GLOBAL DISASTER DISPLACEMENT RISK

A baseline for future work

THEMATIC REPORT

iDMC internal displacement monitoring centre

ACKNOWLEDGEMENTS

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Cover photo: Internally displaced people wade in the flood waters of the Protection of Civilians site near Bentiu, in Unity State, South Sudan. The site, which houses thousands of IDPs from conflict, has seen significant flooding during the rainy season, due to the fact that is located on a flood plain. Credit: UNMISS/JC McIlwaine, August 2014

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TABLE OF CONTENTS

INTRODUCTION: DISASTER DISPLACEMENT RISK

Displacement is one of the least reported impacts of sudden-onset disasters. Often hidden behind news of pre-emptive evacuations that save lives, its costs to individuals, local communities, countries and the international community tend not to be accounted for. Neither is the risk of future displacement anchored in national and regional strategies for disaster risk reduction (DRR). The UN Office for Disaster Risk Reduction (UNISDR) has rigorously analysed the risk of economic losses due to disasters risks in its Global Assessment Report (GAR). One critical gap, however, concerns evidence and analysis of the risk of disaster-related displacement, a problem which hinders the effective reduction of both displacement and disaster risk.

This report lays the groundwork for addressing this gap. It presents the first results generated by IDMC's global disaster displacement risk model, which builds upon and extends the analysis presented in the 2015 GAR.[1] Therefore, it serves as a critical baseline for DRR and climate change adaptation efforts and future humanitarian responses.

Habibullah builds his own house as a response to the April 2010 Afghanistan earthquake, which destroyed more than 2,000 houses.
Photo: NRC/Christian Jepsen, October 2010

A view of Myanmar's post-monsoon flood waters in 2016. Photo: NRC, April 2016

Displacement associated with disasters is a global issue. There were 24.2 million new displacements brought on by sudden-onset natural hazards in 2016, and we have collected data on more than 3,800 events in more than 170 countries and territories since 2008. As we finalised this report between July and September 2017, more than 8 million people were displaced by disasters according to our provisional estimates.

Our data shows that internal displacement is on the rise globally, along with the humanitarian and development needs to resolve it.[2] At the same time, resources are becoming increasingly stretched, both regionally and across a growing number of priorities. This calls for a new approach to addressing the phenomenon.

Almost 20 years after the Guiding Principles on Internal Displacement were published, researchers and policy-makers have agreed that looking backward is not enough to inform policies and action to reduce current displacement and future displacement risk.[3] If displacement is only understood by analysing what has happened in the past, protection and assistance measures will only be able to address current situations. In other words, when displacement is only accounted for and addressed after it happens, responses are largely limited to humanitarian, relief and protection interventions.

If, on the contrary, retrospective analysis is complemented with probabilistic analyses and metrics – assessments of the likelihood of certain displacement events taking place within a specific future timeframe – new opportunities for action open up. First, decision-makers are able to understand the probability of future displacement events, meaning that preparedness can be significantly improved. Second, by understanding the different layers of displacement risk – the type and scale of displacement that may occur at different intervals and frequency – governments and others in the development sector can target their investments in support of effective risk reduction.

Displacement associated with conflict is influenced by highly volatile political, socioeconomic and cultural conditions specific to each situation, making it difficult to assess from a probabilistic point of view, but that associated with sudden-onset natural hazards has components that science can estimate and model. Doing so provides useful information that can be used to identify and address the drivers of disaster risk, and with it reduce the likelihood of displacement taking place.

Disaster risk assessments typically consider rare, high-intensity hazards that occur only once every 250, 500, 1,000 years or more. That means that most of the disasters that could take place have not yet happened.[4] In order to account for such events, we have adopted a probabilistic approach to measuring risk. We then combine this with empirical data on more common, low-intensity hazards for which we have recorded the number of people displaced.[5]

By combining the prospective data presented in this report with our retrospective figures, and by analysing the broad socioeconomic and political dynamics that play a role in the underlying drivers of displacement, we can better understand how it happens and how to reduce it. This in turn will help to address displacement risk across its whole "gestation cycle" rather than only from point zero when displacement actually starts.

HOW DISPLACEMENT ASSOCIATED WITH DISASTERS COMES ABOUT

Internally displaced people (IDPs) are described as "persons or groups of persons who have been forced or obliged to flee or to leave their homes or places of habitual residence, in particular as a result of or in order to avoid the effects of armed conflict, situations of generalised violence, violations of human rights or natural or human-made disasters, and who have not crossed an internationally recognised State border."[6] The definition is based on two core parameters, the forced nature of the movement and the internal dimension of the flight.

People may become displaced during or following the impact of a sudden-onset hazard when either the event itself or the disaster it triggers puts them in direct physical danger. They may equally become displaced if their homes are rendered uninhabitable or they lose their livelihoods or access to basic services.

