



Research Report



Children and Disasters: Understanding Impact and Enabling Agency

Fran Seballos, Thomas Tanner, Marcela Tarazona and Jose Gallegos





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Photos:

- Front cover top – A woman and child watch the flood water rise from the door of their makeshift home in Kamrangir Char, Dhaka, 2004 (Photo: Naser Siddique, UNICEF).
Bottom – Children present their DRR work to the community, El Matazano, El Salvador 2009 (Photo: T. Tanner,)
- Above – Children mix cement to build a retaining wall at their school, Potrerillos, El Salvador 2010 (Photo: T. Tanner)

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Development Studies

Contents

Foreword from Lord Puttnam	6
Executive Summary	7
Key policy recommendations	10
1.0 Introduction	11
1.1 Children and Disasters	12
2.0 Disaster impacts on child welfare and development	15
2.1 Determining trends and patterns of disaster impacts on child welfare between 1999 and 2009	17
2.1.1 Introducing the data	
2.2 Results	19
2.2.1 Bolivia	19
2.2.2 Mexico	21
2.2.3 Mozambique	22
2.2.4 Nepal	23
2.2.5 Vietnam	25
2.2.6 Indonesia	26
2.2.7 The Philippines	28
2.3 Discussion	30
2.3.1 Concentrated high impact disasters: intensive risk	31
2.3.2 Persistent lower impact disasters: extensive risk	31
2.3.3 Lessons for future data analysis	33
3.0 Enabling Environment	35
3.1 DRR and child-centred practice in context	36
3.2 Enabling CC-DRR in practice – lessons from case studies	39
Adult perception of child agency underpins the enabling environment	39
Children need to be seen to be heard	42
Inclusion and experience generate support	42
Facilitation is a crucial enabling factor	42
Children working together generate agency and action	43
Safe spaces for child-adult exchanges build trust and recognition	43
Community development and existing programmes are starting points for action	44
Individual champions are often the difference between success and failure	44
Access to policy spaces and long-term cultural shifts lead to sustainable child groups	44
Groups need to engage with wider networks to access resources and policy spaces	45
3.3 Discussion	46
4. Conclusions	49

Annex 1	51
References	55
<hr/>	
Boxes	
2.1 Understanding intensive and extensive disaster risk terminology	17
2.2 Statistical significance	19
2.3 Future research	33
2.4 Improvements to data collation	34
3.1 Philippines policy and practice – a snapshot	36
3.2 El Salvador Policy and Practice – a snapshot	38
3.3 Child-led mangrove restoration projects in the Camotes Island, Philippines	40
3.4 Mobilisation during emergencies in El Ciprés, El Salvador	41
3.5 Building capacity and trust for child engagement	47
A.1 Identification strategy: persistent lower impact/extensive risk	52
A.2 Identification strategy: concentrated high impact/intensive risk	53
<hr/>	
Figures	
2.1 Deaths and missing by disaster type 1974-2009, Bolivia	20
2.2 Deaths and missing by disaster type 1974-2009, Nepal	23
2.3 Deaths and missing by disaster type 1974-2009, Vietnam	25
2.4 Deaths and missing by disaster type 1974-2009, Indonesia	27
4.1 A model of multi-scale action for enabling child-centred DRR	50
<hr/>	
Tables	
2.1 Country data and scale	18
2.2 Summary of significant results in Bolivia	21
2.3 Summary of significant results in Mexico	22
2.4 Summary of significant results for Mozambique	23
2.5 Summary of significant results in Nepal	25
2.6 Summary of significant results for Vietnam	26
2.7 Summary of significant results for Indonesia	28
2.8 Summary of significant results for the Philippines	29
A.1 Treatment groups per country	52
A.2 List of models per country	54

Foreword



• Lord Putnam visits Cambodia Photo: Andrew Stenning/Daily Mirror

Climate change is one of the great, if not the greatest challenge of the 21st century, and children in developing countries are particularly vulnerable to the increase in severity and frequency of climate-related disasters.

Just about every significant crisis captures the world's attention and sympathy, and demands an immediate response. However, this report offers a fresh understanding of differing types of disaster. It moves us away from seeing (or even responding to) disasters as one of a number of catastrophic events witnessed through the prism of 24-hour global media coverage. The report makes clear that persistent lower profile disasters, such as regular flooding or drought, can have prolonged impacts on children's development that are just as serious as a one-off, highly publicised disaster.

As climate change continues to cause more extreme and unexpected natural catastrophes such as cyclones, floods and droughts, we have to become more knowledgeable and concerned about the effect this will have on vulnerable children, especially in the world's poorer countries. These children, whilst in no way responsible for climate change, are the most likely to feel its effects, and the least able to deal with them.

Children need to prepare for climate change, and that can only be made possible through our ability to help their communities respond and adapt. Many humanitarian agencies are already helping children become more resilient. They are learning to better prepare themselves for extreme weather conditions. They are being helped to build better schools that are more resilient to extreme events, along with installing rainwater-harvesting systems in those schools to ensure children have clean water to drink - all year round.

Through these and other adaptation projects, children gain the skills and knowledge to survive and thrive in increasingly difficult environments. In the long term, this could help reduce the need for emergency assistance and increase the economic well-being and stability of developing countries.

We need to make sure that when a disaster does strike, fewer children die and fewer lives are ruined. Climate change is happening to now. We have a responsibility to ensure that children are able to adapt to and survive these life-shattering events.

Lord Putnam
UNICEF UK Ambassador

Executive Summary

Children are highly vulnerable to disasters, in part because of their particular stage of physiological and social development. Powerful forces of nature such as earthquakes, cyclones and tsunamis can have serious immediate and long-term impacts on human health, property and livelihoods, which can have devastating consequences for children and their futures. Where children and their families are already vulnerable, for example because of low income, poor housing, or high population density, the impact of these sudden events is more severe.

- School girls wash their hands before mid day meals at a Government Primary School, Madhya Pradesh, India, 2009 (Photo: Pranav Purushotham, UNICEF)

The frequency and intensity of weather related disasters such as floods, droughts, and cyclones appear to be increasing because of climate change. This is not only increasing the impact on the poorest and most vulnerable communities, but also creating new challenges such as rising sea levels and changing rainfall patterns and temperatures. Reducing children's vulnerability to both sudden disasters and crises related to climate change is an essential part of child development programmes, as are strategies for adapting to climate change.

The Children in a Changing Climate coalition (CCC) have come together to conduct two research studies: first, a seven-country study of the trends in the impact of disasters on child welfare from 1999–2009; and second, an analysis of the enabling environment that supports children's involvement in disaster risk reduction.

This report contributes to building an improved understanding of 1) how different intensities of disaster affect children in different contexts and 2) the structures needed to realise the benefits of engaging children as active citizens and agents of change at the sub-national and local scale. This improved knowledge is vital in order to ensure that development and risk reduction programmes address children's specific vulnerabilities and bolster their resilience to the increasing number of disasters.

The research shows that disasters continue to hinder progress in child welfare and development, despite global efforts to meet the Millennium Development Goals and to respond better to the growing number of emergencies.

In its analysis of trends in the impacts of disasters on child welfare, the report differentiates between high impact disasters (intensive), often referred to as 'emergencies', and those lower impact events that are persistent and widespread (extensive) but represent a significant yet largely unrecognised component of disaster impacts and costs.



In Bolivia, the report reveals a link between persistent lower impact events (which include floods, landslides, droughts and epidemics) and reduced enrolment and increased dropout rates for pre-school children, as well as a widening gender gap in achievement rates at primary school. These low level but frequent disasters also contributed to an increase in the incidence of diarrhoea for children under the age of five, one of the biggest causes of infant mortality.

Furthermore, in countries where child malnutrition is already a problem – such as in Mozambique, Nepal and Vietnam – lower impact persistent disasters are seen to be exacerbating the situation. In Mozambique, where floods, cyclones and drought are common, lower impact events contributed to an increase in low birth weight for children – indicating low levels of nutrition for mothers during pregnancy. In Nepal, lower impact landslides, floods and snowstorms contributed to an increase in the proportion of malnourished children under the age of three; while in Vietnam, lower impact flooding, storms and hailstorms contributed to an increase in numbers of moderately underweight and stunted children.

In Indonesia, where high impact earthquakes, volcanoes and tsunamis take place alongside lower impact but persistent flooding and landslides, both types of disaster contribute to an increase in the number of people living below the poverty line. Concentrated high impact events over the last ten years had negative impacts on education, health and poverty levels in Indonesia (increased infant mortality, reduced share of houses with access to sanitation) and on education in the Philippines (increased drop-out rates and reduced achievement rates for secondary school). Results for both high impact and lower impact events identify a need to intensify efforts for disaster risk reduction in education, health and social and economic policies.

However data analysis alone does not reveal the full complexity of how and why disasters affect child welfare. For instance, in Vietnam ‘lower impact’ disasters are associated with a reduction in the number of children severely stunted and underweight but an increase in the number of children moderately stunted and underweight. While in urban areas of Mexico ‘lower impact’ persistent disasters are linked to an increase in the number of children with access to clean drinking water and proper sanitation, whereas ‘high impact’ events including floods had a significant relationship with an increase in the numbers of urban children having access to sanitation.

These contradictions clearly indicate that a wide range of factors influence the impact of disasters on children, households and communities; and equally a wide range of factors and programmes may be successfully addressing these vulnerabilities.

Other unexpected findings reinforce this point. In Mexico, concentrated high impact events (mainly floods and earthquakes) in the last ten years are linked to reductions in infant mortality and primary school drop-out rates as well as an increase in net attendance at primary school. In Mozambique, high impact events are linked to an increase in achievement rates at both primary and secondary school. While in the Philippines and Indonesia, lower impact events are linked to improved trends in secondary educational outcomes. However, in both the Philippines and Indonesia, the occurrence of concentrated high impact events is so frequent that major events may override any positive trends linked to lower impact events.

While we must regard these results with caution in light of data limitations and a clear need for qualitative follow-up at a more disaggregated level, they identify some core questions for further research. For instance, where, why and how some investments in disaster risk reduction and emergency preparedness may have paid off, and where, why and how linkages between short-term disaster responses to major events can effectively support and engage with longer-term development programmes to ‘build back better’.

Improving the resilience of children and their communities requires a deeper understanding of the experiences and impacts of all types of disasters, coupled with evidence of what cushions the impacts of disasters on children in different contexts.

Humanitarian organisations and governments responsible for disaster management (prevention and preparedness) need to address both the root causes of vulnerability and build resilience to a range of high impact and lower impact but persistent shocks, rather than focusing predominantly on responding to emergencies.

Children in a Changing Climate partner programmes have shown that child-sensitive programmes and policies can reduce the risks that children face from disasters. For example, we can construct school buildings to better withstand strong cyclones and teach children how to stay safe during a flood. However, it is essential to work with all citizens, including children, to understand why some people are more vulnerable and consequently to design risk reduction programmes that focus on the most vulnerable.

The report identifies that inconsistent capacities and skills at provincial, municipal and village levels are key constraints preventing effective application of national risk reduction policies and limiting child engagement in disaster risk reduction processes. Scaling-up child-centred disaster risk reduction requires incentives, resources and political commitment to engage with children in determining and addressing their unique vulnerabilities. Government actors at the local level need to have an understanding of children’s needs, capacities and agency as well as a political sense of duty to protect and engage with their citizens to reduce disaster risks. It also requires support for children’s groups to be visible in communities and in policy spaces to raise the profile of children as capable contributors to improving resilience to disasters.

- A boy tills the soil in the garden of the Linda Community School, outside the southern town of Livingstone, Zambia (Photo: Giacomo Pirozzi, UNICEF)



Key policy recommendations



- Children in Barobo, make a film to share their concerns about the impacts of flooding on their community, Eastern Samar, Philippines (Photo: Grace Molina, CDP)

Disaster risk reduction is a key strategy for climate change adaptation. It is urgent if we are to reduce the increased risk that children face, particularly in developing countries. In order to deliver child-centred disaster risk reduction more comprehensively in countries most vulnerable to climate change, the research identifies a need for:

- Investment in capacity building at local, regional and national levels to better collect and record accurate data on hazards, vulnerabilities such as child welfare outcomes, and household coping mechanisms. This will lead to improved knowledge on how to address the different impacts of disasters on vulnerable sectors of the population
- National frameworks for disaster risk reduction to resource decentralised training and capacity building programmes across sectors. This will provide government actors with the skills to engage effectively with communities, including children, in disaster risk reduction planning and programmes
- Programmatic interventions targeted at improving child welfare. These should take into account the disaster profile of the area and ensure that interventions are resilient in the face of both lower level persistent disasters but also concentrated high impact events
- Disaster risk reduction approaches to be integrated with both development and child-centred policy and programming to ensure complementary outcomes are delivered through disaster risk reduction, climate adaptation and development focused programmes (including the Millennium Development Goals)
- The views of children to be integrated into disaster risk reduction and climate change adaptation programmes. This will improve awareness of different needs – as well as capacities – and ensure that interventions are tailored to meet the needs of children at different ages and stages of development
- Political action to realise children's rights. This includes recognising children's ability to play a vital role in policy and programmes in order to create child sensitive policy and governance frameworks
- Policymakers and practitioners to recognise and work with a child's particular cultural and social context from the local to the household level
- Post-disaster aid and humanitarian agencies to build relationships with both government and development agencies to support rehabilitation and reconstruction programmes in 'building back better' and improving child welfare outcomes in the wake of disasters.

Risk reduction (current and future) is a core component of long-term development programming and central for improving and sustaining child welfare. In order to address social, economic, political and physical vulnerabilities, risk reduction policy and programming needs to understand the social, cultural and political contexts that turn hazards into disasters, and to account for the specific needs and capacities of children. Taken together, this will contribute to improved resilience to disasters and so improve the well-being and development of children in developing countries.

1.0

Introduction

"Disasters are the antithesis of human development"

(Baez et al., 2010)

The study is unique in its development of an approach to separate out 'persistent lower impact' and 'concentrated high impact' disasters and analyse the trends in impact of both risk types on child welfare and development

The Children in a Changing Climate coalition welcomed the recognition from the Chair of the Global Platform 2009, who noted that children have potential as strong agents for change and should be involved in decision-making processes for disaster risk reduction; but the coalition also recognise the continued need for specific and targeted policy to address children's needs and vulnerabilities in relation to disasters.

This report is a synthesis of two studies that set out to: 1) improve the understanding of those involved in disaster risk reduction (DRR) and climate change adaptation (CCA) of the unique impacts of disasters on children's lives, well-being and futures, and therefore the need for child sensitive approaches to understanding risk and designing policy and programmes; and 2) identify core elements of the enabling environment that support child agency at the policy, programming and community level to ensure that the benefits of engaging children as active citizens and agents of change at the sub-national and local scale are realised.

