

Children and Climate Change

The impacts of climate change on nutrition and migration affecting children in Indonesia

Climate change matters to children

The survival, development, protection and participation of children are all implicated in a climate-changing world. This alone makes a compelling case for bringing children into the focus when examining the impacts of climate change on their communities.

Children are in a rapid stage of growth and formation, with evolving physical and cognitive functions. The environment has long been recognized as a crucial determinant of child survival and health, with children especially susceptible to air and water quality, temperature, humidity, and vector-borne infections due to their less developed physiology and immunity (UNICEF, 2008: 4).

Deprivations, such as poor nutrition, are irreversible by the age of 24 months and have lifelong cognitive, physical and reproductive repercussions for children.

The United Nations Convention on the Rights of the Child guarantees every child the right to a standard of living adequate for their physical, mental, spiritual, moral and social development and the right to the highest attainable standard of health. It also prescribes children's right to access information and for their views to be heard. The impacts of climate change are already and will continue to affect how well those rights are fulfilled and thus the future strength of the society in which they live.



Group of girls playing on the banks of the Ciliwung River in Jakarta

The environmental decisions made today will determine the inheritance that is left to today's children. There is a moral imperative for children to be explicitly considered, informed and engaged in the climate change response.

UNICEF study looks at the impacts

The UNICEF East Asia and Pacific Regional Office commissioned a series of country studies across the Asia-Pacific region, including Indonesia, to examine the empirical evidence on the probable climate change impacts on children as well as children's adaptive capacity to climate threats. The Indonesia study explored children's vulnerabilities to climate change and disaster impacts, with a focus on children's health and nutrition and migration patterns affecting children.



A child's photo of a lone corn stalk struggling in dry ground in Nusa Tenggara Timur province



Mother and son in Jakarta

Without accounting for climate change, Indonesia has long struggled with high levels of malnutrition among children and women of reproductive age, and it has among the highest out-migration rates in South-East Asia. Nutrition and migration describe the essence of a child's health status and the degree of their social protection. They are determinants of a child's survival, of their physical, cognitive and social development and of the foundations for realizing their potential. The impacts are lifelong.

Climate change and nutrition

The *Fourth Assessment Report* of the Intergovernmental Panel on Climate Change (IPCC) in 2007 predicted several climate-induced health impacts with "high confidence". Chief among them was a rise in malnutrition levels and consequent related disorders.

Arrestingly, given the potential size of the affected population, the report stated that "malnutrition linked to extreme-climatic events may be one of the most important consequences of climate change" (Confalonieri et al., 2007: 413-414).

Additionally, the Maternal and Child Undernutrition Study Group for *The Lancet* established that undernutrition already affects 3.5 million child and maternal deaths annually, and 35 per cent of the disease burden of children younger than 5 years (Black et al., 2008: 243). It has long been associated with the poorest health outcomes of infectious and other diseases among children.

Acute malnutrition, or wasting, means low weight for height, and chronic malnutrition is indicated by stunting or low height for age.

Undernutrition also includes poor foetal growth and micronutrient deficiencies, the so-called 'hidden hunger' that results from an insufficient intake or failure to absorb vitamins and minerals because of diarrhoea. In children, malnutrition impairs physical, cognitive, motor and emotional development.

Undernutrition diminishes immunity to disease, which, of itself, depletes nutritional status – a vicious, deleterious cycle for children (Akachi, Goodman and Parker, 2009: 8).

Nutritional status of Indonesian children

Over recent decades, Indonesia has made steady progress in reducing its prevalence of underweight children younger than 5 years. Nonetheless, high malnutrition persists, with Indonesia identified as one of 20 countries globally with the highest burden of undernutrition (Bryce et al., 2008: 514). According to the 2010 RISKESDAS (Basic Health Survey), an estimated 17.9 per cent of Indonesian children are underweight (close to one in every five children), 35.6 per cent (or one in three) children aged 0–59 months are stunted and 13.3 per cent are wasted.

The UNICEF climate change study used the UNICEF conceptual framework for child malnutrition (1990) to examine the causal links between societal, household and immediate influences on child malnutrition.

For Indonesia, poor maternal and child care and feeding practices are the main cause of undernutrition in children and women. Recent data have shown declining rates of exclusive breastfeeding (from 40 to 32 per cent between 2003 and 2007), poor complementary feeding (only 41 per cent of children aged 6–23 months are fed as per the World Health Organization recommendations) and caring practices as well as poor maternal nutrition (BPS, 2008).