They may also be displaced in order to avoid the potential impacts of a hazard before it strikes, often in the form of emergency evacuations. These may be planned, ordered or recommended and facilitated officially, or they may be the spontaneous response of exposed populations based on their own information and perceptions of risk. Either way, they are usually undertaken as a measure of last resort. Evacuations accounted for more than eight million, or over a third of the displacements associated with disasters that we reported in 2016.

As we have reported elsewhere, most people displaced by disasters remain within their home countries, which makes their plight a predominantly national responsibility.[7] Their displacement also tends to be short-term. Even when housing is damaged or destroyed, people generally return to rebuild.[8]

Depending, however, on the extent of the damage and the vulnerability of the affected population, IDPs may cross borders. Such movements may be intentional, or accidental when borders are porous and not clearly marked. Significant cross-border displacement was reported in the Greater Horn of Africa during food crises and famines that were driven at least in part by drought in 2010 and 2011 and again between 2015 and 2017.[9]

The current and projected data on IDPs crossing borders because of disasters is limited, making it difficult to assess the implications of such population movements, but it is an important topic addressed in the Nansen Initiative's protection agenda and the Platform on Disaster Displacement, at which regional and global policy and research agendas are being discussed and integrated.[10]

A combination of international governance arrangements and national accountability mechanisms is needed to reduce displacement and the future risk of it. In developing such a framework, it is important to recognise that climate change and variability is only one of a number of components in the complex and growing phenomenon of displacement associated with disasters. Risk drivers such as badly planned and managed urbanisation, poverty and inequality and poor governance also play a significant role, and can change more quickly and have a greater influence on displacement risk and trends.

This raises the importance of risk-sensitive development and climate resilient interventions. It is only via an ethic of prevention and risk reduction as a cross-cutting topic spanning different sectors and levels that displacement risk will be successfully reduced.

THE CONCEPT OF RISK

The concept of risk relates to the evaluation of the likelihood of negative outcomes and the efforts made to mitigate them. Risks are an inevitable part of life, but action can be taken at the individual, community, national and regional level to reduce them and develop contingency plans. The evaluation of risk is the starting point for translating perceptions into mitigating actions.

The concept of risk applies to many aspects of daily life at the individual level. People have vaccinations before travelling to reduce the risk of disease. They wear helmets while cycling to avoid injuries, and invest in pension plans to mitigate the risk of losing income. There are dozens of similar examples at the local and national level, from public health issues such epidemics and the side effects of medication; and environmental concerns such species extinction and biodiversity loss; to national security matters such as terrorist attacks, nuclear proliferation and the breakdown of ceasefire agreements; and political, economic and financial considerations such as exchange rate crises, sovereign debt defaults and membership of supranational organisations such as the European Union.

Common to each is the perception that something undesirable may occur at some point in the future. Two important features are inherent in the concept of risk:

- the likelihood or probability that something will occur
- the anticipatory focus of thought and attention on the future

In terms of understanding and managing disaster risk it is vital to recognise that the disasters natural hazards trigger are not acts of God that occur in a vacuum, and that much can be done to mitigate the risks they pose and reduce the losses they cause.

For disaster displacement risk in particular, it is also important to understand that displacement associated with disasters is mainly linked to the exposure and vulnerability of the population in question and a lack of coping capacity of communities, local and national governments and other stakeholders. Knowledge and understanding of its main drivers are the foundation for defining effective measures to reduce future displacement risk.

Debris at the fishing village of San Jose de Chamanga, Ecuador, a few kilometres away from the M7.8 epicentre of April 2016.
Photo: NORCAP/IOM/Fernanda Baumhardt, June 2016

WHY MEASURE DISPLACEMENT RISK?

Several global policy agendas reinforce the notion that displacement needs to be understood and addressed through a risk lens, and two include provisions to address and reduce displacement risk. By adopting the 2015 Sendai Framework for Disaster Risk Reduction, UN member states agreed "to build resilience and reduce disaster risk, including … displacement risk".[11] In December of the same year, the parties to the UN Framework Convention on Climate change (UNFCCC) adopted the Paris Agreement, which tasked the convention's Warsaw International Mechanism with convening a task force to "develop recommendations for integrated approaches to avert, minimize and address displacement related to the adverse impacts of climate change."[12] In order to know if the risk of displacement has been reduced or averted, it must first be measured.

The UN secretary general's Agenda for Humanity establishes a core responsibility to "leave no one behind", with a specific goal of reducing the global caseload of IDPs by half by 2030.[13] This target recognises that in order to do so, "efforts should be made to prevent all new forced displacement", which in turn requires an understanding of displacement risk and its drivers.[14]

In addition to avoiding the upheaval of people's lives and the need to safeguard their rights, there is also an economic imperative to reduce displacement risk. There are both direct and indirect costs associated with displacement, even if they have not yet been fully accounted for. They may manifest as the cost of sheltering and assisting those who have lost their homes, and as less obvious impacts such as loss of productivity and the interruption of children's education, the latter having the potential to reduce future productivity and earnings.[15]

The measurement of displacement risk is not simply a way to report against a global policy target. It can also help governments and civil society to anticipate and better prepare for future events. Assessments such as the one reported here will inform decision-makers in adopting measures that go beyond providing IDPs with humanitarian assistance and protection to better plan and intervene with sustainable development activities that will prevent displacement and reduce displacement risk.

