought in key food-producing regions. In order to fully assess and respond to the impacts of future crises and the effects of climate change on household food security,[39] real-time data is essential to understand how crises affect the poorest people. This information must be used to inform global debates and influence policy.

Today, 45 million people are estimated to be hungry as a result of climate change,[40] and this total is predicted to rise to between 80 million and 210 million during the next few decades.[41] It is estimated that by 2050 there will be 25 million more malnourished children as a result of climate change.[42]

The worst-case scenario predicts that in 2080 there could be 1.3 billion hungry people in the world, 550 million of whom could be hungry as a result of climate change, and 480 million of whom will be living in Africa.[43] Children in the developing world will be hit hardest.

INCREASING FREQUENCY OF DISASTERS

The most immediate and direct impact of climate change on children's lives is through increasingly frequent and intense natural disasters. Weather-related disasters are on the rise; over the past two decades, the number of disasters has doubled from 200 a year in the 1980s to more than 400 a year today.[44] These disasters affect the lives of around 250 million people each year, approximately half of whom are children. As climate change combines with existing trends such as land degradation, decline of ecosystems and population growth, the number of people affected by natural disasters is likely to increase by 320%.[45]

Disasters also affect children in many other ways. They are at greater risk of injury, deteriorating nutritional status, water-borne diseases and a lack of sanitation. The psychosocial disruption and emotional turmoil experienced by children during a disaster can have long-term implications for their health and wellbeing. If children are displaced as a result of the disaster, they may be separated from their parents or carers, or even lose one or more members of their family.

During or following a disaster, there is often a reduction in breastfeeding of babies and young children. This can be due to mothers being separated from their children, mothers feeling less capable to breastfeed because of stress and a lack of support to ensure they can continue, or because breastmilk substitutes are more readily available. This results in an increase in malnutrition and risk of disease, and potentially death in the youngest, most vulnerable children.

Finally, it should be noted that natural disasters are far more deadly in poor countries than in rich countries. For example, high-income countries account for 39% of the exposure to tropical cyclones, but just 1% of the mortality risk. Low-income countries, however, face just 13% of the exposure to tropical cyclones, but suffer 81% of the mortality risk.[46] Clearly, it is not just exposure to hazards that makes poor countries vulnerable to natural disasters. A combination of factors relating to social and economic development and the extent to which a country has invested in effective disaster response, early warning and risk reduction systems are essential determinants of disaster risk.[47]

WHEN DISASTER STRIKES

Cyclones are predicted to become more frequent and intense as a result of climate change. Investing in reducing the risks of disasters is essential to ensure communities are warned and prepared ahead of time.

But when disasters strike without warning, children and their families have little time to escape to safety. Cyclone Nargis hit Myanmar in May 2008, nearly 140,000 people were killed and 2.4 million people were affected.

Nyi Lay, 12, lived with his family in a village in Labutta. When the cyclone struck, their house was about to collapse, so Nyi Lay's father decided they should move to higher ground on the lake bank.

"My mum was holding my younger brother and my older sister was holding my younger sister. There were about 30 people on the lake bank. The wind and the rain became stronger and the tide level covered the bank. We dipped our legs in the mud so we didn't drift away with the tide. When the water level was up to my dad's chest, we decided to climb the trees. Suddenly, the tree fell because of the strong winds. Then, I was separated from my mum and dad.

"I clung to a tree trunk and floated along with it. The rain was really heavy and it was painful when it hit my back. I drifted the whole night, and I was terrified. I couldn't find my mum, dad and younger sister."

Nyi Lay was registered in Save the Children's Family Tracing Programme and was reunited with his sisters and grandmother a few weeks later. Sadly, there has not been any news from his parents and his youngest brother. "I miss my parents and brother," he says, "I always wonder whether they are still alive."

Nyi Lay (left), reunited with his grandmother and sisters

2

THE INDIRECT EFFECTS OF CLIMATE CHANGE ON CHILD SURVIVAL

As well as undermining food security and contributing to the spread of disease, malnutrition and disasters, climate change also threatens to damage the very systems that underpin child survival. Children will face a 'double exposure' from climate change, not only through its direct impacts (described in the previous chapter) but also its indirect impacts on health and social systems, access to water and sanitation and migration and population displacement. While it is impossible to determine the total number of child deaths due to the indirect effects of climate change, estimates reflect an increasingly troubling future for children.

In many developing countries, health and social systems are under resourced and are often unable to meet the needs of the poorest people and children. It is essential that climate change adaptation focuses on strengthening these systems, as well as providing additional support to ensure that they are 'climate proofed' – better able to withstand the effects of climate change. Finally, increasing migration and urbanisation driven by climate change must be addressed, as these trends have knock-on effects – including loss of livelihoods, lack of access to essential services like health and education, and inadequate shelter – that further undermine a child's chances of survival.

The following sections consider the indirect effects of climate change on children's survival in relation to five key areas: health systems, livelihoods, migration and displacement, urbanisation, and the impact on women.

WEAKENED HEALTH SYSTEMS

The worst-case scenario predictions for climate change suggest that health systems in poor countries with high levels of child mortality, which are already overstretched, will come under even greater pressure.