There is also suboptimal access to health services, safe water and sanitation. This is compounded by high absolute poverty levels.

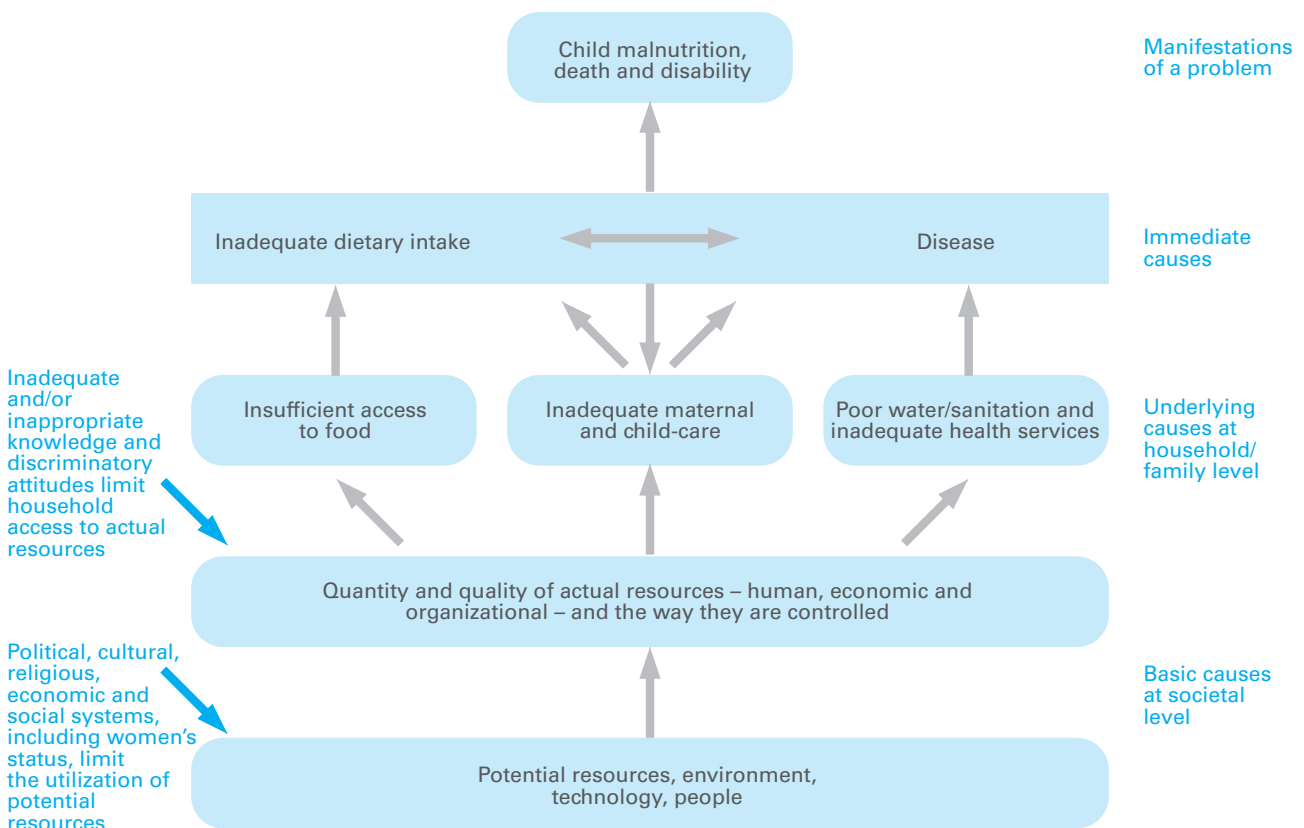
Climate altering food security

Agricultural production accounts for 12.9 per cent of Indonesia’s gross domestic product and 43.3 per cent of total employment. Seasonality (or the predictability of precipitation) is crucial to rain-fed agriculture. In interviews in East Java for the UNICEF study, people consistently noted that the rainy season for the past two years had lengthened, from 6 months to 12 months. However, the prolonged rainy season in East Java over the past two to three years is regarded as anomalous and is not expected to continue. By 2050, delays in the rainy season

are predicted, with shorter and more intense rainfall as well as a drier dry season (MOE, 2010: xvii).