The first study (CCC 2011a) sought to articulate the impact of disasters on child welfare and takes a unique approach to understand the needs of children exposed to both 'persistent lower impact' hazards (extensive risk) and 'concentrated high impact' hazards (intensive risk – see Box 2.1). The disaster data included all natural hazards¹ – both geological and hydro-meteorological (or 'climate') hazards – in the analysis. However the proportion of climate hazards generating disasters of both high and low impact illustrates a clear need for understanding the existing disasters profile to inform future learning for climate change adaptation. For example, disaster data from the Philippines shows the event causing most high impact disasters is cyclones (referred to locally as typhoons) and it shows that the event causing most persistent lower impact disasters is also cyclones – a hazard sensitive to climate change.

The second study (CCC 2011b) analysed community-based, child-centred DRR programmes in the Philippines and El Salvador to understand the enabling environment for children to become effectively engaged in articulating their needs, identifying solutions and taking action to reduce disaster risk and adapt to climate change. The lessons learnt from the analysis seek to inform the policy and practice of disaster risk reduction and climate change adaptation as well as development agencies in scaling-up child engagement with both policy and practice.

This report introduces the subject matter below before presenting the two studies in sections two (impacts) and three (enabling environments), presenting recommendations and results of both before drawing together conclusions (section four). Detailed analyses and methods related to both studies are presented in the full reports.

¹ For Vietnam only climate related hazards were recorded in the database and therefore results do not include earthquakes or other geological hazards.



- A child receives Plumpy'nut at Abela Health Centre, Ethiopia, 2007 (Photo: Indrias Getachew, UNICEF)

1.1 Children and disasters

Children, and especially young children, are less equipped to deal with deprivation and stress due to their particular physical, social and psychological characteristics.² This makes them particularly vulnerable to the effects of disasters. In the late 1990s the number of children affected by disasters was estimated at 66.5 million per year; climate change impacts are projected to increase this to as many as 175 million per year in the coming decade.³ Recurring disasters and the changes in climate are:

'causing child rights to become even more difficult to safeguard, as adults, communities and governments do not fully appreciate the threats to their children's future or are increasingly powerless to fulfil their responsibilities to protect them' (Polack, 2010)

Disasters are commonly accepted to be a result of complex interactions between hazards such as earthquakes, cyclones and floods, and vulnerability – a product of complex interactions between the physical, economic, cultural and political sphere, experienced in different ways by a diverse range of individuals and groups.⁴ Vulnerability can be related to the physical exposure of communities to hazardous events, such as those living in flood plains or along fault lines; but it is also connected to the social and economic context within which these populations exist. For example, impacts are felt more intensely in areas where there is low income and weak livelihood security, poor housing and infrastructure, or in dense settlements. And within these communities culture and politics play a role in further exacerbating vulnerability where 'years of accepted social practice and constraining premises [can] expose different groups within society to different levels of risk' (Comfort et al., 1999). Analysis of Young Lives⁵ data reveals the differential experience of disasters between ethnic groups; in Vietnam the minority H'mong reported higher incidence of drought, crop failure and pests, whereas the majority Kinh reported slightly higher incidences of flooding and hailstorms, indicating different levels of exposure for different ethnic groups (Valadez, 2010).

While there remain some uncertainties of the exact relationship between extreme climatic events (cyclones, floods and drought) and global climate change, the widely acknowledged evidence shows that there will be an increase in the types, frequency and severity of hydro-meteorological (or climate) hazards. The Intergovernmental Panel on Climate Change (IPCC) recognises that changing climate risk is likely to impact those who are already vulnerable, through their exposure to extreme events and because their ability to cope with such shocks is low (IPCC, 2007). This is especially acute in developing countries where governance is weak, education systems are poor, coping capacities are lower and where climate-sensitive health factors such as malnutrition, diarrhoea and malaria are higher (Haines et al., 2006; and Anderson, 2010).

² See Bartlett (2008); Cutter (1995); and Peek (2008).

³ Penrose and Takaki (2006); Save the Children (2007 and 2009).

⁴ See Cannon (2008); and Gaillard (2010).

Integrating both local and scientific knowledge of historic, current and future risk into development programmes can lead to improved long-term development outcomes

Data from Indonesia shows that most deaths and missing people recorded as a result of persistent low-impact disasters were in Tenggara Timur; a province with poverty indicators and secondary school enrolment rates lower than the national average, and child malnutrition and child mortality above the national average. However the proportion of actual events recorded was much higher in provinces of Java. This data indicates the wider social and economic context that transforms hazards into disasters and connects the concerns of disaster risk reduction to broader development strategies.

To reduce the potential impact of current and future disasters on children and their communities there is an urgent need to address the underlying drivers of vulnerability in the community and the household. This can be done through development and livelihood strategies that recognise and respond to existing and future risk and through programmes that are aimed at realising basic rights and agency for both adults and children.

From a child rights perspective disasters and climate change not only affect a child's basic right to live (Article 6 United Nations Convention on the Rights of the Child (UNCRC));⁵ the right to the enjoyment of the highest attainable standard of health (Article 24); and the right to education (Article 27), but they cut across their right to participate (Article 12) and for decisions to be made in their best interests (Article 3).

Child-centred approaches to reducing disaster risk and adapting to climate change reflect the understanding that interventions cannot properly account for children's needs or secure their rights unless specific attention is paid to these during the design and implementation of any policy or programme (Back et al., 2009).

This report uses the term **child-centred DRR** as an overarching framework that recognises children as both beneficiaries and as active citizens through a combination of:

- **Child sensitive policy and programming** which responds to the needs of children as recipients or beneficiaries. This may occur through school feeding programmes, social protection/cash transfer measures for families to reduce existing vulnerabilities, structural strengthening of school buildings, contingency plans for education and service provision etc.
- **Participatory policy and programming** where children are actively engaged in decision-making, planning and accountability processes for prevention, preparedness and response. This includes child-led DRR where children are supported to be active agents of change in their spheres of influence – the household, school, community and beyond.

⁵ Analysis commissioned by Save the Children from the Young Lives project – which follows 12,000 children in four countries to investigate the changing nature of childhood poverty – focused on the relationships between the type of shock experienced and the impact in relation to ethnicity, household wealth, occupation, education level of household head and their gender. Although the Young Lives sample is pro-poor and therefore not representative of the nation the data can be used to reveal difference at the micro level. See www.younglives.org.uk

⁶ See: <http://www.unicef.org/crc/>

Child-centred DRR may therefore involve work at community level with both adults and children to understand and respond to identified risk and vulnerabilities; training and capacity building with DRR specialists to take children's needs and capacities into account; and engagement at international, national and sub-national levels to influence policy and programming to account for children's needs in times of disaster and to create spaces for child participation. These actions require an understanding of both how disasters impact on child welfare and development and an understanding of the social, political and cultural processes, which enable children to engage with and inform DRR practice and policy.

- Members of the Pilar National High School Supreme Student Government with their school risk maps. Camotes Islands Philippines, 2009. (Photo: Fatima Molina, CDP)



2.0

Disaster impacts on child welfare and development

“Disasters appear to... produce deleterious consequences on nutrition, education, health and many income-generating processes. Furthermore, some of these detrimental effects are both large and long-lasting”

(Baez et al., 2010)

Disaster impact analysis often focuses on the immediate economic loss of the disaster event and the cost of rehabilitation and repair of major infrastructure – the immediate and long-term human dimensions of loss are not factored into these costs. Disaster risk reduction programmes therefore tend to focus on the protection of the economy and structures rather than looking at vulnerability and difference within and between communities. Much climate change adaptation has followed suit. But disaster impacts persist into the long-term, well beyond initial mortality and infrastructural damage and may include negative impacts on health, education, nutrition and morbidity; for children these can lead to lifelong impacts on well-being and achievement in their adult lives.

Human disaster figures (such as mortality, morbidity, or numbers displaced) are not usually disaggregated by gender, age, or other socio-economic factors, leaving a major gap in understanding of the differential impact of disaster within communities at the national policy level.⁷ This approach to measuring disasters hampers vital understanding of impacts on different groups, including children, women, ethnic, disabled or elderly people. To improve both disaster prevention and response, and climate change adaptation, there is a need to better understand the differential experience of both extreme and slow onset events to inform the development of appropriate and targeted programmes.

Increasingly the use of econometric techniques has enabled better understanding of the causality between the occurrence of particular disaster events and welfare indicators. Research in 2007 that analysed the impact of Hurricane Mitch on children's welfare found:

‘that large and aggregate shocks, such as natural disasters, have adverse medium-run effects on children's well-being, particularly in terms of health, nutrition and labor [sic] force participation’ (Baez and Santos, 2007)

For example, ‘the incidence of infant malnutrition also increased more than three times among the households most exposed to intense rainfall during Hurricane Mitch’ (Baez and Santos, 2007). Surprisingly however the study found that Hurricane Mitch had little impact on educational enrolment although ‘the proportion of children simultaneously enrolled in school and working more than doubled going from 7.5% to 15.6%’.

Whilst most micro-level case studies strongly support the notion that children are one of the most vulnerable sectors of the population to disasters there is empirical economic literature (mostly on Latin American countries) showing contradictory results regarding the impact of disasters on welfare. Baez et al., (2010) identify channels by which individuals (and children) are affected by disasters, in both positive (unexpected) and negative (expected) ways. Although recognising the difficulty of isolating the effects of disasters on child welfare – due to many other social, economic and political influencing factors – the work concludes that the net effect of disasters are largely negative and the study cites a number of econometric

⁷ See the UNISDR Desinventar databases at <http://gar-isdr.desinventar.net> and the database of major emergencies <http://www.emdat.be/database>

“there is a two-way relationship between vulnerability to natural disasters and poverty... disentangling the direction of causal impacts is rather challenging”

(López-Calva and Ortiz-Juárez, 2009)

DRR and climate adaptation practices need to put energy into reducing the effects of persistent lower impact disasters as well as the high-impact situations that tend to get the most attention

studies that link drought, rainfall variation, flooding, earthquakes and displacement to impacts on nutritional status, physical development, disease incidences and mortality rates in children.

Crucially however they identify different ways in which disaster impacts may reach a household. For example they identify two potential routes via which disasters can impact negatively on nutrition: a direct impact that reduces household income can lead to lower food consumption; or indirect impacts on food availability or the relative price of food can generate the same effect. In addition they identify negative effects on education due to direct impacts such as ‘the destruction of education-related infrastructure – such as schools and complementary installations and resources’; or as a result of ‘taking children out of school [which] may be used to reduce the burden – when school costs are relatively high – or to increase household income by putting them to work’. In contrast they also identify the potential for positive effects of disasters on education whereby a natural disaster could ‘change the opportunity cost of sending children to school, through [reduced] market wages’ thus potentially generating larger incentives to send children to school. These studies illustrate that disasters can impact both positively and negatively on child welfare in direct and indirect ways.

2.1 Determining trends and patterns of disaster impacts on child welfare between 1999 and 2009

The study presented here is unique in developing an approach to understand the different effects of persistent lower impact events (extensive risk) and concentrated high impact events (intensive risk). It analyses the trends of both risk types on child welfare and development, using a similar and comparable methodology.

This separation of risk type reflects a growing concern with the need for DRR practices to engage in tackling regular low to moderate-level risk, as well as responding to emergency high impact situations. The cumulative effect of persistent lower impact events is of particular interest for child sensitive policy and programming where recovery from lower impact events at an early age can be continuously setback through repeated experiences.

Analysis of Young Lives data (Valadez, 2010) found that households experiencing one shock, were at an increased likelihood of experiencing a second – double exposure, suggesting that many households and communities are likely to face multiple shocks and demonstrating the need for a more nuanced understanding of ‘disasters’ and the ways in which disasters make themselves felt.

Through a desk-based assessment the study sought to investigate whether available data gives evidence of patterns and trends in the impact of concentrated high-impact and persistent lower impact disasters on available childhood welfare indicators over the past decade (1999–2009) across seven countries: **Bolivia, Mexico, Mozambique Nepal, Vietnam, Indonesia, and the Philippines.**



- Girls travel with their animals looking for shelter in the outskirts of Dhaka, Bangladesh, 2004. (Photo: Farjana Khan, AFP/ UNICEF)

Box 2.1 Understanding intensive and extensive disaster risk terminology

In 2009 the United Nations International Strategy for Disaster Reduction (UNISDR)⁸ identified 'extensive' and 'intensive' risk as 'emerging new concepts that are not widespread but are of growing professional relevance'. Disaster data used for this study was categorised as 'extensive' and 'intensive' risk and used to assess the differential impact of the risk types. UNISDR define the terms as follows (emphasis added):

- **Intensive risk:** The risk associated with the exposure of *large concentrations* of people and economic activities to *intense hazard events*, which can lead to potentially catastrophic disaster impacts *involving high mortality* and asset loss. It is understood mainly as a characteristic of large cities or densely populated areas that are exposed to intense hazards such as strong earthquakes, active volcanoes, heavy floods, tsunamis, or major storms. This report will refer to intensive risk as '**concentrated high impact**' events/risk.
- **Extensive risk:** The *widespread* risk associated with the exposure of dispersed populations to *repeated or persistent* hazard conditions of *low or moderate intensity*, often of a highly localized nature, which can lead to *debilitating cumulative disaster impacts*. It is understood to be a characteristic of rural areas and urban margins where communities are exposed to, and vulnerable to, recurring localised floods, landslides, storms or drought. This report will refer to extensive risk as '**persistent lower impact**' events/risk.

NOTE: The terms used in this report should be recognised as simplifications of the more detailed definitions provided above.

2.1.1 Introducing the data

The disaster data⁹ was pre-classified by risk type (see 2.1). The data is recognisably a reflection of that which is reported at the country level and is therefore likely to contain bias geographically and over time.¹⁰ Child welfare data – sourced at the lowest available geopolitical scale – falls into the broad categories of 'child health' 'education' and 'poverty'. Data at the sub-national level is not uniformly available and therefore specific indicators vary between countries. The study reflects that data which was most accessible for the time period 1999–2009 and is therefore limited in coverage of the wide range of potential impacts of disasters on child welfare. Although the data used for this study is provided at the lowest available geopolitical scale (district or region) only limited statistical tests and modelling techniques can be carried out using area data; the results therefore provide a useful first picture of disaster risks to child welfare and development which identify a series of further research questions and approaches.

⁸ UNISDR Terminology on Disaster Risk Reduction (2009) available from: <http://www.unisdr.org/eng/library/UNISDRterminology-2009-eng.pdf>

⁹ Sourced from the Desinventar databases.

¹⁰ Discussions on the bias present in Desinventar can be found in López-Calva et al. (2009).



- A neighbourhood boy wades through the floodwater on the outskirts of the city of Cotonou, Benin, 2010 (Photo: Olivier Asselin, UNICEF)

Table 2.1 Country data and scale

Country	Education variable ¹¹	Health (including nutrition) variables	Poverty variables	Geopolitical scale of data
Bolivia	Y	Y		Region/district
Mexico	Y	Y	Y	State and urban/rural
Mozambique	Y	Y		Province/district
Nepal	Y	Y		Region/province
Vietnam	Y	Y	Y	Region/district
Indonesia	Y	Y	Y	Region
Philippines	Y			Region/province

Each country data set was the subject to specific regression analysis for both concentrated high impact and persistent lower impact risk, producing separate sets of results for each type of risk and each variable per country. Regression analysis tests the impact of a given shock (the disaster) on a small number of indicators of child well-being or development.