Functioning health systems – which comprise organisations, institutions and resources devoted to improving health – are vital to child survival. Health services require an adequate workforce and resources, as well as appropriate financing, a functional information system with good leadership and governance.[48] When functioning to full capacity, they can provide a continuum of care for mothers and children during the antenatal period, childbirth, the postnatal and neonatal periods, and childhood. Perhaps most importantly, they enable mothers to deliver children safely and provide necessary assistance if complications develop. This is critical, as the first 24–48 hours of a child's life often determine their future – up to 2 million children die on the day they are born.[49]

Climate change is likely to affect health systems in several ways. Its impact on the global economy could lead to decreases in national budgets for healthcare. This will be a challenge for the least developed countries, where health ministries are already over-extended, health services are understaffed and lack essential medicines and care facilities. Health services in developing countries are also likely to be overwhelmed

by the additional disease burden driven by climate change. Furthermore, as climate change is altering the geographical spread of disease, health workers will need to respond to diseases they may not have had to deal with before.[50]

In many parts of the world, the poorest people – predominantly women and children – have little or no access to healthcare. User fees, opportunity costs, transport costs and the cost of medicines already create barriers to access.[51] As a result, the wealthiest families in developing countries are nearly twice as likely to access essential healthcare than the poorest families.[52] Furthermore, countries with high rates of child mortality in some of the regions predicted to be worst affected by climate change still lack access to skilled health workers to provide services to women and children. In Afghanistan, for example, which has one of the worst child survival rates in the world, only 14% of births are attended by a skilled health worker.[53] In Ethiopia, this figure is even lower, at 6%.

A staggering 500,000 mothers in developing countries die every year during childbirth or from complications during pregnancy.[54] Evidence suggests that babies whose mothers die in the first six weeks after having given birth are far more likely to die in the first two months of life than babies whose mothers survive.[55] In Afghanistan, it was found that 74% of infants born alive to women who died either in childbirth or through complications after childbirth, also died.[56]

For women and children living in conflict-affected states, health and social services are often simply unavailable. For example, in the Democratic Republic of Congo (DRC), the conflict caused an additional 5.4 million deaths between April 1998 and August 2007. Of these, 47% were children under five, although they make up only 19% of the population. Only 0.4% of the deaths were through direct violence; the vast majority were caused by infectious disease, malnutrition and neonatal and pregnancy-related conditions.[57]

Natural disasters also have a devastating impact on health systems – health facilities can be destroyed, staff are unable to get to work or even killed, and people's access to care is reduced just when they need it most. In large-scale emergencies, up to 50% of hospital capacity can be lost.[58] Initiatives like the World Disaster Reduction Campaign on Hospitals Safe from Disasters are essential to ensure that health centres can withstand extreme weather events associated with climate change. Taking a risk reduction approach in the design and construction of health facilities, having emergency preparedness plans in place and using early warning systems to identify health epidemics are just a few examples of how this can be achieved. Such measures are not prohibitively expensive; adding 4% to the construction costs of a new hospital or health centre is enough to ensure that it can be constructed to withstand disasters.[59]

IMPACT ON FRAGILE LIVELIHOODS

For people who rely on agriculture and other natural resources for their source of income, climate change and environmental degradation will make livelihoods increasingly fragile. Around 1.5 billion people across the world rely on small-scale farming, and variations in weather, temperature and crop productivity affect food consumption and poverty, bringing significant implications for child survival.

Natural resource-based livelihoods have always been subject to changing environmental circumstances and farmers have always had to adapt. However, climate change brings new challenges that threaten to overwhelm coping capacity, reduce resilience and negatively affect child survival. Changing weather patterns, land degradation and the use of fertilisers will result in natural resource-based livelihoods becoming less productive in many areas.

People who live around coastal areas and earn their living from the sea will also be affected. Rising sea levels are already contaminating surface and underground water supplies, directly affecting people's health, as well as agricultural production

FORCED TO MOVE

Environmental degradation and desertification, combined with the effects of climate change, are making rural livelihoods in many areas unsustainable, forcing people to leave in search of opportunities elsewhere.

Sheema was only 14 when she married her husband, who is 11 years older than her. When Sheema lived in Barisal, in the south of Bangladesh, she used to go to school. But she had to drop out when their family home was destroyed by river erosion and they moved to Dhaka, where they now live in an inner-city slum.

"My family couldn't afford to send me to school in Dhaka," Sheema, now 19, said. "I worked in a garment factory."

Soon after she married, Sheema became pregnant with her first daughter, now four, and later gave birth to her second child, now 14 months. The family lives in a one-room house in a slum in the oldest part of Dhaka, and share a toilet and cooking area with at least 20 other families. To make matters worse, Sheema has tuberculosis.

"My husband earns 4,500 Taka a month (about £40.50)," Sheema adds. "It's not enough. I need to go to work. I have children now, I can't go to school [but] I want to send them to school."

Despite making good progress in reducing child mortality and malnutrition in recent years, nearly half of all children under five in Bangladesh are underweight or small for their age. Save the Children is training local women to visit newborn babies and their mothers at home to give them basic healthcare advice.

MUNEM WASIF/AGENCE VU

and the ecosystems upon which the poorest people depend.[60] Sea levels have already risen by 4cm and are predicted to rise further by as much as 79cm by the turn of the next century (2100).[61] As a quarter of the world's population live within 100km and 100m elevation of the coastline,[62] this is a major concern.

INCREASED MIGRATION AND DISPLACEMENT

Extreme weather events, gradual environmental change and a rise in sea levels will increase the number of people moving away from their homes, both temporarily and permanently. Estimates vary, but by the middle of this century, between 50 million and 200 million people could be displaced due to climate change.[63] Most of these people will move within their own country, but many will cross international borders.[64]

The reasons why children leave their homes and migrate to other areas are complex and multidimensional, but migration has both positive and negative outcomes.[65] Recent research by Save the Children explored the movement of millions of children within and between countries.[66] The results found that the majority of children move with their parents. However, many children move independently to find work to support themselves or their families, to escape chronic poverty, to escape from abuse or exploitation, to pursue educational opportunities, or as a result of conflict or natural disasters.

