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Bartlett, S. 2009. "Children in the Context of Climate Change: A Large and Vulnerable Population." Pp 133-148 in: *Population Dynamics and Climate Change*, edited by J.M.Guzmán, G. Martine, G. McGranahan, D. Schensul and C. Tacoli. New York: UNFPA; London: IIED.

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Children in the Context of Climate Change: A Large and Vulnerable Population

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Introduction

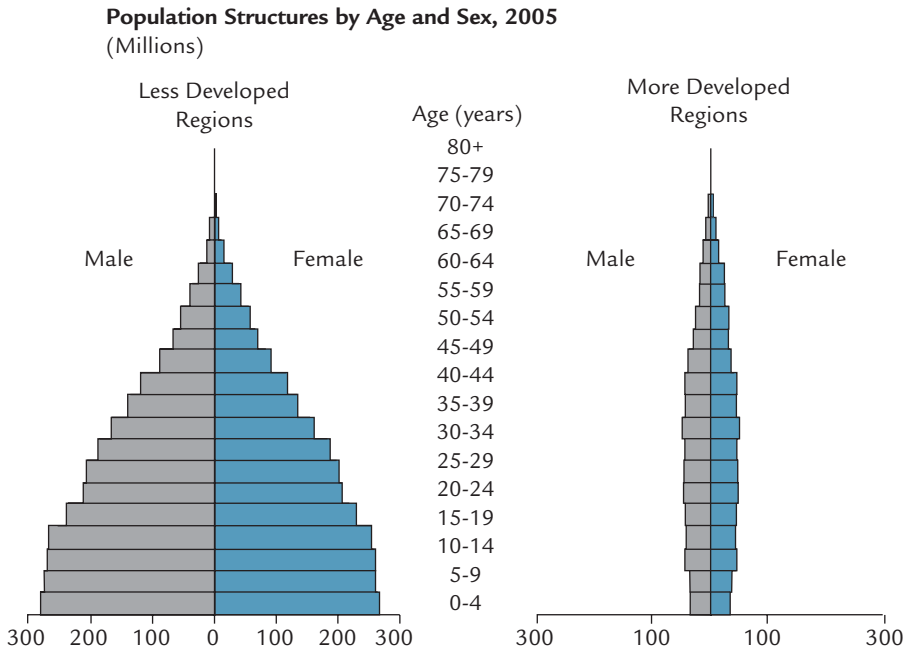
It is generally acknowledged that low-income countries and poor communities worldwide are most seriously at risk from the probable impacts of climate change. This is not because climate change will necessarily be more extreme in these places (although this will often be the case¹), but because people, their enterprises and the places they occupy are so much more vulnerable in the context of poverty. These people are less well served by protective infrastructure and services, less able to adapt and prepare for extreme weather events and are often more dependent on local climate-sensitive resources. In urban areas especially, poor people frequently occupy the most risk-prone areas. Among these vulnerable populations, children, and, particularly, very young children, are especially at risk for a number of reasons, which will be discussed later in this chapter. The fact that children in poor countries and communities also tend to make up a very large part of the population only serves to heighten the concern. In order to be most effective, measures taken to adapt to climate change must take into account the disproportionate and often different ways in which children can be affected, bearing in mind not only their substantial presence and their vulnerability, but also their potential resilience, with adequate support, and their capacity to contribute actively to adaptation measures.

Background

Despite the rapid global decline in fertility over recent decades, which has occurred even in most low-income countries, a very high proportion of the population in these countries still consists of children and adolescents (Figure 8.1).²

In high-income countries, people under 18 make up about 20 per cent of the population. In many of the low-income countries most exposed and most vulnerable to climate change, they are closer to half the population (for instance, 42 per cent in Bangladesh, 51 per cent in Nigeria and 57 per cent in Uganda). Even more to the point is the proportion of highly vulnerable children under five—they make up between 10 and 20 per cent of the population in countries more likely to be

Figure 8.1: Age Distribution of the World's Population



Source: United Nations, 2005.

seriously affected (for instance, 11 per cent in India, 12 per cent in Bangladesh, 17 per cent in Mozambique and Nigeria and 21 per cent in Uganda). In higher-income countries, the proportion of under-fives is closer to 4 or 5 per cent (UNICEF, 2007).