For persistent lower impact risk some results were sensitive to the different models that were run, i.e. a relation may be significant for one model and not for another. The models reflected the use of different thresholds to define treatment and control areas of persistent lower impact risk and to allow for the application of fixed and random effects (see Table A.2 in Annex 1). All results where at least one of the models was statistically significant are presented.¹² For concentrated high impact risk one model was used and applied both fixed and random effects estimations (see Annex 1).

In the case of persistent lower impact disasters, treatment and control provinces were identified based on historical disaster data from the period 1988–1998 which identified provinces/district more (treatment) or less (control) prone to persistent risk according to the median number of data cards¹³ in the Desinventar database.

For the case of concentrated high impact disasters, treatment and control provinces/districts are identified based on the occurrence of high impact events in the period of study. Provinces/regions where no disaster occurred are used as the control and provinces/regions where disaster occurred are used as the treatment.

To define the pre and post event periods for treatment sites, the trend of events during the period of analysis was analysed. The period from 1999–2009 is divided in two according to the evolution of variables that recover the structural change caused by a disaster. Boxes A1 and A2 in Annex 1 elaborate the process of identification for both risk types.

¹¹ All countries provided data at primary and secondary level with Bolivia, Nepal and Indonesia including pre-school data.

¹² Results are more robust when they are statistically significant for all models. However, given the goal of this study is to identify trends, results that are statistically significant for one or more models are presented.

Despite the value and relevance of this study, the availability and time span of data used limits the degree to which a robust understanding of childhood vulnerability and causal linkages to disaster impacts can be established. The results present the overall trend in childhood welfare in response to both risk types for the study period; 1999–2009. The results presented are those which are statistically significant and provide a basis from which to conduct further country level research.¹⁴ Lessons in relation to data are discussed in section 2.3.3.

Box 2.2 Statistical significance

A result is statistically significant when there is a high probability that the observed relationship did not occur by pure chance. In simpler words, *the statistical significance tells us something about whether the results are 'true' (significant) in the sense of being representative. In this study this means that the analysis shows an impact of the disaster on the welfare variable.*

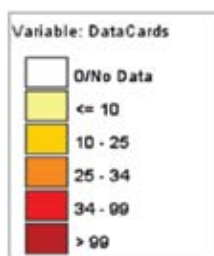
2.2 Results

Each country's results are presented independently with a full discussion of results from across the countries according to risk type in section 2.3. Each country presents an introduction to the country and the disaster profile, and a box of 'at a glance' relevant facts for child welfare to provide a level of context. Detail on the disaster events during the period under study are presented for both concentrated high impact and persistent lower impact risk types and the significant results summarised.

2.2.1 Bolivia

Bolivia is the highest country in South America, the fifth largest in the region and completely landlocked. It is split in three topographical regions: the Andes and arid highlands of the west; the semi-tropical valleys in the middle third of the country; and the tropical lowlands of the east. From October 2009 to July 2010, the government had to declare a national emergency five times due to floods, drought and river contaminations.¹⁵

The greatest impacts of disasters come from earthquakes, floods and droughts associated with El Niño.¹⁶ Floods (36 per cent) and earthquakes (47 per cent) were the cause of most houses destroyed and damaged in the 35 years to 2009, whilst landslides generated 17 per cent of deaths and 20 per cent of missing people.¹⁷



- Distribution of persistent lower impact events in Bolivia, 1999–2009

¹³ See: <http://www.gfdr.org/gfdr/sites/gfdr.org/files/documents/Bolivia-2010.pdf>

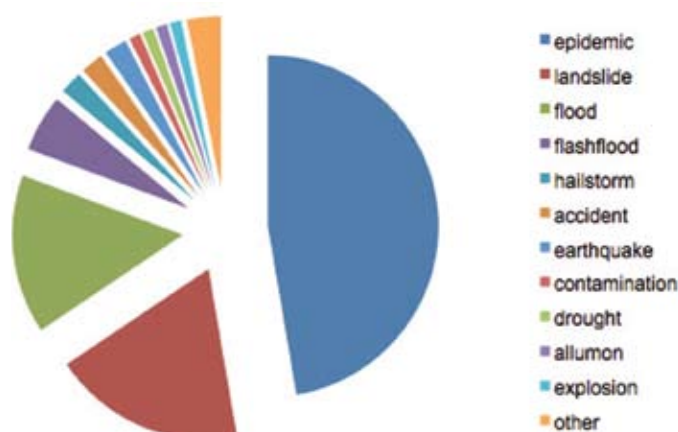
¹⁴ For a full discussion on the limitations of the data see CCC (2011a).

¹⁵ See: <http://www.gfdr.org/gfdr/sites/gfdr.org/files/documents/Bolivia-2010.pdf>

¹⁶ IADB (2006).

¹⁷ Missing refers in Desinventar to people who disappeared due to a disaster but whose body was not found. Deaths are people whose body was found. According to UNISDR, it is more accurate to use the sum of deaths and missing people as an indicator of the impact of a disaster than on casualties. Through the document 'deaths and missing' is referred to in this sense.

Figure 2.1 Deaths and Missing by disaster type 1974-2009



Child welfare – at a glance

- 36 per cent of deaths in children aged under five are caused by diarrhoea, 28 per cent by malnutrition, 20 per cent by acute respiratory infections and 16 per cent by perinatal problems (related to childbirth).¹⁸
- On average, children from rural areas attend school for 4.2 years, while children in urban areas receive an average of 9.4 years of education.¹⁹
- Attendance rate at primary school is higher than secondary with children in urban areas reaching 81 per cent compared to children in rural areas with a 70.4 per cent net attendance rate.²⁰

Concentrated high impact (intensive) risk disasters 1999–2009: There were only three high impact disasters in Bolivia during the period. A hailstorm in February 2002 caused the flood of Choqueyapu River (that runs through La Paz), when 69 people died. Two floods in Cochabamba, one in December 2003 in Villa Tanuri, Chapare – which caused the collapse of a bridge and resulted in 45 deaths – and the other in January 2005 in the town of Mizque which destroyed 500 houses.

Persistent lower impact (extensive) disasters 1999–2009: The departments of Bolivia that experienced the highest number of events are La Paz (with more than 99 registered events and more than 58 deaths and missing people reported), followed by Santa Cruz and Cochabamba (with between 34 and 99 events).

¹⁸ See: http://www.unicef.org/bolivia/children_1540.htm [last accessed March 2011]

¹⁹ See United States Library of Congress: <http://lcweb2.loc.gov/frd/cs/profiles/Bolivia.pdf>

²⁰ See: <http://huebler.blogspot.com/2006/04/primary-school-attendance-in-bolivia.html>

Table 2.2 Summary of significant results for Bolivia

Risk Type*	Variable Type	Negative Impact	Positive Impact
Persistent lower impact	Education	Reduced net enrolment (preschool) Incr. dropout rates (preschool) Incr. gender gap in achievement rates (primary)	Incr. net enrolment (primary)
	Health	Incr. incidence of diarrhoea per 1,000 in under five's	

* only three years of recorded concentrated high impact events exist, which impedes drawing any conclusions according to statistical analysis

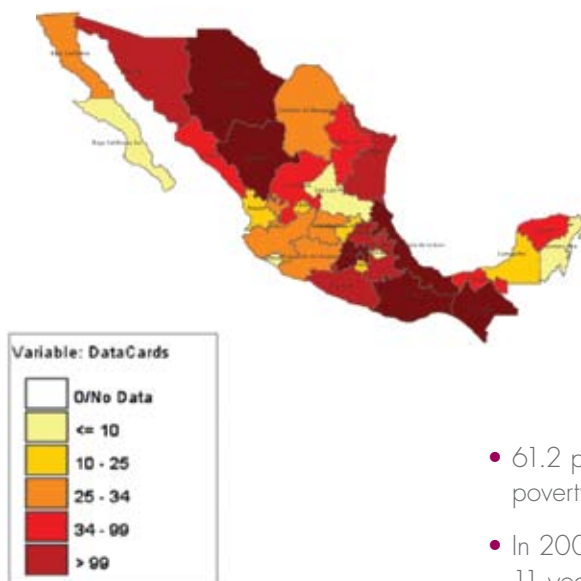
2.2.2 Mexico

Mexico is the eleventh most populous country in the world.²¹ The country is crossed from north to south by two mountain ranges: Sierra Madre Oriental and Sierra Madre Occidental. At the centre, and from east to west, the country is crossed by the Trans-Mexican Volcanic Belt (or Sierra Nevada). Most lowlands are located along the coasts and in the Yucatan Peninsula. The northern and central regions have arid or semi-arid climates, and experience frequent drought.²²

Between 1974 and 2009 earthquakes caused 25 per cent of the deaths and missing people and floods caused 11 per cent. In the same period floods, rains and earthquakes caused 44 per cent, 36 per cent and 8 per cent of the houses destroyed and damaged respectively.

Child welfare – at a glance²³

- 61.2 per cent of Mexico's 11.6 million children under five years live in 'asset poverty' and 27.4 per cent in 'food poverty'.
- In 2009 school enrolment rates for the 13 million children between 6 and 11 years old were 97.9 per cent for boys and 98.6 per cent for girls, although almost 3 million adolescents (12–17 years) did not go to school in 2008; 48.6 per cent of whom were male and 44.1 per cent female.
- 87 per cent of the rural population had access to water in 2008 up from 77 per cent in 2000.²⁴



- Distribution of persistent lower impact events in Mexico, 1999-2009

²¹ According to the World Development Index 2008.

²² See: http://ec.europa.eu/development/icenter/repository/env_cc_varg_adaptation_en.pdf

²³ See: <http://www.unicef.org/mexico/spanish/ninos.html> [last accessed March 2011]

²⁴ See: <http://data.worldbank.org/country/mexico> [last accessed April 2011]

Concentrated high impact risk disasters 1999–2009: High impact disasters are recorded for seven of the years under study, only 2000, 2001, 2003 and 2006 returned no records. Veracruz and Tabasco were affected by more than five high impact disasters between 1999 and 2009. Veracruz has more than 2000 (54 per cent) deaths and missing people registered and Chihuahua more than 882 deaths and missing people (23 per cent). Intensive floods generated 67 per cent of houses destroyed and damaged for the same period.

Persistent lower impact disasters 1999–2009: Most provinces in Mexico have registered more than 120 records for persistent disaster events over the past ten years. Chihuahua, Veracruz and Puebla have more than 400 deaths and missing people registered for this period.

Table 2.3: Summary of significant results in Mexico

Risk Type	Variable Type	Negative Impact	Positive Impact
Concentrated high impact	Education		Incr. net attendance (primary) Reduced dropout rates (primary)
	Health	Decr. share of child population accessing sanitation (rural)	Decr. child mortality (under one year old) Incr. share of child population accessing water (urban)
Persistent lower impact	Health	Reduced share of child population accessing water (urban) Reduced share of child population accessing sanitation (urban)	Incr. share of child population accessing sanitation (rural)

- Distribution of persistent lower impact events in Mozambique, 1999-2009

2.2.3 Mozambique

The Zambezi River divides Mozambique into two topographical regions. To the north of the river the coastline changes into hills, low plateaus and further west to rugged highlands as it moves inland. To the south of the river, the lowlands are broader with the Mashonaland plateau and Lebombo mountains. More than 60 per cent of Mozambique’s population lives in coastal areas, and is therefore highly vulnerable to cyclones and storms. The province of Nampula recorded the highest number of high impact events across all the countries studied – mainly floods.

Mozambique is one of the ten countries with the highest mortality risk to tropical cyclones, and is among the top 20 countries with a high percentage of people and Gross Domestic Product exposed to floods (UNISDR, 2009). Floods, epidemics and cyclones are the most frequent disasters, although drought affects by far the largest number of people.

Child welfare – at a glance²⁵

- Approximately 41 per cent of children are chronically malnourished
- 320 children under five years die every day due to diseases such as malaria, respiratory infections and diarrhoea.

²⁵ See: http://www.unicef.org/mozambique/children_1596.html [last accessed March 2011]

- 83 per cent of children are enrolled in primary school, compared to 32 per cent in 1992 although the quality of education and of the schools is still considered to be very poor, with over half of the students failing to complete Grade 5.

Concentrated high impact disasters 1999–2009: Only 1999 did not return a record of a high impact disaster in the years under study. Nampula has 66 events registered between 1999 and 2009. This is the highest number among all provinces in all countries analysed. Floods caused 70 per cent of deaths and missing, and cyclones generated 49 per cent of houses destroyed and damaged.

Persistent lower impact disasters 1999–2009: Gaza and Nampula present more than 500 registrations of lower impact disasters. Deaths and missing people due to these persistent events are concentrated in Gaza and the central coastal region of Zambezia (with more than 200 events in 10 years).

Table 2.4: Summary of significant results for Mozambique

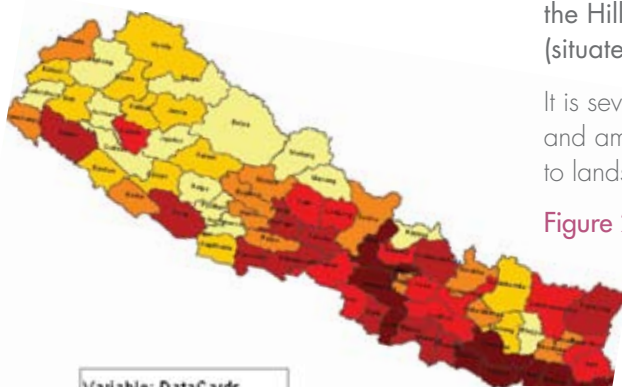
Risk Type	Variable Type	Negative Impact	Positive Impact
Concentrated high impact	Education		Incr. achievement rates (primary and secondary)
Persistent lower impact	Health	Incr. low birth weight (under 2.5 kg when born)	

2.2.4 Nepal

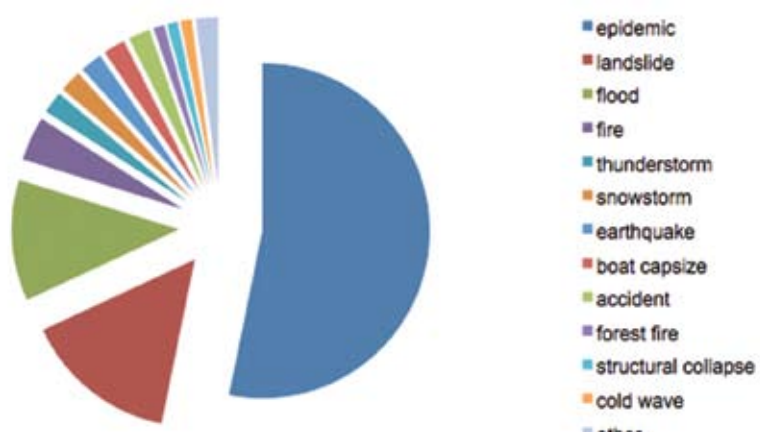
Nepal is a landlocked country located in the Himalayas. Nepal is commonly divided into three physiographic areas: Terai (the southern lowland plains), the Hill (with mountains from 800 to 4,000 metres) and the Mountain region (situated in the Great Himalayan Range, making up the northern part of Nepal).