Children who move alone face a number of risks, including abuse and exploitation, as well as lack of access to basic services. For example, children who move alone and without relevant documentation such as a birth certificate or identity (ID) card are often denied access to social welfare, education and healthcare.[67] To ensure that children who move independently are protected as climate-induced migration increases in the future, national and international policies, legislation and services must be introduced as a matter of urgency, with explicit provision for protection of migrant children.

Sudden-onset natural disasters or conflict can also result in large population displacements, compounding the threat to child survival. In 2008, 27 million people were displaced as a result of conflict or armed violence and at least 36 million people were displaced by natural disasters. Children in temporary shelters and resettlement camps often suffer from higher levels of malnutrition,[68] as well as diseases associated with overcrowding and exposure such as pneumonia (which is globally the biggest killer of children under five). Pneumonia is also related to smoke from cooking fires in overcrowded shelters, where displaced people often find themselves living. Overcrowding can lead to the rapid spread of diseases such as measles. Measles outbreaks can be particularly deadly in countries experiencing or recovering from a natural disaster or conflict. Damage to health infrastructure and services also interrupts routine immunisation programmes.[69]

Finally, displaced mothers and children often lose access to essential health services, and displaced children are more likely to be separated from their families. Large-scale humanitarian assistance, as well as protection, is required to support children who find themselves cut off from families and services.

IMPACT ON URBANISATION

With more than half the world's population now living in cities, the convergence of increasing urbanisation with climate change will pose new threats to child survival. Estimates suggest that around 900 million urban-dwellers in low- and middle-income countries live in poverty; 650 million of these people lack access to water, and 800 million lack access to sanitation.[70] Many people live in overcrowded slums on low-lying and marginal lands. These areas are particularly vulnerable to disasters, fires and infectious disease as they are densely populated, with poorly constructed houses.

Contaminated water, poor sanitation and hazardous waste[71] in urban environments are exceptionally dangerous for children. Rising temperatures can result in heat waves that are particularly acute in

SURVIVAL IN THE CITY

Kroo Bay is a coastal slum area of Freetown, the capital of Sierra Leone. The population of Kroo Bay is estimated at 6,000 but the numbers of people continue to increase as families migrate to the city with their children in search of work. Kroo Bay itself is below sea level and, due to overcrowding, land has been reclaimed from the sea by piling mud on top of mountains of rubbish. As a result, Kroo Bay is extremely vulnerable to the impact of climate change.

When the rainy season peaks from June to September, heavy tropical showers send torrents of water, mixed with the city's rubbish and mud, right through Kroo Bay. The inadequate sewers are quickly blocked, and the whole area is flooded. Stagnant water provides a breeding ground for malarial mosquitoes and outbreaks of diarrhoea, which happen every year during the rainy season. Flood waters run through people's homes, and children regularly suffer with coughs and colds.

Sierra Leone has the world's worst infant and maternal mortality rates. One in four children die before they reach the age of five and one in six mothers dies during childbirth. Save the Children is training volunteer health workers and improving water supplies and sanitation, as well as responding to emergencies and helping prevent them in the long term.

Kroo Bay in Freetown, Sierra Leone

AUBREY WADE

urban settings; rising temperatures and the 'heat island effect' can raise temperatures by 5–12°C.[72] In addition, poor air quality affects respiratory disease and children's health. Indeed, a 1°C rise in temperature could increase global deaths from air pollution by over 20,000 a year. Finally, one-third of all children in urban areas of low-income countries are stunted, and mortality rates of children under five are 5–20 times higher than they would be if urban populations had adequate access to healthcare and nutrition.[73] As more people move to urban areas, this influx will exacerbate the current situation and increase risks to children's survival.

Urbanisation is occurring at a rapid rate. More than 50% of the world's population, around 3.3 billion people, now live in urban areas compared to 15% in 1990, and this figure is expected to rise to 5.3 billion by 2050.[74] Migration to urban areas is also an adaptation strategy in itself: where agricultural and natural resource-based livelihoods are no longer viable, people often have no choice but to leave their rural homes in search of alternative livelihoods and economic stability or stay behind and try to eke out a living. Cities can offer a wealth of opportunities, with greater access to wage labour in factories and industry. For many people, the potential benefits of moving to a city outweigh the costs.

ADDITIONAL BURDENS ON WOMEN

The changes brought about by climate change – desertification, reduced agricultural production, changing weather patterns – will place additional burdens on women and girls, which in turn will affect children's chances of survival. Women in developing countries are predominantly responsible for feeding and caring for their children, as well as being involved in household food production or buying food from local markets. Girls also carry a large burden of household responsibilities, often collecting fuel and water, as well as caring for other family members.

Women make up two-thirds of the world's poor people and an estimated 70–80% of agricultural workers. As climate change is predicted to reduce agricultural productivity in many areas, women will face an additional threat to their livelihoods, with few alternative options for earning an income. Furthermore, as water resources become depleted, women and girls in developing countries who have no choice but to collect water will have to walk even greater distances or buy water from street vendors, often at inflated prices.