This lopsided distribution is most apparent in sub-Saharan Africa, where over 40 per cent of the population is under 15. Here, as well as in North Africa, the Middle East and in many parts of Asia, the largest sector of the population is under five years of age. This is despite under-five mortality rates that continue to exceed 100 per thousand live births in some countries.

Within countries, differences in distribution also exist, and, again, it is often the poorest communities that have the highest proportion of children. For instance, National Family Health Survey data show an average of four children per woman among Delhi's poor compared to 2 per woman among the city's non-poor (UHRC, 2006).

The child population is expected to grow more slowly over coming decades than the population as a whole, and, in many parts of the world, it is expected to decline in number. But in those places where the proportions of children are already highest, the absolute number of children is expected to continue to grow. Over the coming decades, increasing numbers of these children will live in urban areas, often in the informal settlements and hazard-prone parts of cities which are frequently the only places where land can be found. Especially in the context of rapid urbanization, these settlements can be among the most vulnerable to extreme weather events (Parry et al., 2007). It is difficult to generalize about how urban age structures are changed by migration, since this depends, for instance,

on the nature of the migration, whether it is temporary, seasonal or long term and whether migrants move individually or as families. But high levels of in-migration often increase the proportion of young adults and thus can lead to increased birth rates (although rural migrants' fertility rates tend to decline once in the urban areas). A city's age structure may also be influenced by substantial out-migration by older groups as they return to 'home' villages or towns.

What does all this mean in the context of climate change? In the broadest and most simplified terms, it means that the populations most vulnerable to the likely challenges posed by climate change are also those with the highest concentrations of children in need of care, and with the lowest ratio of caregivers and bread winners to children. This reality arguably increases the vulnerability of these populations in a rather dramatic way. Larger numbers of young children add to the burdens simply by virtue of their age and need for care. In addition, in the context of many of the risks posed by climate change, their needs are likely to intensify, since their stage of development leaves them especially vulnerable to many of the hazards. Children who become ill, malnourished, injured or psychologically affected by disasters, famines, displacement or deepening poverty will increase the challenges faced by their families and communities. With appropriate support, children can be extraordinarily resilient to shocks and stresses, but in extreme situations that affect many people, these supports may not be reliably available.

This is not the only reality posed by high concentrations of children, however. Young children unquestionably need care. Older children and adolescents need care, too, but they also can, and often do, contribute to their households and communities in a range of ways. It is easy to overlook their energy, ingenuity and eagerness to be involved in meaningful ways. Ten- to 18-year-olds are a substantial part of the population, especially in low-income countries and communities. But in terms of formal planning for adaptation and preparedness, they are a resource that is too seldom recognized and drawn upon.

Given these very basic realities, policy and planning for adaptation in the face of climate change needs to be based, among other things, on an understanding of the particular vulnerabilities of children, both girls and boys. It is also important to understand how resilient children can be and how productive and proactive in responding to challenges in their lives. Adaptation, in these terms, means considering how to strengthen and support the capacity of children and adolescents to cope with the full range of risks and adversity associated with climate change, as well as that of the families and communities on which they depend.

Understanding the Impacts of Climate Change on Children

Children, especially young children, are in a stage of rapid development and are less well equipped on many fronts to deal with deprivation and stress (Engle et al., 1996). Their more rapid metabolisms, immature organs and nervous systems,

developing cognition, limited experience and behavioural characteristics all contribute to their vulnerability. Their exposure to various risks is also more likely to have long-term repercussions than for adults.