A government study in 2007 concluded that a delay in the onset of the rainy season beyond 20 days during the El Niño years had disrupted production significantly; a one-month delay translated to an estimated 11 per cent decline in the yield of wet-season rice in East Java and Bali (an area that, together with Central and West Java, provides approximately 55 per cent of the national rice yield). The same study also noted that a rice plot experiment in the Philippines found that for every 1 per cent increase in average temperature during the dry season, rice yield decreased by 10 per cent. (This is sobering for Indonesia, where the temperature is predicted to rise 1–2.5°C by 2050 and 1– 3.5°C by 2100) (Natawaidjaja, 2009:3).

The 2007 government study further confirmed that delays in rainfall onset meant that rice was planted later and thus the ‘hungry season’, or *paceklik*, at the end of the dry season also lengthened. The study was unequivocal that month-long delays in the monsoon onset will be more frequent by 2050 (Naylor et al.: 7752-6).



Climate impacts on child malnutrition using UNICEF conceptual framework	
Immediate causes	<p>Individual influences:</p> <ul style="list-style-type: none"> • Poor diet (quantity and diversity) due to production and income declines. • Diarrhoea episodes due to inundated or unsanitary environment.
Underlying causes	<p>Household influences:</p> <ul style="list-style-type: none"> • Threats to food security driven by temperature and precipitation changes or soil desertification or salinization that result in variations or failure of agricultural production or animal rearing, impacting on household subsistence, consumption and income generation. Likely reductions in the ability to produce and procure a diversified diet and to seek health care for illness. • Livelihood pressures on households from the above climate-induced impacts, encouraging premature infant weaning so that mothers can work longer hours or out-migrate for work. Increased workloads impact on a mother's ability to take care of herself and her children. • Extreme climatic events, such as floods or sea level inundation of coastal cities, leading to displacement to informal and unsanitary environments, and contaminated water sources that compromise nutritional status. • Negative coping strategies, such as the reduction in the quantity of daily meals and portions. • Rising ambient temperatures and precipitation that increase the transmission season, boundary and density of vectors. This will compromise the health of non-immune and malnourished populations in particular. • Withdrawal of children from school to help with household food procurement or livelihood even when maternal and paternal education is high (which typically correlates with improved child-caring practices and increased support for education) (Semba et al., 2008: 322-328). • The increase in pests and disease through increased rain and humidity as well as the impact on plant stress and photosynthesis poses issues for the nutritional content of food that is produced.
Basic causes	<p>Societal influences:</p> <ul style="list-style-type: none"> • Lack of public investment in the agriculture sector and its technologies, including irrigation, and in the preservation of natural resources, such as forests, in spite of climate impacts. • Lack of an early warning system for food security. • Inadequate or poorly maintained public water storage and sanitation infrastructure, aggravated by climate-induced water shortages and inundation. Less water equals poorer hygiene. • Reduction in access to forest-derived natural resources, traditional, medicines and food sources, owing to climate-mitigation strategies, such as the United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries, or REDD, that designate forests for carbon-offset schemes. • Forest loss from logging and burning. • Temporary displacement or relocation due to climatic factors, without availability of social assistance or regularization of land entitlements, leading to lack of material resources and access to cultivation lands. • Loss of biodiversity or stocks, and threats to food safety through temperature rise.

Another important aspect of climate-induced crop failure for malnutrition is that an exclusive diet of particular crops will produce specific malnutrition 'syndromes'. For instance, the perishing or sale of animals during an economic emergency may result in iron deficiencies, and a cereal diet will exacerbate iron and zinc deficiencies. This will be another dimension of child malnutrition to track in food-insecure settings (Pasricha, 2008).

"Because of the high rainfall the fertility for the corn is not good, and it means that the plants get unhealthy to the point where they die. If the corn dies, it also means that the country people will have a difficult economic situation."
 Jeri (boy) in Nusa Tenggara Timur province

A review of the impact of the Asian financial crisis found plausible evidence of a 10–20 per cent increase in maternal anaemia due to a reduced intake of iron-rich foods, especially among the poorest quintile, and consequent increases in low birth weight, stunting and wasting rates (Bhutta et al., 2009).

If unaddressed, food price increases or household economic crises will have a detrimental immediate impact on the health and nutrition outcomes for children and women.

Shifts in wet and dry season onset patterns are predicted for Indonesia, with reports of variable and failed harvests, which will have multiple impacts. These include the undermining of the economic security of households, leading to reduced meal intakes and an increase in the agricultural burden on mothers, which in turn will impact on the care and feeding practices for themselves and their children.