Another critical issue is access to education. Women themselves identify education as an essential strategy to help their children adapt to the effects of climate change in the long term.[75] In addition, education is vital for women's empowerment and for maternal, newborn and child survival. The evidence is clear: children of mothers with no education are more than twice as likely to die or be malnourished than children of mothers who have secondary education or higher qualifications.[76] Nonetheless, girls' access to education during conflict or natural disasters can be severely reduced. Girls are the first to be pulled out of school to support their families, carry out household chores or work to bring in extra income.[77] As these situations intensify and become more frequent as a result of climate change, girls' access to education could be further compromised.

Women and children must be consulted and involved in strategies to adapt to climate change. Women show exceptional leadership and are the first to make changes in their communities and for their children to reduce disaster risk as well as adapt to climate change. Unless women are involved in decision-making, leadership and implementation, efforts to reduce the risks associated with disasters and climate change are unlikely to succeed.[78]

INTERVENTIONS TO TACKLE CHILD SURVIVAL

To reduce the threats to child survival from the effects of climate change, it is essential that adaptation strategies focus on the needs of children in the world's poorest countries. Climate change adaptation refers to the ways individuals, communities and governments prepare for and respond to the effects of climate change. Between $100 billion and $300 billion each year will be needed to meet the adaptation needs of developing countries.[79] It is imperative that this funding be additional and not diverted away from existing development and humanitarian aid budgets. To ensure that children's needs are adequately addressed, adaptation measures will need to give attention to nutrition, health systems, child-centred disaster risk reduction and social protection.

STRENGTHENING HEALTH SYSTEMS

To increase children's chances of survival, strengthening health systems at all levels – national, district, sub-national and local – must be a central component of adaptation. Adults and children who are in good health are less vulnerable to disease and therefore have greater adaptive capacity. Yet health systems in many countries are weak and ineffective and fail to meet the needs of the poorest people, leaving millions of children at risk. Additional investment is needed to enable sufficient health staff to be recruited and retained, and trained to prepare for and manage health emergencies.

It is vital that there are effective, multi-hazard early warning systems in place to detect epidemics or changing disease patterns, as well as systems that will activate response to epidemics quickly and efficiently. Health ministries also need support to develop their capacity to prepare for and respond to health emergencies. In order to do so, they will need access to international funds to enable them to adapt to climate change, predict its likely effects on health systems, and reduce the risk and impact of natural disasters or epidemics.

In the meantime, interventions to save a child's life need not be expensive or complex. Simple solutions such as mosquito nets (for malaria), access to oral rehydration therapy (for diarrhoea) and vaccinations against common diseases (such as measles) are highly effective. Yet millions of children today still lack access to these life-saving interventions. In Nigeria, for example – a country with one of the highest rates of child mortality – only 1% of children under five years old sleep beneath an insecticide-treated net.[80] Climate change should bring a renewed sense of urgency to providing these life-saving interventions to children and their families due to its impact on disease distribution.

FOOD SECURITY AND NUTRITION

Given the likely negative effects of climate change on children's nutrition and food security, it is essential that adaptation measures focus on these areas. High levels of poverty, fragile and natural resource-based livelihoods, as well as a lack of purchasing power are among the underlying causes that lead to chronic food insecurity. As a result, efforts to promote greater food security

and to tackle malnutrition in the context of climate change must build on and broaden interventions that have proven successful in reducing malnutrition, building people's resilience to shocks, and reducing poverty.

Proven approaches to address malnutrition and the broader issue of food insecurity among poor populations are safety nets and social cash transfers (key components of social protection). Safety nets include transfers of for example cash or vouchers in emergency situations, often delivered by non-governmental or UN agencies, that strengthen access to food and that prevent them having to sell livelihood assets. Social cash transfers are usually delivered by governments on a permanent basis in order to address poverty and vulnerability. Both approaches have a critical role to play in building people's resilience to shocks, helping them cope with them when they occur, and reducing child mortality.[81]

Cash transfers provide predictable, regular cash grants to individuals or households. For example, in Ethiopia, Save the Children successfully targeted the most vulnerable households, who received seasonal cash or food transfers as part of the government's Productive Safety Net Programme. In Swaziland, part of Save the Children's response to the drought in 2007 focused on providing food and cash transfers.[82] In both settings, cash transfers increased the poorest families' access to nutritious foods, increased the diversity of food consumed, and increased investment in alternative livelihood activities and healthcare.

Save the Children's experience has shown that spending on healthcare can triple when cash transfers are used. In addition, households receiving reliable and predictable sources of cash no longer turn to coping mechanisms that could be harmful in the long term, including withdrawing their children from school or the sale of assets such as livestock.[83]

To date, the climate change treaty negotiations in the run-up to the UN Climate Change Conference in Copenhagen in December 2009 have focused on the role of insurance as a way of supporting adaptation to the effects of climate change. Less attention has been paid to a wider package of social protection measures, including cash transfers. Cash transfers that actively target children under five as well as pregnant and lactating mothers have the potential to tackle malnutrition brought about by climate change.

On a wider scale, adaptation measures must target the poorest people worldwide. During the Climate Change Congress in March 2009 (a meeting attended by more than 2,500 delegates from 80 countries), calls were made for funds for adaptation to support a global safety net for the poorest people affected by climate change. Save the Children supports this call and argues that children's needs must be prioritised in all adaptation interventions.

NATIONAL PLANNING TO ADDRESS ADAPTATION

Countries with high rates of child mortality should focus adaptation plans on reducing child mortality. Adaptation plans should be mainstreamed into national disaster management policy, poverty reduction programmes and other national-level instruments. For adaptation plans to be successful, they must be adequately funded and ensure that children participate in planning and decision-making.