Almost all the disproportionate implications for children are intensified by poverty and the difficult choices low-income households must make as they adapt to more challenging conditions. Events that might have little or no effect on children in high-income countries and communities can have critical implications for children living in poverty. The likelihood of poor developmental outcomes is considered to increase cumulatively with the number of risks they face, whether physiological or psychological.³ Children on the edge, like families on the edge, have fewer assets—in every sense of the word—to draw on and are more likely to be adversely affected by the various challenges imposed by climate change. At the same time, it is important to recognize that relating risks to outcomes for children is not a simple matter of accounting. Many variables come into play, including the meanings that events have for people, and these variables can relate to one another in complex ways. Children driven into work by their families' increasing poverty, for instance, may be academically disadvantaged, but they may also feel a sense of pride and achievement in their capacity to contribute that could boost their confidence and resilience (Boyden, forthcoming).

There has been little hard research on the impacts of climate change on children. Even where more general impacts are projected, figures are seldom disaggregated by age or sex. But the fact is that, in large part, the challenges associated with climate change will intensify existing difficulties, not present an entirely new set of conditions. This can legitimately be extrapolated from existing knowledge on environmental health, disaster responses, household coping strategies, the effects of poverty on children, children's resilience and the beneficial effects of their participation in various efforts. These all contribute to a picture of the implications for children and adolescents of extreme events, as well as more gradual changes, and of the adaptations that are likely to be made.

Health and survival

The disproportionate health burden for children of challenging environmental conditions is well documented. According to a conservative estimate, children under 14 are 44 per cent more likely to die because of environmental factors than the population at large. The same gap exists for morbidity, and it increases greatly when the potential loss of healthy life years is considered (Prüss-Üstün and Corvalán, 2006). The greater burden, especially for the youngest children, then, is not a minor matter of degree, and it is likely to be exacerbated in many places by climate change.

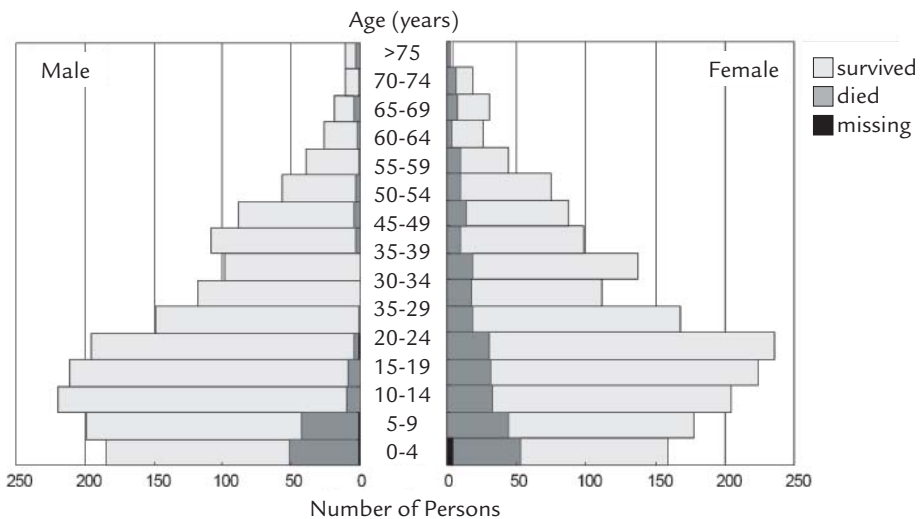
Mortality in extreme events: In low-income countries, the loss of life during such extreme events as flooding, high winds and landslides is shown repeatedly to be disproportionately high among children, women and the elderly, especially among

the poor. A study of flood-related mortalities in Nepal, for instance, found that the death rate for children aged two to nine was more than double that of adults, and pre-school girls were five times more likely to die than adult men. The risk for poor households was six times that of higher-income households (Pradhan et al., 2007).