It is seventh in the world in the percentage of people exposed to floods per year and among the top 15 countries with people and Gross Domestic Product exposed to landslides triggered by precipitation or earthquake per year

Figure 2.2 Deaths and Missing by disaster type 1974-2009



- Distribution of persistent lower impact events in Nepal, 1999-2009



Between 1974 and 2009, 50 per cent of deaths and missing were caused by epidemics, 14 per cent by landslides and 11 per cent by floods;²⁶ in the same period floods (45 per cent), earthquakes (23 per cent) and wildfires (18 per cent) were the principal cause of houses destroyed and damaged.

Child welfare – at a glance²⁷

- Approximately one in 25 children die during the first month of life mainly due to diarrhoea and/or acute respiratory infections; conditions exacerbated by underlying malnutrition.
- Education is compulsory and schooling is free for children aged from five to nine years.
- Four out of every five primary school-aged children are in school but only one third of children aged 13 to 16 years are enrolled in secondary school.

Concentrated high impact disasters 1999–2009: Only five out of eleven years under study recorded high impact events. The Eastern region is the only one affected by more than two concentrated disasters during 1999–2009, all of them floods although no deaths were registered. Almost all deaths and missing people were registered in the Central region. Landslides generated 76 per cent of deaths and missing people and floods 16 per cent.

Persistent lower impact disasters 1999–2009: The Central and the Eastern region registered more persistent lower impact disasters than other regions during 1999–2009. Most deaths and missing people were generated by landslides (36 per cent), followed by floods (18 per cent) and snow storms (25 per cent). Floods (54 per cent) and fires (18 per cent) caused most destruction and damage to houses. Saptari, a province located in the Eastern region presents the highest number of data cards (mostly fires, floods, thunderstorms and cold waves).

Table 2.5: Summary of significant results in Nepal

Risk Type*	Variable Type	Negative Impact	Positive Impact
Concentrated high impact	Education	Reduced gross intake ratio for grade 1 Reduced gross enrolment (primary)	Incr. No. of students (secondary) Incr. No. of schools
Persistent lower impact	Health	Incr. fatality rates of total population Incr. ARI fatality Incr. proportion of malnourished under three years	Reduced incidence of ARI per 1,000 under five years Reduce incidence of pneumonia per 1,000 under five years

*Limited child welfare data available for 2006–2009 disallowed regression analysis of concentrated high impact risk

²⁶ Including glacial lake outburst flooding.

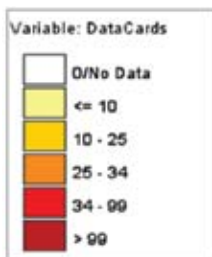
²⁷ See: <http://www.unicef.org/nepal/5461.htm> [last accessed March 2011]

2.2.5 Vietnam

Vietnam is the eastern most country on the Indochina Peninsula in Southeast Asia. The topography is a combination of hills and densely forested mountains. To the north of the country are the highlands and the Red River Delta. The south has coastal lowlands, the mountains of the Annamite Chain and forests.

In the 35 years between 1974 and 2009 floods were responsible for 70 per cent of deaths and for 41 per cent of houses destroyed and damaged; whilst in the decade 1999–2009 weather-related disasters were responsible for 4,556 deaths. Vietnam is predicted to be one of the five most affected countries by future sea level rise.²⁸

Figure 2.3 Deaths and Missing by disaster type 1974-2009



- Distribution of persistent lower impact events in Vietnam, 1999-2009

Child welfare – at a glance²⁹

- In 2006, 40 per cent of children living in rural areas were poor compared to about 10 per cent of children living in cities.
- In 2006 one third of children below five were stunted and almost half of all children do not have access to hygienic sanitation facilities
- Primary school completion rates for ethnic minority children is just over 60 per cent compared to 82 per cent for Kinh children, with 65 per cent attending secondary compared to almost 82 per cent of Kinh.

Concentrated high impact disasters 1999–2009: Records of high impact disasters exist in all the years under study. Concentrated high impact floods generated more than 80 per cent of deaths and missing whilst floods and storms caused 42 per cent and 40 per cent of houses destroyed and damaged respectively.

²⁸ See: http://gfdrr.org/ctrydrnnotes/Summary_Vietnam.pdf

²⁹ See: <http://www.unicef.org/vietnam/children.html> [last accessed March 2011]

Persistent lower impact disasters 1999–2009: Most provinces of Vietnam register more than 20 persistent disasters for the period. Floods cause 56 per cent of deaths and missing people, whilst storms cause 15 per cent; 42 per cent of houses destroyed and damaged were due to hailstorms, 24 per cent to flash floods and 19 per cent to storms.

Table 2.6: Summary of significant results for Vietnam

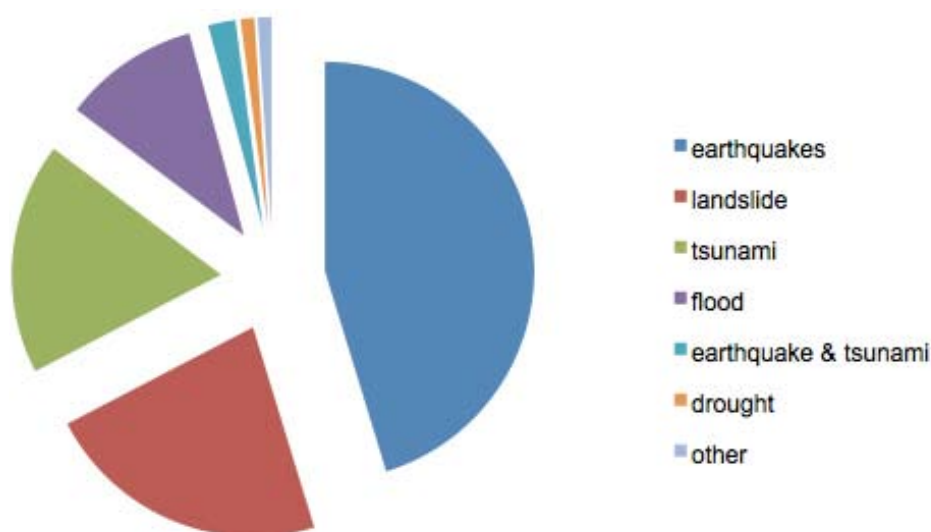
Risk Type	Variable Type	Negative Impact	Positive Impact
Persistent lower impact	Education	Reduced no. of classes Reduced total no. of students (primary) Reduced no. schools (primary)	Incr. Net enrolment (lower secondary) Incr. total no. of students (upper secondary) Incr. no. of secondary schools Incr. no. of teachers Incr. no. of schools
	Health	Incr. infant mortality rates Incr. % moderate underweight and stunting Reduces % of population with access to improved sanitation Reduces % of population with access to improved water source	Reduces % severe underweight and stunting

2.2.6 Indonesia

Indonesia is the largest archipelagic nation in the world with more than 17,000 islands, of which about 1,000 are permanently settled with the larger islands being mountainous. According to WDI 2008 it is the world's fourth most populous country. It is situated in one of the most active disaster hot spots where several types of disasters such as earthquake, tsunami, volcanic eruption, flood, landslide, drought and forest fires frequently occur. There are some 400 volcanoes, of which 100 are active.

Indonesia has the highest number of people living in areas potentially affected by tsunamis in the world (more than 5,000,000), ranks second in the world in the number of people exposed to landslides triggered by precipitation or earthquake per year, and third in the number of people exposed to earthquakes and exposed to drought (UNISDR, 2009). Between 1974 and 2009 earthquakes caused 43 per cent of deaths and missing people, landslides 21 per cent and tsunamis 17 per cent. In the same period earthquakes generated 68 per cent of houses destroyed and damaged, floods 18 per cent and landslides and tsunamis 6 per cent.

Figure 2.4 Deaths and Missing by disaster type 1974-2009



Child welfare – at a glance³⁰

- Under-five year olds mortality rates fell from 79 per 1,000 live births in 1991 to 44 per 1,000 in 2009. Despite this progress child mortality remains a serious problem.
- Stunting affects 37 per cent of children under five while 18 per cent of children below the age of five are underweight.
- Primary enrolment rates reached 97 per cent in 2009, however around 25 per cent do not transfer to secondary education and around 2 million of Indonesian children do not attend school, of which 15 per cent are children aged 7 to 15 years.

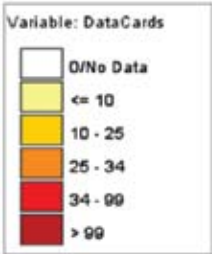
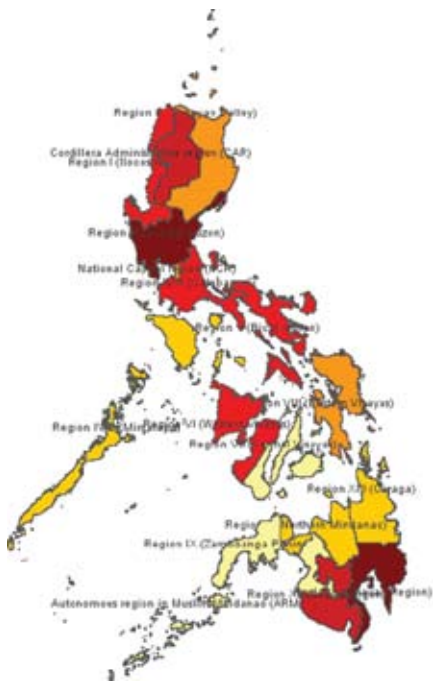
Concentrated high impact risk 1999–2009: High impact events occurred yearly in Indonesia. The Region of Yogyakarta was most affected in term of deaths and missing between 1999 and 2009 with almost 5,000 cases (45 per cent). These deaths were caused by the earthquake of 2006, which had a magnitude of 5.9 on the Richter scale. The same earthquake of 2006 also affected Jawa Tengah, which presents 12 per cent of the deaths and missing, and Sumatera Utara (North Sumatra) with 11 per cent. Sumatera Barata has 12 per cent of the deaths and missing registered (most of them due to the earthquake of September 2009).

Persistent lower impact disasters 1999–2009: Jawa Tengah (Central Java), one of six provinces on the island of Java, concentrates 16 per cent of the total persistent risk events registered on the Desinventar database between 1999 and 2009. Jawa Barat (West Java) is the most populous province of Indonesia and concentrates 9 per cent of the total persistent risk disasters registered on the database between 1999 and 2009. Most deaths and missing people for this period however are registered in Nusa Tenggara Timur (15 per cent).

³⁰ See: http://www.unicef.org/indonesia/children_2833.html [last accessed March 2011]

Table 2.7: Summary of significant results for Indonesia

Risk Type	Variable Type	Negative Impact	Positive Impact
Concentrated high impact	Education	Reduced net and gross enrolment (secondary)	Incr. pre-school participation
	Health	Incr. infant mortality Reduced share of houses with access to sanitation	
	Poverty	Incr. number of people living under poverty line	
Persistent lower impact	Education		Incr. net enrolment (primary and secondary) Incr. gross enrolment (secondary)
	Poverty	Incr. % of people living under the poverty line	



- Distribution of persistent lower impact events in Philippines, 1999-2009

2.2.7 Philippines³¹

The Philippines is an archipelago of more than 7,000 islands divided into three island groups. Luzon, in the north is a very mountainous island and is the largest and most economically and politically important in the country. Sixty per cent of the total land area of the country is exposed to multiple hazards, and as a result 74 per cent of its population is vulnerable to disaster.³²

The Philippines ranks second in the world in mortality risk to tropical cyclones (typhoons), second in the number of people exposed to typhoons, and second in the number of people exposed to earthquakes. It ranks fifth in the number of people living in areas potentially affected by tsunamis (UNISDR, 2009).

Child welfare – at a glance³³

- Child mortality rates have decreased steadily since 1998; however in 2003, 7 out of 17 regions were estimated to have infant and under-five mortality rates higher than the national average – figures are worst for rural areas.
- The prevalence of underweight children (0–5 years old) has decreased since 1998 from 32 per cent to 28 per cent in 2003.
- The net enrolment ratio in public secondary education in 2002 was only 57 per cent, of which almost 60 per cent of those reach and complete the last year – roughly 3 million 12–15 year olds are not taking secondary education.

³¹ Disaster data for the Philippines has the following additional limitations: the disaster dataset was provided at the regional level, and only in very few cases were there data cards at the provincial level. Where a disaster affected more than one province UNISDR disaggregated the disaster by assigning a proportional value to each affected province which was used as the basis for the regressions.

³² See: <http://gfdrr.org/ctrydrnnotes/Philippines.pdf>

³³ See: http://www.unicef.org/philippines/childrensrights_8920.html [last accessed March 2011]

Concentrated high impact disasters 1999–2009: High impact disasters were recorded in every year of the period of study. Central Luzon was affected by more than 10 high impact disasters between 1999 and 2009. Cyclone and landslides caused 75 per cent and 23 per cent of deaths and missing respectively. Typhoons were the cause of 99 per cent of houses destroyed and damaged.

Persistent lower impact disasters 1999–2009: Central Luzon and Davao Regions registered more than 33 lower impact events between 1999 and 2009. Seventy-six per cent of deaths and missing people were caused by typhoons as well as 77 per cent of the houses destroyed and damaged.

Table 2.8: Summary of significant results for the Philippines

Risk Type	Variable Type	Negative Impact	Positive Impact
Concentrated high impact	Education	Incr. drop-out rates (secondary) Reduced achievement rates (secondary) Reduced cohort survival (secondary)	
Persistent lower impact	Education		Reduced drop out (secondary) Incr. survival rate (secondary)

- A girl carries a bucket of water to her tent in a camp near the slum of Cité de Dieu, in Port-au-Prince, Haiti 2011 (Photo: Marco Dormino, UNICEF)



“inequalities in risk exposure and sensitivity to risk and in access to resources, opportunities and capabilities, put specific groups in a disadvantaged position”

(Baez et al., 2010)

2.3 Discussion

Overall the study found 52 statistically significant results: 28 (54 per cent) negatively impacted on child welfare and 24 (46 per cent) unexpectedly indicated gains in child welfare. All countries exhibited negative results: for concentrated high impact events 57 per cent of results were negative and for persistent lower impact events 52 per cent of results were negative.

Unexpected gains in education indicators were found in all countries, whilst health impacts were unexpectedly improved in Mexico, Vietnam and Nepal. In three out of seven countries (Indonesia, Mexico and Mozambique) the analysis revealed unexpected positive results in response to concentrated high impact risk, although both Nepal and Bolivia lacked enough data to generate results for this risk type and Vietnam did not return any significant results for high impact events.

Although the results validate much of the concern for children's specific needs and vulnerability they also illustrate the complexity of establishing the causal link between natural disasters and child welfare outcomes.