Forty of the world's Least Developed Countries (LDCs) have developed a National Adaptation Programmes of Action (NAPA) designed to meet urgent adaptation needs. Though the extent to which these plans focus on children's issues – and child mortality in particular – varies considerably, they include priority needs and adaptation activities specific to each country's context. The Least Developed Countries Fund (LDCF) of the Global Environment Facility (GEF), established under the United Nations Framework Convention on Climate Change, provided funding for LDCs to develop these plans.

However, while funding was made available to draw up adaptation plans, there is a lack of funding to implement the urgent activities identified. As a result, only a very small number of projects have been funded – in all, the projects identified in the NAPAs total around $1.5 billion.

Future, updated NAPAs and additional adaptation planning should focus on securing children's right to participate in decision-making. Involving children in the planning, design and implementation of projects is the best way to ensure that their needs are addressed, and that the project will be successful.

INTEGRATING CLIMATE RISK INFORMATION

In order to adapt to changing environments and risks brought about by climate change, it is essential that climate and weather-related projections and forecasts reach the very people whose lives depend on them, as well as the organisations, governments and donors who work with them. For example, if information is shared effectively and in a timely manner, farmers can adapt their planting accordingly and not have to wait and hope that their crops will grow successfully each season. This information is also essential for all aspects of development and humanitarian planning.

INVESTING IN CHILD-CENTRED DISASTER RISK REDUCTION

Activities undertaken before the onset of a natural disaster can build people's resilience to shocks and help ensure that children and their families are as prepared as they can be. Disaster risk reduction (DRR) is defined as any activity carried out by a village, community, aid agency or government that helps prepare for, reduce the impact of, or prevent disasters. DRR includes all strategies and practices designed to minimise vulnerability and disaster risk at all levels of society.[84] DRR has been highlighted by the UN Secretary-General Ban Ki-moon as the first line of defence in adapting to climate change.[85]

While some natural disasters are natural in their origin, the gravity of their impacts is not beyond our control. Children and their communities can become more resilient to the risks posed by disasters. The actions of donors, governments, aid agencies, communities and individuals can help reduce children's vulnerability. Indeed, DRR is increasingly considered a priority in climate change negotiations. More needs to be done to move beyond rhetoric and ensure that climate change adaptation and DRR are linked in policy and practice, to increase children's chances of survival whenever disaster occurs

Children are among the most vulnerable people when a disaster strikes – but they should not be seen as victims. Save the Children's experience shows that, given the space and opportunity, children can meaningfully participate and show leadership in activities to protect themselves as well as their wider community from the effects of a disaster. They are also best placed to identify their needs and plan what needs to be done for an effective response. In Vietnam, for example, children taking part in a Save the Children DRR programme identified two simple interventions to help them during flooding: pre-positioning emergency boats to take them to school, and learning how to swim (see case study on page 17). Yet children's specific needs are frequently ignored or not sufficiently taken into account by communities, aid agencies and governments.

Even with DRR measures in place, there will be times when local capacity will be overwhelmed and an international intervention will be required. The proliferation of natural disasters – including small-scale, climate-related events – will challenge the humanitarian system's ability to respond. In order to meet increased needs, aid must be swift and well targeted, and donors must ensure that staff on the ground in a position to scale up quickly. Wherever possible, it will be crucial to help communities prepare for and respond to the increasingly frequent threat of disaster.

REDUCING THE RISKS

Floods are a regular occurrence in some parts of Vietnam. Involving children in activities to reduce the risks from flooding means that children – and their families and communities – are better prepared. It also empowers children.

Bui Thi Thu Hang, who lives in a flood prone area in Vietnam, goes to a 'disaster preparedness club' at her school. "Through involvement with the club, I learned so much about how children can prepare for disasters to help reduce casualties and how we can be confident about expressing our ideas to adults to help make our community a safer place," she says.

"I was selected to lead the club as I was the class head and because I was one of the pupils living in a disaster-prone area. We produce a risk map that shows all the vulnerable areas as well as evacuation routes where people can make their way to safe areas. Our club members go to the vulnerable areas and talk to people about how and when to leave. Through a network of friends and families, our members also monitor at-risk areas and inform the People's Committee of Storm and Flood Control if there is a change in the situation.

"When we want to talk to communities about preparedness, I don't get scared at all talking to adults. The only thing in my mind is to inform people that they are living in a dangerous area and they must know how to protect themselves. I believe that children have a right to be heard and we have good ideas that people should listen to."

PHOTO: TUL PINKAEW/SAVE THE CHILDREN

Bui Thi Thu Hang with an illustration showing steps to tackle the threat of flooding

4

CONCLUSION AND RECOMMENDATIONS

Many of the countries with the highest levels of child mortality and predicted to be most affected by climate change are largely unprepared for the additional challenges they will face. Children in these countries – especially children under the age of five – are in danger of increased risk of mortality.

The sooner global emission of greenhouse gases that cause climate change are reduced, the less severe the impact of climate change will be. For mitigation to have its desired effect, global temperatures must be kept as far below an increase of 2°C as possible.[86] There is little time to lose: global temperatures have already risen by 0.76°C and the 12 warmest years on record occurred within the past 13 years.[87] To ensure that the worst-case scenario predictions are not realised, governments must commit to a bold and binding international agreement to reduce global emissions.

Even if all greenhouse gas emissions were halted tomorrow, the earth's average temperature would continue to rise by 0.6°C by 2050, as greenhouse gases already trapped by the earth's atmosphere can take decades to cause warming. While it is within our power to reduce emissions, we cannot turn back the clock. This is why adaptation strategies for the poorest countries must be an integral part of any agreement on mitigation; adaptation strategies need to be adequately funded and reach affected communities without delay.