The distribution of deaths related to the 2004 Indian Ocean tsunami followed a similar pattern, as shown in Figure 8.2 (Nishikiori et al., 2006). Although the tsunami was not related to climate change, it can still provide insight into patterns of death during an extreme event. The higher mortality rates for girls and women have been related to the fact that they are more often responsible for small children, a fact which may limit their mobility. The loss of these primary caregivers can leave surviving children and families still more vulnerable (Nishikiori et al., 2006).

In slower onset disasters such as droughts and famines, mortality rates are also much higher for young children. Situations are commonly defined as emergencies when crude mortality is 1/10,000/day and under-five mortality is double that (Sphere Project, 2004). Although the higher rate for young children is not unreasonable, given average under-five mortality rates in low-income countries (UNICEF, 2007), it nevertheless highlights a grim reality: High mortality rates for young children, which would be unthinkable in high-income countries, are routinely accepted as a baseline indicator of normality in low-income nations. And, while overall death rates for young children continue to drop in most parts of the world due to improved health care, immunization rates and environmental conditions, for many of the children most at risk from the biggest killers—diarrhoeal and respiratory diseases, malaria and malnutrition—the situation is likely to worsen with some of the effects of climate change.

Figure 8.2: Age and Gender Distribution of Tsunami-related Deaths



Source: Nishikiori, et al., 2006.

Water and sanitation-related illnesses: Children under five are the main victims (80 per cent globally) of sanitation-related illnesses (diarrhoeal disease, primarily) because of their less-developed immunity and because their play behaviour can bring them into contact with pathogens. These illnesses also results in higher levels of malnutrition and increased vulnerability to other diseases, with effects on overall development. During heavy or prolonged rains, blocked drains and flooded latrines can make contamination difficult to avoid, increasing the incidence of diarrhoeal illness in children.⁴ Where the incidence and duration of rainstorms increase because of climate change, these conditions will become more prevalent. Contamination of water supplies is also a risk during droughts. After extreme events, diarrhoeal illnesses related to breakdowns in sanitation can take more lives than the initial disaster (WHO, n.d.).

Malnutrition: Malnutrition results from food shortages (as a result of reduced rainfall, other changes affecting agriculture and interruptions in supplies during sudden acute events), but it is also closely tied to unsanitary conditions and to children's general state of health. Even when there is enough food available, the calorie intake of small children in dirty surroundings may go in large part towards fighting off infection (Solomon et al., 1993). When children are malnourished, their vulnerability to infection is greatly increased, and a vicious cycle results (Lechtig and Doyle, 1996). A chronically malnourished two- or three-year-old may be at a permanent disadvantage, becoming both physically and mentally stunted (Grantham-McGregor et al., 2007). Children in Africa born in drought years, for example, are significantly more likely to be malnourished or stunted (UNDP, 2007). Research in Zimbabwe found that children who had been in the critical 12- to 24-month age group during a drought in the early 1980s were, in adolescence, an average of 2.3 inches shorter than the mean (Alderman et al., 2004).

It is important not to underestimate the long-term implications of the malnourishment that may accompany climate change—not only for the children involved, but also for their families and for society at large. Malnourishment can lead to physical stunting, but also to mental stunting and diminished potential over a lifetime. In the case of the Zimbabwean children in the research just cited, their estimated potential loss in lifetime earnings was calculated to be 14 per cent. If children are basically healthy and well fed, catch-up growth will happen quickly once recovery is under way. But if children are already undernourished, they are less likely to withstand the stress of an extreme event either in terms of their immediate response or their long-term development. Infants are at particular risk. Stresses related to a crisis may affect mothers' breast milk production; at the same time, breast-milk substitutes present a serious health risk in unsanitary environments (Caldwell, 1996; IFE Core Group, 2006). Malnutrition appears to be a greater risk among children of displaced families,⁵ which may be related to the poor levels of sanitation in many temporary shelters as well as to the effects of displacement on household coping strategies.