The shifts in planting seasons are indications that climate change will increasingly be a cause of food production disruptions and food price increases. If unaddressed, they may result in food availability being an issue for Indonesia.

Impact on migration affecting children

In comparison to nutrition, climate change-linked migration has been far less researched, particularly its impacts on children, although at the global level, there is now a significant body of literature examining the association between climate change and migration. Within Indonesia, however, no predictions of the population likely to migrate or be displaced due to climate change effects have been made.

“I feel a bit worried, because there are still a lot of people who are not aware about the climate change that is happening.”

Dewi (girl), a junior high school student in East Java

Awareness of migration as an issue in climate change adaptation was uneven among the different people interviewed for the UNICEF study, both at the national level and in the two provinces – Nusa Tenggara Timur and East Java – selected for closer analysis.

Despite the scarcity of data, the field consultations suggest possible links between climate change and changing migration patterns for Indonesia and their specific effects on children. These include the increase in the



Watch house along the Ciliwung River in Jakarta, which posts the monitoring results for the river flow and rainfall upstream

internal and international migration rates of women and the extension of work contracts beyond the initial duration of two years, with some decisions to migrate related to unviable agriculture trends locally. Additionally, there were reports of young children already heading to the provincial capitals to look for menial labour.

By reviewing international and local studies related to migration, climate change and/or children, the research team produced a matrix (following page) of plausible links between these factors within the Indonesian context.

A core recommendation from the UNICEF study is the need for further research and substantiation of the links between climate and migration, with priority topics including: changes in the dynamic of migration patterns related to climate change effects; care, feeding and protection effects on children when a mother is absent; and climate-related maternal migration and the nutritional and educational impacts for children.

The following matrix presents a summary of the current patterns of migration and mobility observed in Indonesia, paired with a synthesis of published and anecdotal reports of the emerging and projected influence of climate change on these dynamics.¹

¹ References for data and information in the table: Resosudarmo et al., 2009; Setiadi et al., 2010; BPS data quoted in Manan and Ikhsan, 2009; IOM, 2007: 5, 16; Bryant, 2005; Muslimatun and Fanggalda, 2009.

Notable characteristics	Climate change factors	Specific impacts on children	Policy and research implications
Migration pattern: Overseas labour migration: registered			
Over 75% are women, typically on two-year contracts. Remittances are an important source of national revenue.	Apparent increase in numbers seeking overseas work and extending contracts. 'Sending' districts are climate vulnerable.	Under-researched to date. Possible positive impacts on education through increased income, but negative impacts on feeding practices because mothers are absent.	Further research needed for data breakdown on numbers of young children affected by mothers' migration. Link to caring practices. Warrants inclusion as census question.
Migration pattern: Overseas labour migration: undocumented			
Numbers unknown; speculated to range from 700,000 to several million. Malaysia is the largest destination. Reportedly even gender balance.	Reported increase in numbers from traditional sending areas, which are vulnerable to climate change.	Under-researched to date. Some evidence of better health outcomes for children migrating with parents. Access to education is not reliable.	Better understanding of the scale and outcomes for children of undocumented family migration is needed, as is deeper investigation of correlations with climate change.
Migration pattern: Rural to urban migration: seasonal or cyclical			
Long-established. At least 2.7 million mainly rural women work as domestic labourers, mainly in urban areas. Men and women migrate in agricultural slack periods for informal sector work.	No clear data available. Anecdotal reports of time away from rural homes lengthening.	Anecdotal reports of larger numbers of underage girls being illegally employed for domestic labour and children working in high-risk areas of the urban informal sector.	Better vigilance measures needed to identify illegal employment of children in domestic labour. Research needed on links between children in informal work and climate change.
Migration pattern: Rural to urban migration: permanent by families			
Steady trend established over decades. Multiple drivers, but principally rural poverty, city wages, better education and health services.	No clear quantified data as yet. Initial impressions are that the trend is increasing due to reduced viability of agriculture, particularly in karstic (eroded limestone) areas.	Little focused research to date. Some preliminary findings indicate better health and education outcomes for children migrating with parents, but the sample size is small.	Follow-up on detailed research on rural-urban migration in Indonesia and China currently being undertaken by Universitas Gadjah Mada to provide better knowledge base for policy development around urban service provision.
Migration pattern: Intra-urban migration			
Indications that loss of urban land to sea level rise is displacing populations. Populations tend to be poor and move to underserved peri-urban areas.	Sea level displacement. Affected people include those who have migrated once from rural areas due to climate impacts.	Not yet researched. Early indications suggest that poor populations are moving to areas that lack basic services, so potential negative impacts on nutrition through lower income and on school access.	Track research being undertaken by Universitas Diponegoro and Mercy Corps relating to intra-urban displacement due to sea level rise.
Migration pattern: Displacement: temporary or circular			
Affects several locations in Indonesia. Coping mechanisms may be in place for floods but less likely for landslide and earthquake.	Sudden-onset disaster. Increased frequency for flood-prone areas, which stretches coping mechanisms.	Health impacts for displaced populations. Incidence of diarrhoeal illness, particularly flood-related. Disruption of education.	This area requires monitoring because: i) incidence of displacement is likely to increase, stretching coping mechanisms; and ii) health risk factor to children is particularly high.