Governments must provide resources to strengthen health systems in developing countries, and invest in social protection. They must also support other measures to tackle malnutrition such as increased access to improved agricultural inputs, and find ways to increase the availability of nutrient-rich foods for the most vulnerable people. Donors and aid agencies should invest in adaptation and DRR plans that address children's needs. In addition, there should be greater coordination and policy coherence to reduce risks and build people's resilience to both sudden- and slow-onset disasters.

Finally, donors and developing country governments must re-focus their efforts to achieve the MDGs – particularly the goals for improving child health and reducing poverty and hunger – to give children themselves the best chance of adapting to and surviving the effects of climate change. National governments and international institutions also have a moral obligation to ensure that interventions to improve children's chances of survival are 'climate proofed' to withstand climate change.

The world's poorest children are not responsible for climate change, yet they are the ones who are hardest hit – the decisions taken in Copenhagen in December 2009 will affect them the most, and they must not be forgotten. The time to act is now.

Save the Children makes the following policy recommendations:

1. Donors and national governments should strengthen and 'climate proof' health, water and sanitation systems in developing countries with high levels of child mortality.

2. Donors, national governments and multilateral institutions should increase investment for and support to social protection strategies that have proven effective in tackling malnutrition and poverty among the poorest families.

3. Adaptation to climate change should involve children and support interventions that have been proven to respond to their needs and priorities. Children have the right to participate in decisions that affect their lives, and as such, adaptation planning, particularly National Adaptation Programmes of Action (NAPAs), must involve children in identifying appropriate interventions.

4. Donors, national governments and the UN should ensure that the humanitarian system is fit for purpose and ready to cope with increased demand.

5. Donors and national governments should put multi-hazard early warning systems in place to alert officials to both slow- and rapid-onset disasters, as well as epidemics, before they reach full emergency levels.

6. Investments in disaster risk reduction by donors, national governments, the UN and multilateral institutions should be child-centred and ensure that children participate in identifying appropriate interventions.

7. National governments must sign a binding agreement in Copenhagen in December 2009 to reduce greenhouse gas emissions by 80% by 2050.

REFERENCES

Executive summary

[1] In many countries already feeling the effects of climate change, children under five make up between 10% and 20% of the population.

[2] E Heelas, *Child Climate Change and Undernutrition: A review*, London School of Hygiene and Tropical Medicine

[3] A McMicheal, S Friel, A Nyong and C Corvalan, 2008, Global environmental change and health: impacts, inequalities and the health sector, *BMJ*, 336: 191–194

Introduction

[4] UNICEF, *The State of the World's Children 2009: Maternal and newborn health*, pp 8–9, UNICEF, 2008

[5] R Black, S Morris and J Bryce, 'Where and why are 10 million children dying each year?', *The Lancet*, **361**, 9376, 2003, pp 2226–2234

[6] UNICEF, 2008 – see note 4

[7] Intergovernmental Panel on Climate Change (IPCC), *Fourth Assessment Report: Climate Change 2007: Impacts, adaptation and vulnerability*, 2007

[8] Global Humanitarian Forum, *Climate Change: The anatomy of a silent crisis*, Global Humanitarian Forum, 2009

[9] Global Humanitarian Forum, 2009 – see note 8

[10] Intergovernmental Panel on Climate Change (IPCC), 2007 – see note 7

[11] Save the Children, *Reducing Risks, Saving Lives*, International Save the Children Alliance, 2009

[12] Demographic and Health Surveys, www.measuredhs.com accessed 24 September 2009

[13] UNICEF, 2008 – see note 4; Uppsala Conflict Database and Crisis Group, Uppsala Universitet, www.pcr.uu.se/database.indexphp, accessed 3 August 2009

[14] E Levina, *Adaptation to Climate Change: International agreements for local needs*, Organisation for Economic Co-operation and Development (OECD), 2007

1 The direct effects of climate change on child survival

[15] A Costello, et al, 'Managing the health effects of climate change', *The Lancet*, **373**, 9676, 2009, pp 1693–1733

[16] UNICEF, *The State of the World's Children 2008: Child survival*, UNICEF, 2007

[17] The Global Humanitarian Forum estimates that 95,000 fatalities from diarrhoea are as a result of climate change, and as children under 5 account for 90% of those who die, our estimates suggest that 85,000 children are dying from diarrhoea associated with climate change.

[18] World Health Organization (WHO), *Combating Waterborne Disease at the Household Level*, 2007

[19] Intergovernmental Panel on Climate Change (IPCC), 2007 – see note 7

[20] Intergovernmental Panel on Climate Change (IPCC), 2007 – see note 7

[21] Intergovernmental Panel on Climate Change (IPCC), 2007 – see note 7

[22] Up to one-fifth of global emissions come from deforestation. After the USA and China, Indonesia and Brazil are the third and fourth biggest emitters of greenhouse gases

[23] World Health Organization, *Climate Change and Human Health: Risks and responses*, 2003 http://books.google.co.uk/books?id=tQFYJjDEwhIC&dq=McMichael+Climate+change+and+health:+risks+and+response+2003&printsec=frontcover&source=bn&hl=en&ei=67YKSpWbKaWTjAfHt623Cw&sa=X&oi=book_result&ct=result&resnum=4#PPA96,M1 accessed 26 September 2009