Malaria and other tropical diseases: Warmer average temperatures are expanding the areas where many tropical diseases can occur, with children most often the victims (Bunyavanich et al., 2003; Ligon, 2006; Kovats and Akhtar, 2008). In many locations, the most serious threat is malaria. Up to half the world's population is now considered to be at risk, an increase of 10 per cent in the last decade (Breman et al., 2004). More than 90 per cent of the burden is in Africa, where 65 per cent of mortality is among children under five (Breman et al., 2004). Malaria also increases the severity of other diseases, thereby more than doubling overall mortality for young children (Snow et al., 2004). *There is growing evidence, too, of its impact for child development more generally.* This potential effect can result directly from the insult to the brain during acute episodes of malaria, but it can also be related to the effects of anaemia, repeated illness and the under-nutrition associated with the disease (Holding and Snow, 2001).

Heat stress: Along with the elderly, young children are at highest risk from heat stress: Children sweat less and have more surface area relative to body mass (Bytowski and Squire, 2003; Lam, 2007). Research in São Paulo found that for every degree increase above 20°C, there was a 2.6 per cent increase in overall mortality in children under 15 (the same increase as for those over 65) (Gouveia, 2003). Risks for younger children are even higher. Those in poor urban areas may be at highest risk because of the 'Urban Heat Island' effect, high levels of congestion and little open space and vegetation (Kovats and Akhtar, 2008). *Higher temperatures can also increase the risk of disease.* In Peru, for instance, over a six-year study, hospital admissions of young children for diarrhoea increased by 8 per cent with every degree centigrade increase above the normal average temperature (Checkley et al., 2000).

Injury: Injury rates are related to challenging conditions, overcrowding, chaotic environments and higher levels of preoccupation on the part of adults (Berger and Mohan, 1996)—all factors commonly experienced in the post-disaster period, as well as in the context of gradually worsening conditions. Children, because of their size and developmental immaturity, are particularly susceptible and are more likely to experience serious and long-term effects (for example, from burns, broken bones and head injuries) because of their size and physiological immaturity (Bartlett, 2002).

Quality of care: Despite their considerably greater vulnerability to a range of health hazards, with adequate care and support, young children can thrive even in difficult conditions. However, as conditions become more challenging to health, so do the burdens faced by caregivers, especially in groups where there are large concentrations of small children. These problems are seldom faced one at a time—risk factors generally exist in clusters. Overstretched and exhausted caregivers are more likely to leave children unsupervised and to cut corners in all the chores that are necessary for healthy living.

Children's learning and competence

For some children in some places, the added challenges brought about by climate change could contribute to an erosion of both their mental capacity and their opportunities for learning and growth. The early years are the most critical time for brain development, which can be shaped by a range of environmental factors (Wohlwill and Heft, 1987). Good health is crucial for cognitive development: Sick or malnourished children lack the energy to be active learners (Grantham-McGregor et al., 2007). Abundant research relates lower cognitive capacity and performance to under-nutrition, intestinal parasites, diarrhoeal diseases and malaria, as well as to maternal health and nutrition during pregnancy and maternal stress both during and after pregnancy.

Learning also depends on supportive social and physical environments and opportunities to master and build on new skills. Mental growth and development does not just happen to children; it is a feedback process that requires their active involvement (Walker et al., 2007). They need access to social interaction and to safe, varied and stimulating surroundings for play, which support their development as capable problem solvers and responsive social beings (Walker et al., 2007). When supportive environments and routines break down, so do opportunities for engagement and learning.

For older children and adolescents, opportunities for purposeful, goal-directed activities and engagement in the world are primary avenues for the achievement of competence.⁶ When people are displaced, or when routines are disrupted, both formal and informal opportunities for learning can become constrained. After extreme weather events, for instance, schools may be destroyed, damaged, shut down or taken over as emergency shelters for weeks or even months.⁷ Conditions for displaced children may also make it difficult to do homework, increasing the likelihood of dropout (INEE, 2004). Children may also be pulled out of school when households experience shocks; either the funds are not available or children are needed to help out the family.