Vulnerability of households, including children, to natural shocks is determined by several factors, however this study is limited to working with child welfare data and disaster data to identify simple patterns and trends – it did not include data on the mediating conditions that can affect disaster impact, nor did it incorporate specific information on physical exposure to shocks. Understanding the degree of difference in disaster impacts on children at different stages of development, between genders, and through different types of exposure is further limited by both the child welfare and disasters data (see section 2.3.3 for a discussion on the data). Despite this, the study's approach to disaggregating risk type breaks new boundaries in understanding disaster impact on child welfare and the results are discussed in the following sections.

- Children walk on a dirt road, on their way to fetch water for their school, in the village of Bezu, Zimbabwe, 2002 (Photo: Giacomo Pirozzi, UNICEF)





- A child plays with materials from a UNICEF-supplied recreation kit, at an interim care centre for up to 100 unaccompanied children on the outskirts of Port-au-Prince, Haiti, 2010 (Photo: Roger LeMoyne, UNICEF)

2.3.1 Concentrated high impact disasters: intensive risk

This report opened by noting the complexity of influencing factors that shape disasters. Recognising the limitation of the data for this study (see section 2.1.1), this short discussion raises questions for high impact disaster risk management that are worthy of further exploration.

Trends in disaster impacts from concentrated high impact risk are difficult to identify over a short time period of study events and are often less frequent – in the case of Bolivia for example only three events occurred in the ten years under study, thus establishing a longer-term trend of high impact disaster is limited. A total of 57 per cent of results showed negative impacts on child welfare and 43 per cent unexpectedly showed positive gains. Mozambique, Mexico and Indonesia all demonstrated some unexpected results in education variables – and for Mexico also on health variables. In fact half the significant results for education showed negative impacts and half positive – however all the negative impacts occurred in the secondary education sector and all but one unexpected result occurred below secondary.

Where concentrated high impact disasters demonstrate no impact or positive impacts on child welfare over time, the hypothesis that humanitarian aid and emergency interventions in post-disaster situations could lead to a longer-term trend of improvement in some aspects of child welfare is worthy of investigation. Understanding the relationships which may exist between emergency aid/humanitarian systems and government departments or agencies in the countries where the education sector appears to have ‘built back better’ could provide useful lessons for improving post-disaster efforts in ways which contribute to the delivery of long-term development gains. The prominence of the education sector in DRR action, through both retro-fitting/structural and curricula based work, indicates a need to clarify the evidence base of DRR approaches that work and develop cost-benefit analysis to guide future investment in DRR.

2.3.2 Persistent lower impact disasters: extensive risk

Results for analysis of persistent, widespread low-moderate risk make up the majority of the study’s outputs of which 54 per cent of results identified negative impacts on child welfare. Of the 46 per cent of results which were unexpected or identified positive impacts, 76 per cent were in relation to education variables and 24 per cent in response to health variables. These results need to be carefully considered in light of the data limitations of the study and the potential different transmission channels of disaster impacts.

The dominance of the gains demonstrated in the education sector clearly points to a need for a better understanding of the mediating factors at the country and local level. Educational gains were identified in all countries except Mexico and Mozambique and were dominated by gains in the secondary sector. Results in Vietnam show a stark contrast between negative impacts at the primary scale – where classes, students and schools all decreased – and the all round gains at secondary level. Whilst this could lead to interpretations that younger children are more vulnerable, the determinants of access to primary and secondary education need to be taken into account in each setting.

Where children are already susceptible to low welfare outcomes investment in welfare interventions and safety net provision is clearly needed in the face of both high impact and persistent lower impact events

In Indonesia gains are seen in both primary and secondary enrolment and it is considered that this could be a reflection of the volume of aid received in the post-tsunami period contributing to increased resilience to persistent lower impact events – detailed work would be needed to understand the aid flows to clarify this and to understand the relationship of long-term reconstruction programmes in mediating lower level risk more broadly. Further studies should identify the enabling factors leading to improved gains in the education sector and seek to improve understanding of the wider institutional and policy environment where these gains occurred, as well as the specific micro-level contexts that mediate the transmission and impact of disaster.

A total of 73 per cent of the significant results for persistent lower level disasters in relation to health variables negatively impacted on child welfare. In Nepal health gains are disease related – although reduced incidence of ARI in under-five's contrasts with the increased numbers of fatal cases. Persistent lower level risk impacts negatively on the nutritional status of Nepali under-three year olds and this impact on nutritional status is also reflected through an increase in low birth weight in Mozambique. In countries where malnutrition is known to be a problem the fact that persistent lower level risk is exacerbating the situation demonstrates a severe lack of capacity to cope with repeated lower impact disasters. Interventions to reduce malnutrition need to factor in the recurrent impacts of lower level disasters.

In Vietnam the positive impact on the percentage of the child population recorded as severely underweight and severely stunted contrasts with the negative impact on numbers of moderate underweight and stunted. Data to support a clear understanding of why this may occur is not available within this study, but these results may reflect ongoing interventions to target those severely underweight or stunted thus increasing the exposure of others to the impacts of persistent lower level risk. Or, it may reflect the coping strategies available to these different groups. Young Lives data from Vietnam revealed that responses to crop failure (correlated with drought and flooding, as well as pests) resulted in over a quarter (25.2 per cent) of households eating less as a coping response. Such action is likely to have longer-term health impacts on children in the household as their development is inhibited (Valadez, 2010), as well as longer-term impacts on household income and consumption patterns. Studies highlighted by Baez et al., (2010) corroborate the impacts of lower level frequent disaster, such as rainfall variation, as being clearly associated with worse nutritional outcomes and go on to elaborate the long-term health effects of low nutritional status on long-term development.

The decline in access to water and sanitation in Vietnam is reflected by an urban decline in child access to water and sanitation in Mexico. However, the gains in rural Mexico in response to persistent risk contrast with the impact of concentrated risk where rural areas are impacted negatively whilst urban areas gain. Such disparity between gains and reductions in access to water and sanitation between the rural areas and urban centres, and between concentrated high impact and persistent lower impact risk, suggest the need for enquiry into the modes and reach of both emergency response/humanitarian aid and DRR/development programmes.

Overall the evidence indicates that both persistent lower impact and concentrated high impact events are likely to have medium-term impacts on child welfare. Results identify a set of specific areas for further study that would support an improved understanding of the factors mediating the impact of both disaster types at the country and local scale.

It is difficult to reach any clear conclusions without undertaking empirical research in-country as to the political economy of the decision-making and investment flows across scales that contribute to these outcomes, and to the coping strategies available to individuals at the micro-level

Between 1999 and 2009 both Mozambique and Vietnam failed to record any impact on schools and hospitals

Box 2.3 Future research should include:

- A political economy understanding of the way that both disasters and child welfare are articulated and prioritised at the country level.
- Data on flows of investment from government, donors and humanitarian agencies in relation to both development priorities, DRR and disaster events at the local and national level.
- The presence of INGOs/CSOs operating in particular areas providing health and education services, funds, DRR investments or emergency response support.
- Micro-level data to better understand the individual and social contexts that mediate the impact of disasters, as well as data on the presence of household and community scale coping mechanisms such as self-help groups, extended family, and formal social protection measures, amongst others.

2.3.3 Lessons for future data analysis

Desinventar data does not provide specific information regarding children:

- Information regarding variables that directly affect children (such as the number of schools affected by a disaster) is inconsistent or unavailable.
- 'Deaths and missing' and displacement figures are not disaggregated by age or by gender.

Indonesia has a comprehensive set of data for schools and hospitals affected for both persistent and concentrated events, but records from other countries indicate a greater impact on schools from persistent lower impact risk than from concentrated high impact risk. What is unknown is whether this kind of reporting reflects the greater ability to report more widely after lower level impact disasters or whether it is a reflection of country-level capacity to gather and record data per se.

The child welfare data includes only limited degrees of disaggregation:

- Education data contributes insights to questions around age through the simplistic division of primary and secondary datasets although misses the gender perspective in most cases.
- Data reflecting the rural and urban divide is limited only to datasets from Mexico on water and sanitation.
- Beyond education no data includes values that reflect child gender, ethnicity/caste, family wealth level, disability or other social and cultural factors that may mediate disaster impact.

In this study the results did not control for migration or attempt to account for the evolution of impacts of disasters occurring before the study period on data provided within the timeframe of the study – neither could it account for forward lags in impact beyond 2009. Despite these limitations the results provide a unique insight into the differential impact of risk type on child welfare and development.

The lack of poverty data – provided only by Mexico, Vietnam and Indonesia – is clearly problematic for developing studies that can further isolate the impact of disaster on child welfare



- In Cité de Paix classmates waded through floodwater on their way home from school on the outskirts of the city of Cotonou, Benin 2010 (Photo: Olivier Asselin, UNICEF)

Box 2.4 Improvements to data collation should include:

- Disaggregation of both child welfare and disasters data by age, gender and socio-economic factors to improve the understanding of disaster impact on different groups of the community.
- Increased regularity and consistency of child welfare data collection – for example Nepal had data only from 2006–2009 for some variables.
- Consistent recording of disaster impact variables that are likely to affect child welfare – for example, recording schools destroyed or affected.
- The collection of micro-level data that includes a broad range of socio-cultural indicators as well as spatial information relating to exposure to improve the context for analysis of disaster impacts.

Social and community factors combine with national-level responses to modify the impact of disaster. The use of micro-level data would improve the understanding of the local contextual factors mediating the impact on child welfare variables. In the longitudinal study of child welfare conducted through the Young Lives study data is collected that allows for the interrogation of the linkages between the type of shock (drought, pests, floods etc.) and the impact of that shock in relation to ethnicity, household wealth, occupation, education level of head of household and their gender (Valadez, 2010). In the Vietnam study group for example, the data showed that children from the H'mong ethnic group were at a much greater risk of experiencing drought than the majority Kinh group (21.8 per cent of H'mong children, as compared to 3.4 per cent Kinh).

This scale and type of data collation uncovers the underlying socio-cultural and political vulnerabilities of different households within communities, but is resource intensive and limited in its influence at the local level. The potential for combining micro and sub-national data to produce more robust analysis of disaster impact and causality would clearly be beneficial.

Disasters policy needs to take account of the existing evidence of impacts of disasters on child welfare – and the potential future impacts – in order to plan child-sensitive DRR and emergency response programmes. In parallel child protection and development policies need to take into account the potential effects of both persistent lower impact and concentrated high impact events on individual and child welfare.

Both the results of this study and the outcomes of the Young Lives analysis (Valadez, 2010) indicate that there is a clear need for improving the understanding of different transmission channels of disaster impact at the local level. This requires not only an understanding of the socio-cultural and political context of households, but also an understanding of the post-disaster decision-making that informs coping strategies. In order to do so detailed studies of impacts and mediating factors at the local level, that engage with children in the process, are needed to better inform policy and programming.

3.0

Enabling Environment

"a move away from a concept of vulnerability involving passivity and suffering... means increasing capacities... and therefore fostering and enabling people's resilience"

(Cannon, 2008)

"Emphasising the value of engagement with children is not to expect them to have all the answers. Rather it reinforces the case for ... policy-making to include bottom-up processes to ensure approaches are context specific and take account of the needs of marginalised groups"

(CCC, 2008)

If DRR is to mobilise a shift from emergency response to disaster prevention and preparedness through addressing 'vulnerability' and building 'resilience' rather than focusing predominantly on hazards, a firm understanding of the complex interplay of mediating factors is needed. This requires engagement with communities to understand the structural causes of differentiated vulnerability, the specific nature of risk, and working with those actors to build household and community resilience to external shocks. Engaging the community, including children, in these processes can contribute to the shift from passive vulnerability to active agency.

A growing body of work emphasises the latent capacity of children to participate directly in DRR or climate change adaptation supported by child-centred programmes. It acknowledges the unique risk perceptions and risk communication processes of children, and their capacity to act as agents of change before, during and after disaster events.³⁴ Such examples demonstrate the ability to reduce risk behaviour within households and at the community scale, but also showcase children's capacity to mobilise adults and external policy actors to effect change on wider determinants of risk and vulnerability (Tanner et al., 2009; Mitchell et al., 2008).

When children learn and practice DRR from a young age the benefits stream is expected to integrate into their adult lives embedding changed behaviour early enough for it to be passed on to subsequent generations. Investment in child-centred DRR may therefore yield higher benefit and future savings than when adults acquire the same skills (Back et al., 2009). The studies imply that greater resources should be channelled towards enabling children's agency, including enhanced efforts to incorporate children's perspectives, knowledge, and potential for action into regular community-driven development, DRR and CCA programmes (Tanner et al., 2009).

To support the scaling-up of participatory child-centred DRR there is a need to better understand how and why children become effectively engaged as actors in DRR policy spaces and in the community. The research behind the longer report investigated child-centred DRR programmes in areas of relative poverty and high disaster risk where child participation in decision-making and planning, and child leadership in implementing DRR was evident. The analysis explored the interactions between children and young people, their access to knowledge, their socio-economic context, and the informal and formal institutional environment.

Empirical data was gathered through field research in the Philippines (2008–09 and 2010) with Plan International and World Vision, and in El Salvador (2008–09) with Plan International. For a selection of methods used with the children and youth groups see Molina et al., (2009). Some of these methods were replicated with select adult groups in the communities (e.g. village and/or district councils and church groups) and data from all these sessions were supplemented by household interviews in each community and key informant interviews with leaders in the community, school, district government and both state and non-state actors in child welfare and DRR/M at the provincial and national level.

³⁴ See Back et al. (2009), Peek (2008); and Tanner (2010)

3.1 DRR and child-centred practice in context

Whilst much of the research was participatory and focussed at the community level, there is a need to understand the broader operational policy context within which practices are situated. As noted engaging children in DRR action and policy is framed not only by the socio-cultural institutions, but also by the existing policy context which shapes DRR and child welfare in practice.

Box 3.1: Philippines policy and practice – a snapshot

In response to signing the Hyogo Framework of Action the Philippines developed a Strategic National Action Plan (SNAP 2009–2019) to institutionalise DRR through integration into a range of sectors and through the establishment of Disaster Risk Management Offices at the regional level. In this process the 'Disaster Risk Reduction and Management (DRRM) Act' or Republic Act 10121 was signed into law in May 2010; it is a law based on the right to life and property. The National Disaster Coordinating Council (NDCC) through the Office of Civil Defence (OCD) is responsible for the design of the new Implementation Rules and Regulations (IRR) and the development of a national framework for delivery.³⁵

Interviews at the national and provincial levels suggest that the new DRRM Act provides a strong push towards greater investment and institutionalisation of risk reduction activities and provides for a much greater recognition of the role of citizens and communities in DRR activities.

The current NDCC is an inter-agency council responsible for disaster preparedness, prevention and mitigation chaired by the Secretary of National Defence with the heads of all 18 government departments as members. Policy is operationalised at the sub-national level through Provincial, Municipal and Barangay (village) Disaster Coordinating Councils (DCC)'s who have responsibility for planning, implementing, funding and carrying out specific activities related to Disaster Risk Management (DRM). Whilst some areas are highly organised and proficient in both risk reduction and emergency response activities,³⁶ others rely on more ad hoc structures. Interviews in 2009 from the provincial, municipal and village level show that many local DCC's, although mandated and existing on paper, became functional only in recent years – often in the wake of a disaster. Interviews demonstrate a common feeling that 'people do not react until they have 'felt' a disaster' and are not prepared, despite a long-standing policy environment.