[24] B Obama, 'A pledge to end deaths from malaria by 2015', 2007 http://obama.3cdn.net/c66c9bcf20c49ee2ce_h6ynmvjq8.pdf accessed 24 September 2009

[25] Intergovernmental Panel on Climate Change (IPCC), 2007 – see note 7

[26] A Githeko and W Ndegwa (2001), 'Predicting malaria epidemics in the Kenyan Highlights using climate data; a tool for decision makers', *Global Change Human Health*, Vol 2:1, pages 54–63

[27] B Obama, 2007 – see note 24

[28] S Hales, N de Wet, J Maindonald and A Woodward, 'Potential effect of population and climate changes on global distribution of dengue fever: an empirical model', *The Lancet*, **360**, 9336, 2002, pp 830–834

[29] Global Health Council, 'Interventions in Health', www.globalhealth.org/child_health/interventions/ accessed 26 September 2009

[30] R Black, L Allen, ZA Bhutta, L Caulfield, M de Onis, M Ezzati, C Mathers and J Rivera, 'Maternal and child undernutrition: global and regional exposures and health consequences', *The Lancet*, **371**, 9608, 2008, pp 243–260

[31] R Black, et al, 2008 – see note 30

[32] Intergovernmental Panel on Climate Change (IPCC), 2007 – see note 7

[33] UN Food and Agriculture Organization (FAO), *Special Event on Impact of Climate Change, Pests and Diseases on Food Security and Poverty Reduction*, Background Document, 2005, http://ncsp.va-network.org/UserFiles/File/PDFs/Resource%20Center/Agriculture/FAO_31st.pdf accessed 26 September 2009

[34] Intergovernmental Panel on Climate Change (IPCC), 2007 – see note 7

[35] A Costello, et al, 2009 – see note 15

[36] Food and Agriculture Organization, *The State of Food Insecurity in the World 2008*, 2008

[37] J Bernard, 'Impact of prices on households' livelihoods in Burkina Faso', Save the Children UK, unpublished research, 2008

[38] Global Economic Prospects 2009, World Bank, January 2009.

[39] Global Poverty Alert Non Paper, 9 March

[40] Global Humanitarian Forum, 2009 – see note 8

[41] Intergovernmental Panel on Climate Change (IPCC), *Climate Change 2001 Synthesis Report: Summary for policymakers*, 2001

[42] G C Nelson et al, *Climate Change: Impact on agriculture and costs of adaptation*, International Food Policy Research Institute, 2009

[43] Intergovernmental Panel on Climate Change (IPCC), 2001 – see note 41; R Warren, N W Arnell, R J Nicholls, P E Levy and J Price, 'Understanding the regional impacts of climate change', Research report prepared for the Stern Review on the Economics of Climate Change, Tyndall Centre Working Paper 90, 2006

[44] EM DAT, CRED www.emdat.de

[45] M Webster, J Ginnetti, P Walker, D Coppard and R Kent, *The Humanitarian Costs of Climate Change*, Feinstein International Center, 2008

[46] United Nations International Strategy for Disaster Reduction, Global Assessment Report on Disaster Risk Reduction: Risk and poverty in a changing climate, 2009

[47] United Nations International Strategy for Disaster Reduction, 2009 – see note 46

2 The indirect effects of climate change on child survival

[48] World Health Organization, 'Health systems', www.who.int/topics/health_systems/en/ accessed 26 September 2009

[49] UNICEF, 2008 – see note 4

[50] A Costello, et al, 2009 – see note 15

[51] Save the Children, *Helping Children Survive: Supporting poor families to overcome barriers to maternal, newborn and child health services*, Briefing paper, 2008

[52] D Gwatkin, S Rutstein, K Johnson, E Suliman, A Wagstaff and A Amozou, 'Socio-economic differences in health, population and nutrition within developing countries: An overview', Washington, World Bank, 2007

[53] L Bartlett, S Mawji, S Whitehead, C Crouse, S Dalil, D Ionete, P Salama and Afghan Maternal Mortality Study Team, 'Where giving birth is a forecast of death: maternal mortality in four districts of Afghanistan', 1999–2002, *The Lancet*, **365**, 9462, 2005, pp 864–870

[54] MDG Goal Eight Report, Child Survival Factsheet

[55] UNICEF, 2008 – see note 4

[56] L Bartlett et al, 2005 – see note 53 www.dkmic.de/afghanistan/Afghanistan%20maternal%20mortality.pdf accessed 26 September 2009

[57] B Coghlan, P Ngoy, F Mulumba, C Hardy, V Bemo, T Stewart, J Lewis and R Brennan, *Mortality in the Democratic Republic of Congo: An ongoing crisis*, International Rescue Committee/Burnet Institute, 2007, www.theirc.org/resource-file/irc-congo-mortality-survey-2007 accessed 26 September 2009

[58] UN Special, *Statement by the Director General of the WHO*, May 2009 www.unspecial.org

[59] International Strategy for Disaster Reduction (ISDR), World Health Organization and World Bank, *Hospitals Safe from Disasters: Reduce risk, protect health facilities, save lives*, 2008–2009 World Disaster Reduction Campaign

[60] Intergovernmental Panel on Climate Change (IPCC), *Climate Change and Water*, IPCC Technical Paper VI, 2008, www.ipcc.ch/pdf/technical-papers/climate-change-water-en.pdf accessed 26 September 2009

[61] A Costello, et al, 2009 – see note 15

[62] Intergovernmental Panel on Climate Change (IPCC), 2007 – see note 7

[63] 'Climate-displaced people' is the term used to describe people who, predominantly involuntarily, are forced to move or are displaced, either permanently or temporarily, because of climate change, through its impacts and related shocks