At the same time, it should be recognized that numerous opportunities for learning and engagement exist within the context of adversity if children are given the space and support to be productively involved.

Coping with adversity

Much of the research and programming responding to the impact of extreme events for children have focused on their vulnerability to trauma. This approach has been criticized by many as a Western construct with questionable validity for other cultural realities (Batniji, et al., 2006; Boyden and Mann, 2005). As Engle and colleagues (1996) point out, the expectation of negative outcomes in these situations can unwittingly become part of the problem. Much of what is defined as symptomatic of pathology (such as bedwetting, regression to younger behaviour, anger or depression) may also be construed as a normal reaction to abnormal conditions. Frequently, it is the *aftermath* of a traumatic event and the deprivations

and humiliations of a slow recovery process (rather than the initial event) that children and families themselves report as being the most stressful and debilitating (Becklund et al., 2005).

Levels of psychological vulnerability and resilience depend on numerous factors, including children's health and internal strengths, household dynamics and levels of social support, as well as the way experiences are perceived and interpreted (Boydén and Mann, 2005). Children who have experienced success and approval in their lives are more likely to adapt well to adversity than those who have suffered rejection and failure. Poverty and social status can have an adverse effect in this regard.

Without question, the losses, hardships and uncertainties surrounding stressful events can have high costs for children. Especially in low-income countries, children may end up orphaned or separated from family as a result of disaster. Extended family or other community members can provide a secure alternative, but even these bonds can be frayed to the breaking point, and extra children can become a target for mistreatment (Tolfree, 2005). Even when families remain intact, however, picking up the pieces can be extremely challenging. Basic requirements may be hard to obtain, livelihoods may have disappeared, relief may be inequitably distributed and community life and social supports may have collapsed.

Increased levels of irritability, withdrawal and family conflict are not unusual after extreme events (or even with gradually worsening conditions). Displacement and life in emergency or transitional housing have also been noted to lead to an erosion of the social controls that normally regulate behaviour within households and communities. Overcrowding, chaotic conditions, lack of privacy and the collapse of regular routines can contribute to anger, frustration and violence (Gururaja, 2000). In emergency camps, after the tsunami, adolescent girls, especially, reported sexual harassment and abuse (Fisher, 2005). High levels of stress for adults can have serious implications for children of all ages, contributing to neglect or to more punitive responses. Increased rates of child abuse have long been associated with such factors as parental depression, increased poverty, loss of property or a breakdown in social supports. For instance, in the six months after a hurricane in the United States, rates of inflicted head injury to children under two were found to have increased five-fold (Keenan et al., 2004).

The synergistic and cumulative effects of such physical and social stressors can affect children's development on all fronts. As the numbers of longer-term displaced people grow, and huge numbers of people are temporarily displaced on a regular basis by 'small' weather events, these dysfunctional environments can become the setting within which more and more children spend their early years. In one small settlement in Tamil Nadu, for instance, residents spend increasing amounts of time each year camped on a road near their settlement, waiting for water levels to recede to the point where they can re-enter and repair their mud-filled homes. In Kathmandu, Nepal, small children are routinely sent off to live with rural relatives during the monsoon each year, as water levels rise and sewage backs up into their riverside shanties. Older children and adults stay on, camped under plastic, unable to leave school or the jobs on which they depend.⁸

Even these less extreme events, seldom registered as ‘disasters’, can create havoc in families’ lives. Repeated adversity can result in a significant loss of assets, reducing the capacity to prepare for and adapt to other events and deepening poverty to a level beyond which many households can reasonably cope. When this happens, children may feel the brunt of it. Recent research from Bangladesh, for instance, shows that when there are not enough calories available within a household to meet the requirements of all members, children are the most likely to be short-changed (Cockburn et al., forthcoming). During hard times, children can become an asset that is drawn on to maintain the stability of the household (Mitik and DeKaluwe, forthcoming). They may be pulled from school to work or take care of siblings. Some children may be considered more ‘expendable’ than others (Engle et al., 1996). Many of Mumbai’s young prostitutes are from poor rural villages in Nepal, where inadequate crop yields lead families to sacrifice one child so others may survive.⁹