The inconsistent development and functionality of existing disaster coordinating councils across the country reflects a combination of factors including budgetary issues, political climate and will, and lack of recognition of the vulnerabilities and risks of the area. The devolution of the DRM function to the Local Government Units in 1991 is in some places considered to have deepened problems as many provinces and municipalities lack awareness of their mandated functions and their institutional capabilities were weak.

The primary focus on children in disaster management policy is to ensure that children have safe spaces and places to go after disasters occur and that their parents are capable of reducing the family exposure to disaster through good decision-making in relation to health, education and livelihood activities

³⁵ The policy context of DRR in the Philippines is transforming at different paces across the country.

³⁶ The province of Albay was named the first-ever Disaster Response Champion in the July 2010 Forum on Disaster Risk Reduction held in Shanghai, China, organised by UNISDR, ICLEI and UN-HABITAT.



- Boys in Caga-ut identify the impacts of hazards on their community, Salcedo, Philippines, 2009 (Photo: Fatima Molina, CDP)

Although the policy environment provides spaces within which school children and village youth can be proactive in realising their agency, achieving the potential of these mandated and formal groups is in part a reflection of the attitudes and culture of the community and/or school within which they are found

At the local government level – provincial, municipal and village councils – the policy focus is ‘family’ centred. The family is considered as a unit with policy primarily focusing on the role of the parents as the providers, managers and decision-makers in the household and thus responsible for the protection and welfare of the children.

At the village level the Council includes village health workers, village ‘police’ and councillors appointed to a range of standing committees including the Development Committee, Committee on Education, and Committee for the Protection of Children (CPC). Village councils have responsibility for developing community plans, they can access resources for programmes to benefit the community and have the right to propose, approve and implement ordinance within the village that serve to reduce risks to the community and protect children.

Opportunities for child-centred DRR are framed by a policy arena that is proactive in recognising child rights and supporting participation and voice on the one hand, and seeking to protect them on the other. The National Youth Commission (NYC)³⁷ was established in 1995 as a government agency attached to the Office of the President; its remit includes initiating and formulating national policies on youth and establishing consultative mechanisms to facilitate government-youth engagement.

The Council for the Welfare of Children (CWC)³⁸ was created in 1975 by a Presidential Decree to ensure protection of children against all forms of abuse and exploitation, to defend children’s rights, promote their welfare and development, and ensure that they are given priority attention at all levels both by government and civil society. In 2000 the CWC formulated Child 21 (2000–2025), a national framework for the development of children in the Philippines. One of the seven principles of the vision for a child-friendly society is that ‘children are able to genuinely engage and actively participate in decision-making processes and governance’.

The Local Government Code of 1991 established the Katipunan ng Kabataan (KK) and the Sangguniang Kabataan (SK). The SKs (Youth Councils) are the governing bodies of the KKs, and youth representation through the SK is federated at municipal, provincial, regional and national levels. The SK are given a direct hand in governance and decision-making at the village level through representation of the SK Chair on the Village Council and through a mandatory 10 per cent allocation of the Village Council budget for SK-led projects and programmes.

The Department of Education (DepEd) mandated for the existence of a body of elected students – the Supreme Student Government (SSG)³⁹ – to provide a venue for students to improve their leadership abilities and support the achievement of quality education and academic excellence. It has already integrated DRR topics into science and social studies subjects and instructed all key personnel in both public and private schools to prioritise the mainstreaming of disaster risk reduction and management in the school system and to ensure the implementation of programmes and projects related to DRR.

³⁷ See: <http://www.youth.net.ph/> ³⁸ See: <http://www.cwc.gov.ph/index.php>

³⁸ See: <http://www.cwc.gov.ph/index.php>

³⁹ See: <http://www.deped.gov.ph/cpanel/uploads/issuancelmg/DO%20No.%2034,%20s.%202008.pdf>



- Girls participate in a research workshop Los Guevaritas, Municipio de Comalapa, 2009 (Photo: J. Lazcano)

Box 3.2: El Salvador Policy and Practice – a snapshot

Disaster risk reduction policy in El Salvador is framed by the concept of civil protection, defined as the physical protection of the people and assets in situation of serious collective risk, public calamity or catastrophe, in which the security and lives of the people may be in danger. This is enshrined through the Constitution of the Republic in stating the obligation of the State to guarantee the safety and peace of its citizens. The legal basis for DRR is the Law of Civil Protection, Prevention and Mitigation of Disasters of 2005. With technical and economic control from the Ministry of the Interior, the Law sets out the different levels of coordination and functioning for DRR in the country.

Sub-national commissions prepare their own work plans in line with general guidelines set out in the National Plan of Civil Protection. The Fund of Civil Protection, Prevention and Mitigation of Disasters provide resources for the prevention of disasters or emergency response.⁴⁰ The Ministry of Environment and Natural Resources (MARN) is responsible for the National Service of Territorial Studies (SNET), who provide research, data, early warning and tools and methodologies on social and natural systems to support prevention and disaster risk reduction. The Code of Health clarifies that the Ministry of Health and Welfare should coordinate actions for the comprehensive care of post-disaster effects, adopt and develop measures to prevent epidemics, and monitor the efficient implementation of its disaster plans.

Like the Philippines official legal structures are in place; but in reality the functioning and coordination of DRR has historically been weak and there is little coordination across and between sectors and government departments that may have vital roles in effective DRR, such as water and sanitation, education or environmental protection. The focus remains primarily on systems of emergency response and relief, rather than on prevention and preparedness. A recent assessment report by the United Nations Disaster Assessment and Coordination (UNDAC) argued that El Salvador requires a more comprehensive legal framework to facilitate and coordinate relief, including internally across arms of government, and externally across international humanitarian actors (IFRC, 2010).

In enacting DRR at the decentralised level, the Municipal Code of 2000 states that municipal authorities are responsible for the preparation, approval and implementation of plans for urban and rural development in the locality; for planning, implementation and maintenance of public works; and the promotion and financing of public housing or urban renewal. The orientation of the broader policy environment plays an important role in influencing community-level DRR not only in establishing legislative frameworks and implementation mechanisms, but also in directing the wider culture of risk management. As such, policy approaches based either on hazard management or on vulnerability reduction at national level will play out at community level through the approaches and attitudes adopted by actors and officials at regional and local scales.

However while some national bodies representing DRR such as SNET have their basis in science-based approaches, interviews undertaken with key actors relating to DRR at local and regional level in the study areas revealed an approach focused primarily on understanding and tackling the human causes of disaster

⁴⁰ Fund of Civil protection, prevention and mitigation of disasters. DL. 778, DO.160. tomo 368, publicado 31 de agosto de 2005.

There is a disconnect in DRR approaches in El Salvador between science-led national bodies and human vulnerability-led approaches at local and regional level

events rather than hazard management. Most respondents stressed underlying causes of vulnerability based on the levels of socio-economic development and human behavioural factors influenced by cultural tradition. The poverty and livelihoods context of the case study communities, were therefore seen as the dominant entry points for improving risk reduction by the majority of regional and local DRR actors.

Child-centred DRR is framed by the national cultural and legislative framing of childhood. The traditional concept of the Salvadorian society is that childhood is a formative stage, where the children are learning progressively to become an adult. The new legal framework for children and childhood was created in 2009 by the Law for the Integral Protection of Childhood and Adolescence⁴¹ in order to guarantee the rights and facilitate the accomplishment of responsibilities for all children and adolescents in El Salvador. It created the National System for Integral Protection of Childhood and Adolescence, and is supported by the Salvadoran Institute for Integral Development of Childhood and Adolescence (INSA),⁴² who execute and monitor the implementation of the National Policy to Attend Minors and provide integral protection to children based on child rights established in the Constitution and the UN Convention on Children Rights. Unlike in the Philippines, in El Salvador, no children's groups are formally mandated by the national legislative framework, nor linked to the political machinery.



- Children present their advocacy video to officials in Rembang, 2010 Indonesia (Photo: Katherine Haynes)

3.2 Enabling CC-DRR in practice – lessons from case studies

The research and analysis of child-centred DRR in both El Salvador and the Philippines provides a number of common findings and recommendations. The research findings point to a set of key issues, presented here, which need to be addressed in order to realise child agency and capacity for DRR. Boxes 3.3 and 3.4 present some of the evidence from the country-level analysis, which illustrates the key issues and opportunities that arise for actively engaging children in DRR.

Adult perception of child agency underpins the enabling environment

The research suggests that adult views on child agency have the potential to foster or stifle child participation and contributions to reducing disaster risk. Whilst families value the potential of children as actors within the household they are often not prescribed with individual agency or voice within the home and this is generally carried over into the community sphere. Even where adults vocalised support for child-led DRR activities this was commonly contradicted by household decision-making structures in which children have little or no voice. In the Philippines children themselves often expressed concern over their capacity to act on behalf of the community due to their multiple commitments to the school and the family. However, the support of the family for a child's action is a central enabler for child participation and agency.

⁴¹ Ley de de Protección Integral de la Niñez y Adolescencia, DL. N° 839, DO N° 68, tomo 383, de fecha 16 de abril de 2009.

⁴² Ley de creación del Instituto Salvadoreño para el Desarrollo Integral de la Niñez y Adolescencia DL. 482, DO. 63, tomo 318, publicado el 31 de marzo de 1993.



- Female members of TCAAP select the seeds from the mature mangroves for re-planting,

Box 3.3: Child-led mangrove restoration projects in the Camotes Island, Philippines

Children from the Teguis Children's Association for Active Participation (TCAAP) on the Camotes Islands of the Philippines worked alongside adult groups, including parents, to restore degraded mangrove ecosystems by assembling teams to collect and replant saplings in sanctuaries behind protective barriers. Members of TCAAP identified the multiple benefits of restoration, including livelihood gains, by providing spawning grounds, biodiversity gains, disaster protection from typhoon winds and storm surges, adaptation to climate change impacts, and the removal of atmospheric greenhouse gases causing climate change.

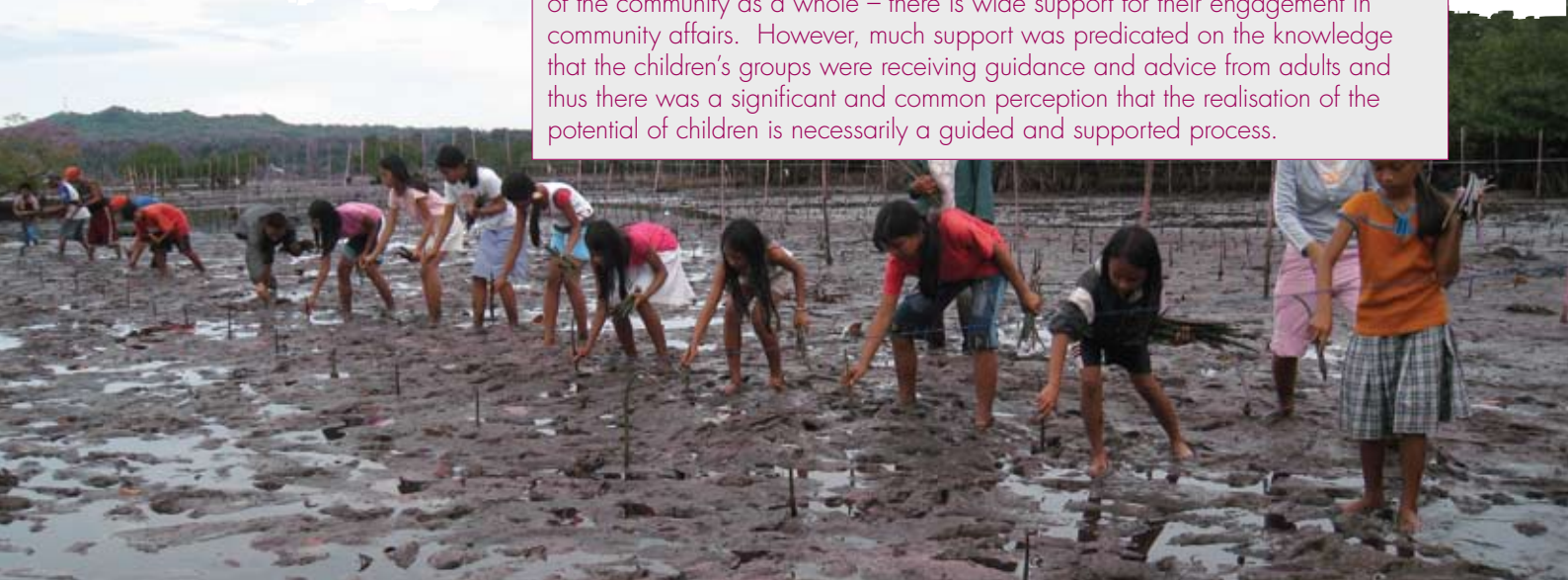
The group has combined knowledge of the process from a range of sources including school textbooks, training sessions, discussion with parents and the media. Whilst much knowledge is sourced from mainstream school activities the participation of children in organised groups enables them to access additional training opportunities, predominantly through their affiliation with a facilitating agency. In the Camotes Islands where strong links exist between Plan Philippines and the municipal governments, municipal officials and councillors act as trainers and provide technical input to programmes, as well as supporting the delivery of programmes and projects.

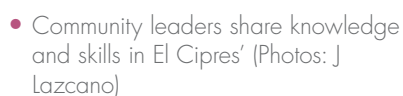
Adapted from: Tanner et al., 2009

Reflections from the Philippines: For the children's group in Teguis – and in Banaba – the established relationships with adult groups in their communities provide the additional social capital at community level that empowers them as active agents for DRR. Not only does the participation of parents and other community adults, particularly officials, act as an enabling human resource, but it is also a sign of support and validation of the activity from within the community. In contrast with many groups in the Philippines the TCAAP are represented on the village council, alongside the SK. The desire for this kind of recognition is repeated widely amongst children's groups in the Philippines who expressed their wish to establish relationships with formal institutions, primarily the SK, the Village Council and the Municipal Council. The children identify them as the most effective partners for enabling change or delivering action as they have authority and power, as well as reach and networks beyond the community

As in El Salvador where children are seen as active in the community – carrying out activities that reduce vulnerability and disaster risk and improve the welfare of the community as a whole – there is wide support for their engagement in community affairs. However, much support was predicated on the knowledge that the children's groups were receiving guidance and advice from adults and thus there was a significant and common perception that the realisation of the potential of children is necessarily a guided and supported process.

- The TCAAP members plant the mangrove seeds. (Photos: T Tanner)





- Members of the Youth Emergency Committee in El Ciprés, El Salvador.



In El Ciprés the youth group had been active since 1998 tackling a wide range of issues – DRR work was integrated into the activities of this long-standing youth group. In 2005 – during Hurricane Stan, the Youth Emergency Committee took the initiative to facilitate the process of evacuating seven families whose houses were at risk of collapsing. They established and managed an emergency camp in the community's school building. They grouped together to request support from the mayor's office and other institutions, constructing a support network for the affected families until they were donated safer and stronger houses several months later.