[64] United Nations Framework Convention on Climate Change, *Climate Change, Migration and Displacement: Who will be affected?*, http://unfccc.int/resource/docs/2008/smsn/igo/022/pdf accessed 26 September 2009

[65] Save the Children, *Away from Home: Protecting and supporting children on the move*, 2008

[66] Save the Children, 2008 – see note 65

[67] Save the Children, 2008 – see note 65

[68] S Bartlett, *Climate Change and Urban Children: Impacts and implications for adaptation in low- and middle-income countries*, International Institute for Environment and Development (IIED), Human Settlements Discussion Paper Series, 2008, www.iied.org/pubs/pdfs/10556IIED.pdf accessed 26 September 2009

[69] Measles is one of the leading causes of deaths in young children, causing 4% of mortality in children under 5, with more than 95% of deaths occurring in low-income countries with weak health infrastructure

[70] UN-Habitat, *Water & Sanitation in the World's Cities: Local action for global goals*, Earthscan, 2003

[71] S Bartlett, 2008 – see note 68

[72] World Health Organization, *Protecting Health from Climate Change – World Health Day 2008*, WHO, 2008, www.who.int/world-health-day/toolkit/report_web.pdf accessed 26 September 2009

[73] D Dodman and D Sattherthwaite, 'Institutional capacity, climate change adaptation and the urban poor', *IDS Bulletin*, **39**, 4, 2008

[74] UN-Habitat, *State of the World's Cities 2008/2009: Harmonious cities*, 2008

[75] International Institute for Sustainable Development (IISD), CARE and Save the Children, *Climate-related vulnerability and adaptive capacity in Ethiopia's Borana and Somali communities*, forthcoming

[76] Save the Children US, *State of the World's Mothers 2006: Saving the lives of mothers and newborns*, 2006

[77] Save the Children, *Delivering Education for Children in Emergencies: A key building block for the future*, International Save the Children Alliance, 2008, www.savethechildren.org/publications/rewrite-the-future/delivering_education_emergencies.pdf accessed 26 September 2009

[78] ISDR, *Gender Perspectives: Integrating disaster risk reduction and climate change adaptation – Good practices and lessons learned*, 2008, www.unisdr.org/eng/about_isdr/isdr-publications/17-Gender_Perspectives_Integrating_DRR_CC/Gender_Perspectives_Integrating_DRR_CC_Good%20Practices.pdf accessed 26 September 2009

3 Interventions to tackle child survival

[79] Stamp Out Poverty, *Assessing the Alternatives: Financing climate change mitigation and adaptation in developing countries*, 2009, www.stampoutpoverty.org/?lid=10939 accessed 26 September 2009

[80] UNICEF, 2009 – see note 4

[81] Save the Children, *Lasting Benefits: The role of cash transfers*, 2009

[82] S Devereux and P Jere, 'Choice, Dignity and Empowerment?' Cash and food transfers in Swaziland. An evaluation of Save the Children's emergency drought response 2007/08, June 2008, www.ids.ac.uk/ index.cfm?objectid=21BE5A77-5056-8171-7B354BE571F19A42 accessed 26 September 2009

[83] Save the Children, *How cash transfers can improve the nutrition of the poorest children: Evaluation of a pilot safety net project in southern Niger*, 2009, www.savethechildren.org.uk/en/54_7871.htm accessed 26 September 2009

[84] Save the Children, 2009 – see note 11

[85] 'Secretary-General calls on Ministers to champion risk reduction as core element of climate change adaptation, implement such policies as first line of defence', UN Department of Public Information, News and Media Division, New York, September 2008, www.un.org/News/Press/docs/2008/sgsm11841.doc.htm accessed 26 September 2009

4 Conclusion and recommendations

[86] A Costello, et al, 2009 – see note 15

[87] A Costello, et al, 2009 – see note 15

FEELING THE HEAT

CHILD SURVIVAL IN A CHANGING CLIMATE

”Climate change greatly increases the risk that the most basic rights of children in poor countries will not be met. These children are particularly vulnerable to the impacts of global warming and yet least to blame.

“Save the Children’s report is very important and timely, coming just a month before the start of the Climate Conference in Copenhagen. Policy-makers all over the world must use this opportunity to adopt an ambitious agreement that will ensure that global warming does not exceed 2°C. Exceeding this limit would have devastating consequences for poor children and other vulnerable groups. Norway and other rich countries must make sure that there is funding for disaster risk reduction and adaption in poor countries, and make it attractive for developing countries to choose climate-friendly development options.

“Save the Children’s report identifies practical steps that should be taken in order to ensure that the world’s most vulnerable children are given a chance of survival.”

Erik Solheim, Minister of the Environment and International Development, Government of Norway

“The world is facing urgent development needs. We see examples of poor countries and people who have not contributed to climate change being hit hardest by the consequences. Development for the sake of development is not what we need. We need sustainable development, where clean water, food and medicines are accessible to everyone.

“There are many expectations, hopes and demands being directed at us as world leaders ahead of the UN Climate Change Conference in Copenhagen in December 2009. And so there should be. The decisions we make in Copenhagen on how to reduce our emissions and adapt to climate change will have a real impact on our future. Not just our future, but the future of the next generation. This affects all of us; this is why the work of Save the Children, not least its report *Feeling the Heat*, is a welcome contribution showing genuine commitment.”

Andreas Carlgren, Minister of Environment, Government of Sweden (holder of the presidency of the EU, July–December 2009)

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