Climate change adding to inequity

Equity analysis shines a spotlight on disparities in human development among populations. In climate terms, the capacity to adapt and withstand adverse effects will hinge on a household's or a community's human and material resources.

Vulnerability has become a proxy for analysing inequality within climate change discourse. In 2001, the IPCC defined vulnerability as the degree to which a system or population is able to cope with climate variability and extreme events. It is associated with the character, magnitude and rate of climate variation and is a result of the exposure, sensitivity and adaptive resources.

In terms of the number of people living in hazard-prone areas who are subject to potential losses, Indonesia ranks as first of 76 countries for tsunami risk; third of 153 countries for earthquake; and first and sixth of 162 countries for landslides and floods, respectively (IDRP, n.d.). With an estimated 53.8 per cent of Indonesians living on less than US\$2 per day, this is a vast population likely to have diminished adaptive capacity (ADB, 2009: 9). Several populations in Indonesia live with high vulnerability on account of different predisposing factors, as the following highlights.

Those with geographic or environmental vulnerability:

- populations in coastal zones, especially on the north coast of Java, along tidal rivers or on low-lying small islands
- those living in non-durable housing (Satterthwaite, 2007: 46)
- the poor in the hill areas²
- households reliant on rain-fed agriculture
- subsistence-farming households
- peatland-dependent communities
- indigenous populations (Confalonieri et al., 2007: 393)
- those living with a single source or unsustainable supply of water (Bish, 2010)
- populations not reached by public health, education and social protection services.

Those with biological or social vulnerability:

- malnourished children
- children of parents with little education



Settlements of Madurese migrants along the river in Surabaya City, East Java

- pregnant mothers and children younger than 5 years
- children who are orphans, independent and street-based or shelter-based
- urban poor, slum dwellers and itinerant
- poor families
- households without secure land tenure
- parents involved in non-agriculture unskilled labour
- displaced persons
- female-headed households³
- unregistered children.

Specific demographics of children:

- 5 per cent of children who are not in school and not reachable with disaster preparedness or adaptation information
- street-based, slum-dwelling and internally displaced children
- children living in low-lying islands.

As Bartlett (2008: 13) notes, what stands out for children as a group is their less-developed defences and the repetitiveness of climate change-related outcomes for those children affected: "more malnutrition, more disease, more death and injury, more risk of neglect, abuse and exploitation."

Engage, educate and enable children

Experiences from various child-centred disaster risk reduction programmes clearly illustrate that when children are educated and informed and involved in safety drills

² Interview with BAPPEDA Sampang, 12 May 2011.

³ Interview with Mercy Corps Jakarta, 18 May 2011.

or the reinforcement and proofing of their environments, they are better able to prepare and protect themselves.

It is logical that what matters is not just how children experience disasters and deprivations, but as Tanner (n.d.) has framed, “how they conceptualize the risk and opportunities.” This logic now needs to be applied to climate change.

“Everyone is doing tree planting and composting. The children are doing this but they don’t know why – and this is in the urban areas. Children are not being talked with seriously about the planet, and they don’t really know the links between their acts and climate change.”

Nana, a volunteer with the Climate Project Indonesia

Children have the right to speak for themselves, and they clearly have strong opinions and observations on climate change. The UNICEF study incorporated a survey component designed for children and youth that canvassed their perspectives, information desires and direct experiences of climate change impacts.