This action gained the Youth Group strong recognition from the community in terms of youth leadership and their capacity to confront complex situations such as emergencies. Now, supported by NGOs, they continue to work on community projects and the Community Development Association, which forms the legal representation of the community to the mayor's office, has recognised their role and is looking to include the Youth Group in the future.

Adapted from: Tanner et al., 2009

Reflections from the El Salvador: As with the El Ciprés example children who reported positive attitudes from adults in El Salvador often linked this to their experiences of having taken action during emergency situations, particularly Hurricane Stan in 2005, which affected all the case study locations. In Canton Alvarez, this experience was also reflected in the widespread recognition and credibility of the children's group with adults in the community.

The engagement of the El Ciprés youth with the municipal office facilitated their actions for the benefit of the community, leading to recognition from the Community Development Association. With little political power and resources devolved to community level, close links with municipal mayor's offices in El Salvador (for example in El Matazano and Canton Alvarez) have enabled children's groups to access resources and undertake actions that are visible to community members and improve awareness of the potential of children as active citizens. However where groups had historically relied on external links alone, such as in El Matazano, this had a detrimental effect in terms of low community awareness of the activities of the children's group and therefore lack of recognition and credibility. Links to the local Community Development Association (ADESCO) and its network are an important channel through which the children's groups' analysis, priorities and actions can become embedded within wider community processes.

very rarely were children conceived as having agency beyond their community. (Philippines)

the role of external professional training was considered critical by adults in La Montañona in enhancing the credibility of children's views (El Salvador)

Children need to be seen to be heard

There was considerable evidence that the visibility and experience of children's group activities was a crucial enabling factor in fostering community buy-in, demonstrated in both the case studies. Many adults and even parents of group members were not aware of the DRR activities of the children's groups. Yet where adults had been exposed to or involved in the activities, they were more supportive and there was a significantly higher level of support for child participation in communities with longer-standing experiences. Visible demonstrations of children engaging in activities to reduce risks in the household and community provide a lived experience that acts as an important catalyst for shifting cultural understandings to support child agency (see case studies in Boxes 3.3 and 3.4).

Inclusion and experience generate support

In the early stages of child-led DRR programmes children learn and act more effectively within the parameters that are known to them – the household, neighbourhood, school and community – and with the people with whom they are most familiar.

In particular, this research suggests that when parents are excluded from the processes of awareness raising, action and empowerment, they may be less likely to support the motivation or activities of their household members or the facilitating agency (Tanner, 2010). Household support provides not only formal permissions for children to participate and engage in activities, but also confirmation to the children that their actions are valued within the community, that their motivations are respected and thus they are empowered to continue in their efforts and advocacy.

Facilitation is a crucial enabling factor

The case studies support the assertion that:

'Without this facilitation, it is apparent from the research literature that children and youth generally feel powerless and excluded from the adult realm of political processes.' (Mitchell et al., 2009).

The research demonstrates that children are capable actors, but they need stimuli and support. There was a common perception that realising the potential of children is necessarily a guided and supported process. This may come through community-based sources such as schools, health centres or adult-led disaster groups, or through external interventions by NGOs and CSOs. This catalytic role is an important part of the enabling environment, allowing children's groups to draw on outside expertise for training and resources, as well as opening up potential interaction with policy spaces and actors outside the community.

Facilitation is also crucial in preventing parallel processes between adult and children's groups, with some programmes demonstrating the challenges and benefits of opening spaces for children's participation and representation within (sometimes formally mandated by) adult-led groups. External training provided to children from those perceived to be technical experts, such as municipal officials, was regarded by adults as providing greater credibility to children's opinions and actions.

the sense of cohesion and partnership with their peers increases their belief in themselves as agents of change (Philippines)

Children working together generate agency and action

Facilitation needs to go beyond training and knowledge, and support analysis, debate, prioritisation and action at community level, as well as dissemination of learning. This recognises the multiple modes of child agency, as analysers, communicators and mobilisers for risk reduction as well as implementers of actions themselves (Tanner, 2010). The ability to transform training and knowledge into action is lost without the support of others with common and shared knowledge and agency. The group structure provides opportunities for children to come together on a regular basis with a common purpose to plan and deliver action – this structure and accessible support and guidance is vital to turn knowledge into action. Beyond the community-level structures it was widely recognised in the Philippines that exchanging knowledge, experience and ideas with other children's groups was also invaluable in terms of building capacity for action and for boosting their agency through feeling part of a larger movement and children's groups.

As in El Salvador where children are seen as active in the community – carrying out activities that reduce vulnerability and disaster risk and improve the welfare of the community as a whole – there is wide support for their engagement in community affairs. However, much support was predicated on the knowledge that the children's groups were receiving guidance and advice from adults and thus there was a significant and common perception that the realisation of the potential of children is necessarily a guided and supported process.

The engagement of the El Ciprés youth with the municipal office facilitated their actions for the benefit of the community, leading to recognition from the Community Development Association. With little political power and resources devolved to community level, close links with municipal mayor's offices in El Salvador (for example in El Matazano and Canton Alvarez) have enabled children's groups to access resources and undertake actions that are visible to community members and improve awareness of the potential of children as active citizens. However where groups had historically relied on external links alone, such as in El Matazano, this had a detrimental effect in terms of low community awareness of the activities of the children's group and therefore lack of recognition and credibility. Links to the local Community Development Association (ADESCO) and its network are an important channel through which the children's groups' analysis, priorities and actions can become embedded within wider community processes.

Safe spaces for child-adult exchanges build trust and recognition

Holding training events with a mix of adults and children provides an important route to common ownership of the DRR agenda. It is essential that training and awareness of DRR policy and practice is delivered community-wide. Creating opportunities for presenting work to parents and adults in the community raises awareness and fosters buy-in through creating spaces for dialogue and exchange of ideas. In El Salvador the elaboration and presentation of Vulnerability Capacity Assessments provided an important tool to initiate dialogue with other community members in potential responses to risk. In addition, interviews suggested that in many communities it also provided a structured interaction that helped to raise awareness with adults of the activities and capacities of children.

whilst in Potrerillos training events undertaken by a mix of adults and children presented an opportunity to work together and interact, experience suggests that careful facilitation is required to ensure adults do not dominate such events (El Salvador)

Creating safe spaces for engaging with authority figures also represents an important part of a child-sensitive enabling approach. Children are often overwhelmed by the notion of authority, so bringing officials into spaces where children feel secure, such as facilitated workshops, is important. The creation of formal spaces for informal engagement between government institutions and children allows adults to be exposed to the children as they learn, discuss and debate, building recognition of the agency and capacity of children and seeing the potential of engagement. Designing facilitation and activities that allow children to participate in spaces that create dialogue and exchange with adult actors should therefore be a priority for facilitating agents.

Community development and existing programmes are starting points for action

A marked distinction could be found between communities where children's groups had worked to link DRR to wider community development issues, both domestically and by using networks and champions. Where existing programmes, such as health and education, are seeking to meet the basic needs of child welfare and improve well-being, it is important that the contribution of these programmes for DRR is communicated and understood. As children and communities see the multiple benefits of their action, they are motivated to continue and strive harder to achieve the common goals. Focussing early activities on nationwide campaigns builds links with the municipal and village councils who bear the duty to deliver.

Individual champions are often the difference between success and failure

The most advanced and stable groups were encountered in communities where the groups worked with authority figures in the community who already commanded the respect and trust of both children and adults, especially ones not subject to political influence and repeated change in personnel. Often these were individuals whose roles directly pertained to child welfare such as school directors or health workers. Whilst also working as a link between outside networks and facilitation, authoritative champions also provided a reference point for parents regarding the appropriateness of group activities.

In both El Matazano and Canton Alvarez (El Salvador) the community health workers were pivotal in making the link and raising the group's profile with the municipal government officials, whilst in Los Prados and Palo Grande, the school director played this main championing role. In Caga-ut, the Philippines, where the children's association had a very low profile, they regularly approached the elementary school teachers based in their village for guidance. In San Francisco, Surigao del Norte the children described their teachers as 'second parents' from whom they sought advice and support.

Access to policy spaces and long-term cultural shifts lead to sustainable child groups

Issues of the sustainability of child agency are based in groups themselves but also in supporting structures within and outside the community. Building partnerships and networks within and beyond the community appears to be critical in sustaining children's participation, including links with formal institutions to access and mobilise resources. Community structures can help sustain the enabling environment through providing policy spaces where children's voices can be heard in village committees or school planning boards.

Just as awareness and behavioural change around DRR will be carried into adulthood, investment in child participation is a multi-generational mission

An accessible champion within the community can provide an important anchor point for children, parents and the wider community. This anchoring can also sustain groups as members graduate out of the groups – commonly as they become college students or begin to work – to ensure that experience, understanding and leadership are replaced. This reinforces the importance of internal knowledge transfer and ongoing training for DRR across scales and a need to engage those who are outside the scope of standard organised groups, including those out of school.

Importantly, there was a significantly higher level of support for child participation in communities with longer-standing experiences, and especially where former children's group leaders are now in local executive positions or indeed parents themselves.

Groups need to engage with wider networks to access resources and policy spaces

Engaging with actors beyond those who are 'familiar and safe', such as their peers and family, requires significant and sustained effort on the part of the group and its support structure. While children may be part of this effort, it will also require other actors to advocate on their behalf. Wider support networks enable groups to exert influence beyond their own households and community members, as well as interact with others. These networks were often developed through schools, health workers, and NGOs rather than enabled by government structures. Where groups were well linked with municipal government, child groups accessed opportunities to exchange with peers, attend municipal-wide training and secure resources to undertake actions that are visible to community members. The relationship also provided potential access to higher-level policy spaces.

These key issues illustrate that enabling child participation in DRR requires direct engagement at multiple scales from the household to the sub-national. Yet it is important to look both within the community to recognise the socio-cultural context for action and to look beyond to recognise the interaction with the wider policy environment, both for DRR and child welfare. Section 3.3 explores this in more detail.

- Children clean up around their school and home as part of a waste management and hygiene campaign in Pilar, Camotes Islands Philippines, 2008 (Photo Fatima Molina, CDP)

⁴³ See Robinson, M. (2007) 'Does decentralisation improve equity and efficiency in public service delivery provision?', IDS Bulletin 38.1, Institute of Development Studies, Brighton.

⁴⁴ Again it is important to note that there are exceptions at the provincial and municipal scales.



“because each region is unique. It is relative; the implementation is not always the same to all. There are traditions and rules in certain areas that should be followed”

(Provincial representative of the Department of Education, Surigao Del Norte, Philippines)



- A young community activist speaks to a crowd about HIV prevention, Mozambique. 2007 (Photo: Giacomo Pirozzi, UNICEF)

3.3 Discussion

The orientation of the broader policy environment plays an important role in influencing community-level DRR through legislative frameworks, which direct the wider culture of risk management. In the Philippines, for example, the Strategic National Action Plan and the Local Government Code frame a policy arena in which decentralisation of DRR responsibilities opens up potential opportunities for child centred initiatives. The research found strong support for a decentralised approach to DRR on the basis of local appropriateness in both countries. While decentralisation is limited in El Salvador and the country relatively small, in the Philippines there is significant heterogeneity across regions and islands.

In filling the implementation gap between policy and practice, decentralisation is often viewed as a governance solution. Despite its limitations⁴³ decentralisation can allow DRR to recognise the heterogeneity of the community (including children) at the local level through engaging in community-based risk assessment and the identification of locally relevant risk reduction actions (van Aalst et al., 2008; Reid et al., 2009). Local-level institutions also support community mobilisation through their ability to embed historical cultural norms and values concerning intra-community cooperation (Allen, 2006).

However, although it poses a number of opportunities it remains a system that requires investment from the national level to make it work for those most vulnerable to disaster in the local areas. In both countries budgets for disaster prevention are minimal at the municipal level and the skills, knowledge and political buy-in for delivering DRR are weak in many areas.⁴⁴ It is important that the local-level duty bearers are enabled to carry out effective planning through decentralisation of resources, training and capacity building, and access to expert knowledge and information. For child-centred DRR this requires an additional awareness and understanding of the rights, needs and capacities of children, and an ability to engage with them for effective policy and practice.

The potential for child-centred DRR through decentralised governance in the Philippines is complemented by child and youth policy that recognises the potential for children and youth as actors in society – which also plays out at the local level, for example through the SK's. At the municipal and village level, such policies can come together creating the potential to deliver child-centred community development programmes that incorporate activities and programmes which contribute in relevant ways to DRR at the local scale. Although opportunities for DRR do exist, in El Salvador the Municipal Code does not explicitly recognise or support engagement of children and young people in planning and development at the local level.

Despite the contrast between a policy environment with high potential for enabling child-centred DRR – such as the Philippines – and a lack of explicit DRR or child engagement policy at the local level in El Salvador, there are a number of core learning points from both countries that are critical for enabling child-centred DRR. Irrespective of the policy context, support at household level from parents is a critical factor for enabling children to realise their potential as capable DRR actors in their community. Support and permission from the household reinforces children's sense of their own agency. However attributing agency to children beyond the home, even between family members, is often challenged by embedded social practice and behavioural norms.

Perceptions of children as passive, subordinate and lacking agency and citizenship hinder children from actively voicing their unique risk perceptions, needs and potential as actors

Children visibly engaged in delivering actions which reduce risk helps to foster both parental and wider community support, with children's groups providing a structure for activities and an entry point for facilitating actors or agencies. Together with school curricula and projects, these enable children to transform their knowledge and skills into action. Formal champions – whether they are village-level duty bearers or a facilitating agency – play important roles in reaching across and beyond the community, advocating on behalf of children and linking with municipal officials and wider networks. Access beyond the community is crucial in gaining skills, learning from others, and enhancing local credibility, while also assisting in mobilising resources for child-centred DRR.

Scaling-up participatory child-centred DRR requires both the existence of policy frameworks that explicitly recognise the potential and role of children in DRR practice and policy spaces and supported active children's groups. However duty-bearers at the local level need to be incentivised by both a political sense of duty to protect and engage with their citizens to reduce disaster risks – and an understanding of child needs, capacities and agency.

3.5 Building capacity and trust for child engagement in DRR needs:

- Resources, training and capacity building for duty-bearers to support decentralised DRR policy and programming and for effectively engaging citizens (including children) in planning and delivery
- Champions – identified by municipal DRR officials – who operate at community level but whom are part of formal institutions and can act as bridges between children, household, schools and local government structures
- Schools to be enabled to go beyond 'teaching' and 'awareness raising' to act as a central catalyst for DRR action at the community level. Outreach and knowledge exchange programmes in catchment communities – working through local students – can increase the reach of DRR learning and create spaces for child-centred community-level action
- DRR training at the point closest to the community, bringing children and adults together in co-learning and knowledge sharing spaces
- To build on existing structures and initiatives rather than creating parallel spaces for policy and practice by integrating or developing children's groups as branches of existing institutions
- To respond to the priorities of the specific community, recognising that the entry point for child-centred DRR is likely to originate in 'alternative' policy arenas, such as health
- Resources to support and enable children to come together visibly as capable agents early on in the process, to build trust in their activities and shift perceptions to value children as active agents

A blend of cross-sectoral top down policy drivers and locally driven programmes of action that deliver relevant and context specific messages and action provide a range of opportunities for mobilising children for DRR

The role of external agencies in building the capacities and agency for DRR amongst duty-bearers remains fundamental to the success of decentralised DRR and child engagement in both the Philippines and El Salvador. Yet to create an enabling environment for child agency in DRR, key actions can be taken across scales both in the policy arena and within child-centred DRR practice.