Again, though, it is misleading to think of children simply as victims and not to appreciate the level of emotional resilience and competency that they can bring to adversity. There are numerous accounts of their hardiness and resourcefulness in the face of both extreme events and everyday difficulties (Hestyanti, 2006; Boyden, 2003). Children may, in fact, be more flexible than adults in their capacity to adapt to extreme situations. It is easy to forget that many children, even in ‘normal’ times, function competently in adult roles, running households, caring for younger children, handling jobs and negotiating a variety of complex realities. This level of responsibility may be less than ideal for children, but this should not diminish the respect they deserve for their capacity to manage challenging conditions. Children’s capacity to cope well in very difficult situations has been attributed to their own active engagement, opportunities for problem solving and for interactions with peers (Boyden and Mann, 2005), as well as to the presence of at least one consistently supportive adult in their lives (Engle et al., 1996; Werner and Smith, 1992).

Implications for Adaptation

In seeking to reduce vulnerability and enhance resilience in the face of the various hazards and risks associated with climate change, how can the many concerns for children of different ages be adequately addressed without completely overwhelming any agenda?

In every aspect of adaptation—protection, preparation, relief and rebuilding—and at every level of response (community, local government, non-governmental organizations [NGOs], international agencies, etc.), some basic concerns need to be taken into account in order to respond effectively to children. These responses must be based on an adequate knowledge of children’s lives and experiences and the challenges faced by their caregivers, and the concerns must be integrated into planning, decision-making and action, not treated as add-ons after the fact. It is critical, among other things, to recognize the implications of the actual numbers of

children in different age groups in any population. In places with very large numbers of young children relative to caregivers and other adults, the ability of the community to provide adequate care in the context of unusual adversity may be underestimated. Conversely, where responses are expected to involve the active participation of community members, there may also not be an understanding of the conflicting responsibilities of many adults. On the other hand, older children can play a real role in effective adaptation efforts, and this should be thoughtfully capitalized on.

Measures should include:

- *Ensuring children's optimal health and nutrition:* Ensuring children's health through adequate nutrition, preventive care and environmental health measures is a potent form of risk reduction. The overall impact of an event will be defined in part by children's pre-existing levels of health—and there are implications for both the urgency and the effectiveness of responses. Food aid and supports for health are vital after crises, but when health is already compromised by malnutrition or illness, children are more likely to suffer long-term damage from extreme events and worsening conditions and also to be a drain on families' capacity to cope. Where extreme events or food shortages are likely, longer-term nutritional and health programmes are critical protection and preparation measures and are more effective than humanitarian aid after the fact for children's long term recovery and well-being. A concern for children's health is also a compelling additional reason for local governments to tackle environmental sanitation problems in underserved areas as part of their preparation for extreme events.
- *Strengthening families' capacity to cope:* All adaptive measures should ideally enhance the capacity of households to come through periods of shock with minimal upheaval. But supporting family coping strategies takes on broader meaning when children are an explicit part of the equation. There should be a focus on the capacity of families to manage hardship without compromising the well-being of their children and a recognition of the time that may be necessary to respond to what may be intensified needs on the part of children. NGOs, for example, might build child-impact assessments into their microcredit activities, ensuring that loan repayments do not compromise children's nutrition; a health-care system might allocate more of its resources to mental health supports; emergency response planning could include the provision of temporary child care, so that parents can have some hours each day to focus on recovery without worrying about their young children.
- *Maintaining, restoring and enriching children's routines, networks and activities:* Children rely on their daily routines and activities for stability and optimal development. Other functions, more critical to survival, will inevitably be prioritized in extreme situations (food, health, livelihoods). But in the course of addressing these, it is important not to compromise children's spaces,

activities, networks and opportunities for gaining competence (for instance, by ensuring wherever possible that emergency camps not be set up for months at a time in schools and that safe spaces for play be a priority even right after extreme events.) Mann (2000) has pointed out that restoring a sense of normalcy for children also extends to reinstating the chores they are accustomed to perform, so that their sense of pride and self-respect remains intact.