In the last year, I experienced the following impacts of weather events:	Rural children	Urban children
Had to finish school because there was not enough money	20.8%	1.4%
Had to miss school to help with family (work or care for siblings)	0%	4.1%
Food became more expensive because of too much or too little rain	62.5%	64.4%
Damage to my home/street/school	29.2%	52.1%
Spent more time collecting water	25%	17.8%
My parents had to move for work because of harvest failure	29.2%	0%
Had to move because of flooding	16.7%	2.7%

The survey found that rural children had commonly experienced harvest failure and drought and a corresponding shortage of water. Significant in these responses is the indication of food and water security stresses.

Children were then asked the related question of the impacts of these weather events that they had experienced.

In the last year, I have experienced the following weather events:	Rural children	Urban children
High winds	65.4%	41.1%
Longer rainy season	34.6%	65.8%
High tides	0%	4.1%
Failed harvest	61.5%	6.8%
Shortage of water	34.6%	21.9%
Drought	42.3%	8.2%
My house/street flooded	23.1%	28.8%

Almost a quarter of the rural children surveyed also responded they had been obliged to drop out of school because the family didn’t have enough money, linked to weather events, and that almost one third of the rural children surveyed had parents who had moved for work because of food shortage or harvest failure.

Children were asked about their feelings on the topic, with the options ordered from positive to negative to ambivalent.

When I think about climate change in Indonesia, I feel:	Responses selected by children*
Optimistic we can do something about it	56.7%
Confident we can make the changes needed	54.5%
Interested in being involved in helping	29.3%
Passionate about educating others	20.3%
Angry	3.0%
Scared	3.0%
Pessimistic	3.0%
I feel nothing	2.0%
I feel confused	5.1%

*It was possible to select multiple options

Even accounting for the power of the ordering, the results resound with the optimism, determination and faith that the children had in the ability of people to do the things that are right and are needed to address climate

change. This represents the potential and, most likely, untapped potential, for children to act on this issue. It also suggests a strong level of interest. Notably, the five children who said that they were angry were all from urban areas, and the three who said they were scared were from Nusa Tenggara Timur province.

Children were then asked what would help children and young people to cope and adjust to climate change. The top responses were that they wanted to do something tangible about it for their communities (28.3 per cent) and they wanted scope to be involved in planning for a future with climate change (24.2 per cent).

There was some interest in the Government's handling of the issue (9.1 per cent), and some children did venture that they would like to address their views on the topic to the Government (9.1 per cent, all urban children). The results reflect a desire for more information, for a forum for engaging children and also to convert their interest in doing practical things to support their family and community.

Many children requested information about climate change "to help us fix the world" or so that "we can overcome global warming".

The willingness to consider other people's situation was a strong current to the responses, as was the preparedness and desire of the children to take action.

"What I want is that when people have been struck by disasters, the Government should help straight away. And if people's homes are not fit to live in, the Government should also help them, for their future."

A child in East Java



Opportunities for action

Evidence gathering:

- Explore the potential to include nutrition as one of the sentinel conditions in the climate-related surveillance-strengthening pilots.
- Contribute to multihazard early warning systems that include food security and water and sanitation stress, and are age-disaggregated to track affected children.
- Seek to partner or communicate with academic institutions already conducting research on climate change-related population movements.

Technical assistance:

- Continue representing children's issues on the UN Working Group on Climate Change.
- Collaborate with United Nations technical clusters to mainstream climate change into nutrition, protection and water and sanitation programmes.
- Monitor the impact of changing migration patterns on child protection and well-being and changing household caring and feeding practices related to climate stresses.





Capacity building:

- Conduct a children's forum at the provincial level or within selected districts to facilitate their input into the development of materials and information on climate change, particularly on practical ways for children to contribute to their own, household or community resilience.
- Partner with the Government and United Nations agencies in the provinces to ensure that climate change is mainstreamed within city development programmes for children.
- Partner with community-based organizations to engage children in participatory disaster risk reduction and climate change adaptation assessments, documenting children's strategies and sharing them with a broad audience.

Conclusion

The UNICEF study found clear and alarming links between climate change and the nutritional status and migration patterns, despite only having a few documented studies with which to base analysis. Importantly, the study brings into focus the effects of these dynamics specifically on children, highlighting the low policy-level profile given to children as a population group that is distinctively affected by climate change and suggesting strategies for making both children and the impacts upon them visible in the Indonesia response.

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