Engaging children in DRR remains constrained by lack of finance, skills and knowledge at the sub-national level, both around the need for and processes of delivering DRR, and how to enable and support child engagement in planning and decision-making. Yet children have a role to play in communicating disaster risk, sharing knowledge around the drivers of risk, and engaging in planning and delivering DRR actions that reduce risk – not just for children, but also for their families and communities.

- Children share their views at a Children in a Changing Climate side event at the UNFCCC COP15 in Copenhagen. (Photo: Plan International)



4.0

Conclusions

"The most useful measures to protect children's health are also fundamental in reducing risks from potential disasters – such as adequate drainage, waste removal and proper sanitation"

(Bartlett, 2008)

"sufficiently large or persistent natural events are likely to have both a short and potential long-term and inter-generational impact on poverty unless public policy plays both a prevention and mitigation role"

(López-Calva and Ortiz-Juárez, 2009)

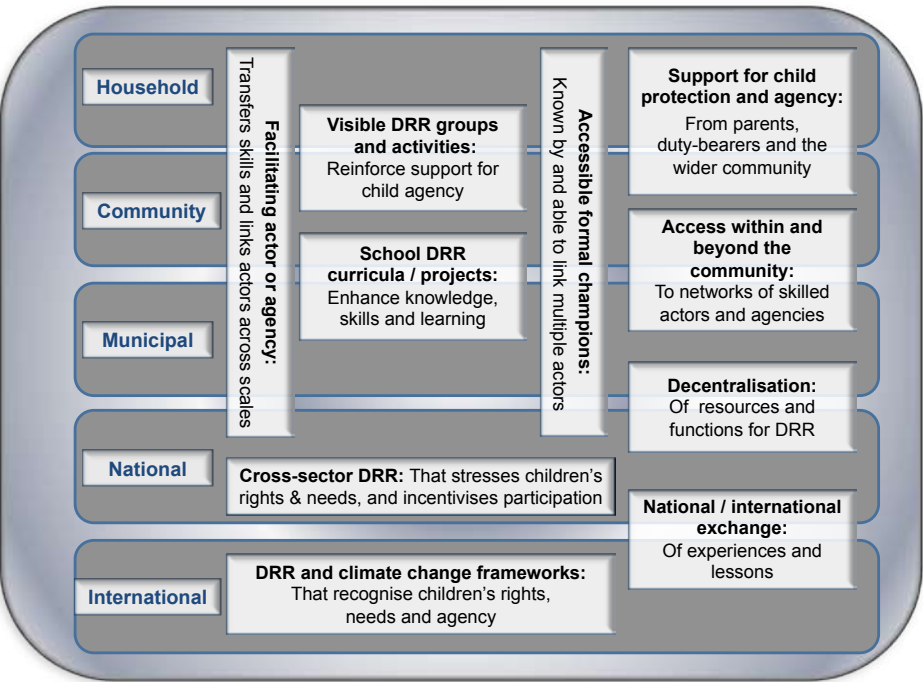
During the decade under study for the statistical analysis and within which the social research was undertaken, an increasing influence of the DRR community on the political and policy agenda was observed – visible in the signing of the international Hyogo Framework of Action (HFA) mid-way through – and increasing awareness of the linkages between disasters and development have been articulated. It was also the decade within which the global development agenda was driven by the Millennium Development Goals (MDGs), with significant national efforts directed towards improving access to and the quality of education and health services for children, as well as others.

The statistical evidence provides a snapshot of the cross-sectoral nature of disaster impacts on child welfare through a focus on formal education, health including nutrition and, in Indonesia and Mexico, poverty incidence. Despite a development agenda dedicated to initiatives that contribute to the realisation of child rights and the promotion of well-being (UNICEF, 2008) both concentrated high impact and persistent lower impact disasters are, in the main, continuing to impact negatively on development progress. Recognising the limitations of the data, the proportion of results that indicated gains in response to both types of risk presents two clear hypotheses for further investigation. These are: 1) impacts are transmitted in many ways and dependant on the micro-level context and strategies available for coping, creating results which may be unexpected, and; 2) disaster response efforts are leading to situations where 'building back better' can lead to sustainable longer-term gains, and disaster risk reduction and development efforts are lowering the vulnerability and/or exposure of children to disaster events. It is likely to be a combination of both.

While a child-centred approach is underpinned by supportive international frameworks, such as the HFA (particularly priority action three 'knowledge and education'), the MDGs, and the United Nations Convention on the Rights of the Child (UNCRC); it is the role of national policy to provide the spaces and incentives for duty bearers at the appropriate scale to integrate science-driven expert knowledge and technical information with community scale knowledge to inform locally appropriate and sensitive DRR programmes. Effective child-centred DRR needs national DRR policy to recognise the need for reducing the vulnerabilities and engaging the agency of children through integration of DRR objectives into a range of policy areas; including for example, health, education, social policy and land-use planning.

The model below (see Figure 4.1), developed as an output of the enabling environments research, can be applied more broadly to the enabling environment for holistic child-centred DRR as set out in the introduction to this paper i.e. child-sensitive programming and child participation. Policy frameworks from the top-down need to provide the spaces, resource and incentives to enable child sensitive policy at the local level which recognises and engages with children in determining and addressing their unique vulnerabilities.

Figure 4.1: A model of multi-scale action for enabling child-centred DRR



While national politicians have signed up to international frameworks – indicating commitment to and taking responsibility for disaster risk reduction – and official legal structures are in place, the reality on the ground is that the functioning and coordination of DRR often remains weak. This research reinforces the need to focus concerns on the implementation gap in translating policy into practice. This is reflected by both studies where the frameworks for disaster reporting and child welfare monitoring exist but are delivered inconsistently within and between countries; and through the qualitative research which identifies an inconsistent level of capacity and skills at the municipal and village level to deliver DRR and engage with children in DRR practice and policy spaces.

Knowledge, understanding and political buy-in must be ensured from the international level down to the sharp end of disasters: the communities and the local government units. If we are to reduce the risks that children and their communities face due to climate change and disasters, not only should those driving DRR policy and programming recognise the vulnerability of children and their specific needs – through access to disaggregated data and the development of child-sensitive policy and programming – but those in positions of power and influence must be willing and able to engage and work with children in both policy development and programme implementation.

Achieving this requires both political sensitisation to the unique vulnerabilities of children in disaster situations and a cultural shift to recognise children's capacities and their right to be engaged in decisions that affect their well-being and futures.

Political will and understanding at all scales is key to both DRR and child engagement

Annex 1

The annex outlines the formula applied for the regression analysis, the identification strategies used for identifying treatment and control areas for both types of risk, an explanation of the application of both the fixed and random effect, and a table identifying the models applied in each country for persistent lower impact and concentrated high impact risk.

Full sets of data identifying the time distribution of both persistent lower impact and concentrated high impact disasters are presented in Annex 2 of the main report (see CCC, 2011a), whilst Annex 3 and 4 of the main report details the results of each model for each variable for both types of risk.

The regression

$$y_{it} = \alpha_i + \beta_1 d_i + \beta_2 p_t + \beta_3 d_i p_t + \mu_{it}$$

This study used a difference in difference analysis, which measured the change induced by a particular treatment or event (the disaster). The following equation was estimated:

Where:

- y_{it} is the outcome analysed (i.e. enrolment rate, child undernourishment) in province/district i and period t ; t is the period of available data for each variable⁴⁵
- α_i represents the particular characteristics of each region;
- d_i is a dummy variable that takes the value of 1 if province/region or municipality/district is considered a treatment area, or 0 if it is a control area;
- p_t is a dummy variable that takes the value of 1 if the observation corresponds to a post disaster period, or 0 if the observation corresponds to a pre disaster period;
- $d_i p_t$ is the multiplication of the previous two dummy variables, and the coefficient of this term will indicate the 'impact' of the disaster event observed in period t on the outcome variable (our main interest); and
- μ_{it} is the error of the equation.

The method is interested in estimating the value of β_3 that measures the impact of disasters on children's welfare.

The identification strategy

Objective criteria are used to define control and treatment areas for persistent lower impact and concentrated high impact risk. For persistent lower impact risk treatment and control areas are identified based on an objective threshold: the median.

⁴⁵ This is not always consistent for variables within or between country data sets

Box A.1: Identification strategy: persistent lower impact/extensive risk**Treatment vs. control regions**

In the case of persistent lower impact disaster events, the strategy relies on historical data held in the Desinventar database. Based on the frequency of events during the period 1988–1998, each region is assigned to the treatment group if its frequency is higher than the median of the distribution or to the control group if the frequency is lower than the median. The threshold, in each country, allows the differentiation of those regions that are more at risk of suffering persistent lower impact disasters (treatment) from others that are less prone to experience these disasters (control).

In an attempt to assess the robustness of the results, additional treatment groups (and control groups, therefore) are considered based on alternative thresholds defined around the value of the median (See Table A.1 below).

For instance, for Nepal, the median of the distribution of natural disasters in the period 1988–1998 per area is 39. Therefore, treatment groups – those largely exposed to persistent lower impact disasters – are defined as those areas that experience 39 or more events during this period (and control groups, less than 39 events). Alternative models are run with treatment groups being defined using 29 and 49 disaster events as thresholds.

Table A.1. Treatment groups per country

	Median	Alternative treatment groups	
	d_i^M	d_i^1	d_i^2
Bolivia	>1	>2	
Indonesia	>7	>6	>9
Mexico	>100	>110	>90
Mozambique (province)	>71	>70	>72
Mozambique (district)	>3	>2	>4
Nepal	>39	>29	>49
Philippines	>12	>11	>13
Vietnam	>6	>5	>7

In the case of concentrated high impact risk, for each district or province where a high impact disaster was recorded between 1999 and 2009, the period is divided in two: one before the disaster (control) and one after the disaster (treatment).

Box A.2: Identification strategy: concentrated high impact/intensive risk

In the case of concentrated high impact events the strategy relies on the occurrence of an event during the period being analysed (1999–2009). To elaborate a historical profile of the occurrence of high impact events a larger span of data and complex analysis would be needed; for example, to determine that a particular area is prone to earthquakes or other geological events a detailed geological analysis is needed and may require techniques that go beyond the scope of this study.

Treatment vs. control data

Provinces/districts are assigned as treatment or control areas based on the occurrence of a concentrated high impact event. This is a province/district considered as treatment if an event occurred during this period, or control in the case no event occurred.

Pre and post-event periods

In order to study the impact of disasters, in both concentrated high impact and persistent lower impact events analysis, the period 1999–2009 is split into two sub-periods: a pre-event period, and a post-event period. A pre-event period is defined as the years before the disaster occurred and the post-period as the years after the disaster occurred. To define this structural change four variables available on Desinventar are reviewed:

- Frequency of disaster events during the year (i.e. number of data cards over time);
- Number of deaths and missing people as a consequence of a disaster event during the year;
- Number of damaged and destroyed houses as a consequence of a disaster event during the year, and;
- Number of schools and hospitals destroyed as a consequence of a disaster event during the year.

First the number of data cards (event reports) is observed to see if there is a change in the trend at some point during the study period. If this measure does not show a clear break, the trends of the variables as listed above are reviewed. In some cases, the number of death and missing people is more useful to establish a pre/post-period than the number of schools and hospitals destroyed after a disaster event, or vice versa.

Estimation procedure: fixed vs. random effects

The argument to choose fixed (FE) or random effects (RE) relies on the nature of the problem being analysed, which is reflected in the structure of the error term μ_{it} of the equation. The data available in our case corresponds to a region (province or district) that is observed along a period of time. Each region has its own particular characteristics – represented by α_i . If these characteristics are assumed to be fixed during the period of time observed, then the fixed-effects estimator is considered. If these characteristics are assumed to follow a process, for instance to be affected by the economic cycle or another non-fixed event, then the random-effects estimator should be chosen and the error term becomes $\mu_{it} + \alpha_i$.

It could be argued that in a 10 year period these characteristics may not change significantly, and thus, by choosing the fixed-effect (FE) estimator, the identification of the effect of a disaster event on children's outcomes would not be affected.

However, it could be argued that the period observed is long enough to have a significant change in a regions' characteristics. If these changes affect children's vulnerability, the estimates of the effect of a disaster on children's welfare status could be biased. By choosing the random-effects (RE) estimator, the process behind the region's characteristics is controlled for, and the estimates recover the isolated effect of the disaster event on the dependent variable.

Although the coefficient of interest is, β_3 it should be noted that the fixed effect estimator does not provide estimation for the coefficient of d_i . The reason for this is that the estimation process applies the average of the value of each variable within the same period to each observation. Given that d_i does not change along the period of observation for each period its value is the same as the average. This is not the case of the random-effects estimator.

The following table summarises the models that are run for each country's development indicator in the case of external risks, considering the different treatment groups defined for each country, as well as the time distribution of disasters (see Annex 2 of the main report; CCC, 2011a). In the case of the models assessing concentrated high impact disasters, no alternative thresholds are considered to define treatment and control areas as mentioned earlier. Therefore, only FE and RE are reported for each model.

Table A.2: List of models per country

	Model Indicator for evaluating persistent lower impact disasters in each country					
	(1)	(2)	(3)	(4)	(5)	(6)
Bolivia³	d_i^M - FE	d_i^M - RE	d_i^1 - FE	d_i^1 -RE	-	-
Indonesia	d_i^M - FE	d_i^M - RE	d_i^1 - FE	d_i^1 -RE	d_i^2 - FE	d_i^2 -RE
Mexico	d_i^M - FE	d_i^M - RE	d_i^1 - FE	d_i^1 -RE	d_i^2 - FE	d_i^2 -RE
Mozambique (province)	d_i^M - FE	d_i^M - RE	d_i^1 - FE	d_i^1 -RE	d_i^2 - FE	d_i^2 -RE
Mozambique (district)	d_i^M - FE	d_i^M - RE	d_i^1 - FE	d_i^1 -RE	d_i^2 - FE	d_i^2 -RE
Nepal	d_i^M - FE	d_i^M - RE	d_i^1 - FE	d_i^1 -RE	d_i^2 - FE	d_i^2 -RE
Philippines	d_i^M - FE	d_i^M - RE	d_i^1 - FE	d_i^1 -RE	d_i^2 - FE	d_i^2 -RE
Vietnam	d_i^M - FE	d_i^M - RE	d_i^1 - FE	d_i^1 -RE	d_i^2 - FE	d_i^2 -RE

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Research Report



- A young tsunami survivor works with her teacher and classmates in one of 160 quake-resistant, child-friendly schools built in Aceh and Nias, Sumatra, Indonesia, 2008 (Photo: Estey, UNICEF)