- *Respecting children's capacities; supporting their active involvement:* On a related front, the chance to solve problems, contribute and take action is known to be a potent protective force for children in adversity. Repeated experience also demonstrates how capable children are of looking critically at local problems and coming up with creative solutions that may not have occurred to adults (Hart, 1997; Chawla, 2001). Every day, in communities around the world, children and adolescents do their share to keep their households afloat and functioning. Many observers are critical of children's involvement in activities that may affect the time they can give to school and study. Certainly there is the potential for undermining education and even for serious exploitation. But the fact is that, for many children, balancing the demands of school with help for the family stimulates their self-reliance, self-respect and overall capacities (Boyden, forthcoming). The contribution of children and young people is also a potential community asset that is too seldom tapped in the formal process of development and adaptation. There are numerous precedents for effective action in disaster risk reduction, preparedness and rebuilding. In the course of local risk assessment and monitoring, for instance, children's extensive knowledge of their own neighbourhoods can be invaluable; children can also be involved along with adults in critiquing and modifying plans for relocated housing and community space, since they inevitably point to concerns that adults overlook (Bartlett and Iltus, 2007).

Conclusions

There are many vulnerable populations in the context of climate change—the poor, the elderly, pregnant women, those in particularly hazardous locations. Children are not unique in this respect. However, they constitute an extremely large percentage of those who are most vulnerable, and the implications, especially for the youngest children, can be long term. If responses to the impacts of climate change fail to take into account the particular vulnerabilities (as well as capacities) of children at different ages, measures for prevention and adaptation may prove to be inadequate in critical ways and may even result in additional stresses for young minds and bodies.

Addressing these concerns for children may appear to be an unrealistic burden, adding unduly to the need for time and resources in the face of so many other compelling priorities. Fortunately, there are strong synergies between what children need and the adaptations required to reduce or respond to more general risks. For

instance, the most useful measures to protect children's health—such as adequate drainage, waste removal and proper sanitation—are also fundamental in reducing risks from potential disasters. Providing support to adults so that they are better able to address their children's needs leaves them better equipped to work collaboratively on reducing risks, preparing for disasters and rebuilding their lives after a crisis. Ensuring that children continue to have opportunities to play, learn and take an active role in finding solutions will prepare them to be citizens who can continue to address the problems faced by their communities and by the planet. It has generally been found that neighbourhoods and cities that work better for children also tend to work better for everyone else, and this principle undoubtedly applies to the adaptations that are necessitated by climate change as well.

Notes

- 1 It is worth noting that most of the locations that currently face the most extreme weather events (e.g., in regard to cyclones/hurricanes/typhoons, heat waves, heavy rainfall and droughts) are in low- and middle-income nations; also, a high proportion of the world's population within the low elevation coastal zone are in those countries.
- 2 Population figures and projections are drawn primarily from PRB, 2008.
- 3 See, for instance: Evans and English, 2002; also see: Werner and Smith, 1992, for classic research exploring resilience longitudinally in a cohort of children in Hawaii.
- 4 See, for instance: Moraes et al., 2003.
- 5 See, for instance: Jayatissa et al., 2006; and Barrios et al., 2000.
- 6 See for instance: Chawla and Heft, 2002.
- 7 See, for instance: Diagne, 2007.
- 8 Author's personal communications with residents in Tamil Nadu and Kathmandu.
- 9 See website: http://www.speakout.org.za/about/child/child_childprostitution.htm, last accessed 5 September 2009.

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