ABOUT THIS REPORT

This report details the first results generated by our global disaster displacement risk model. It presents data on displacement risk associated with sudden-onset disasters, together with a series of policy implications and recommendations. The main objective is to start presenting evidence on how to address internal displacement from a prospective point of view by assessing the likelihood of such population movements taking place in the future.

Our figures aim to provide an order of magnitude of future displacement situations, allowing decision-makers to take risk-informed decisions that will prevent and reduce the risk of displacement before it happens. This report compiles what we have documented and what we know about disaster-related displacement risk. It is an initial analysis and a solid foundation. That said, there are several questions and lines of inquiry we were not yet able to pursue, such as how the magnitude of risk has evolved over time in both absolute and relative terms, as well as how it might change over time due to impacts of climate change. We know where risk is concentrated but we have not yet analysed where it is increasing most quickly - or why. We also did not yet have the opportunity to analyse in depth the latent structural drivers of displacement risk. These questions, and others, will also be useful for informing key policy agendas and thus provide a roadmap for our future efforts.

FINDINGS

TOTAL NUMBER OF PEOPLE AT RISK OF DISPLACEMENT

This section describes and analyses absolute displacement risk. Absolute numbers of AAD illustrate which countries, regions and income groups are likely to suffer more displacement associated with sudden-onset hazards than others (see box below).

We estimate that global AAD is 13.9 million. This represents a significant disaster risk, carrying both human and economic costs. Figure 1 shows the 10 countries with the highest projected absolute AAD. Those with large populations, ranging from 52 million people in Myanmar to 1.4 billion in China, predominate. This highlights the fact that population exposure is a key component of displacement risk. More people are likely to be displaced by disasters in countries with large populations.

The first eight countries in the chart are all lower-middle to middle income countries in south and south-east Asia, a region with densely-populated cities and other settlements. They are among the 50 countries in the world with the largest populations living in urban areas.[17] Their urban areas are often located in flood-prone river basins, along seismic fault lines or in coastal areas exposed to cyclones and storm surges.

KEY DRR CONCEPTS

Hazard

"A process, phenomenon or human activity that may cause loss of life, injury or other health impacts, property damage, social and economic disruption or environmental degradation. Hazards may be natural, anthropogenic or socionatural in origin. Natural hazards are predominantly associated with natural processes and phenomena … Several hazards are socionatural, in that they are associated with a combination of natural and anthropogenic factors, including environmental degradation and climate change."

Hazards may be sudden-onset or slow-onset. The former are sudden shocks such as floods, cyclones or earthquakes, while the impacts of the latter are gradual and linked to an accumulation of effects, as in the case of climate change and drought.

Exposure

"The situation of people, infrastructure, housing, production capacities and other tangible human assets located in hazard-prone areas."

Vulnerability

"The conditions determined by physical, social, economic and environmental factors or processes which increase the susceptibility of an individual, a community, assets or systems to the impacts of hazards."[16]

Average annual displacement (AAD)

The average number of people expected to be displaced each year considering all events that could occur over an extended timeframe. Results are provided in absolute terms – the anticipated number of IDPs each year – and relative to the population size – the number of people per 100,000 inhabitants expected to be displaced each year. AAD should be considered as an indicator of the potential magnitude of displacement, not as an exact value.

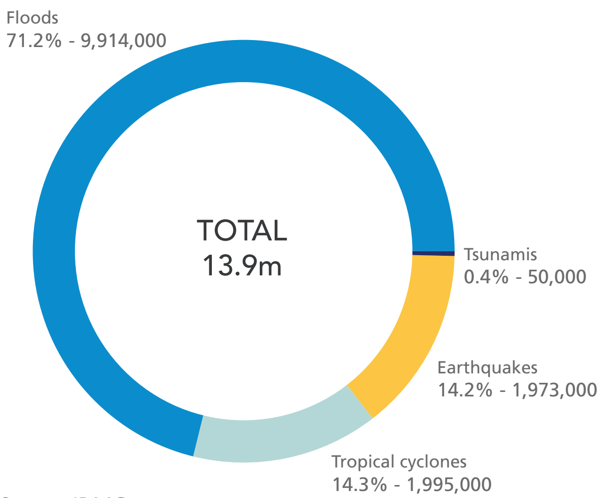
The majority of displacement in these countries will be caused by flooding. Comparatively little will be caused by earthquakes, tsunamis and the winds and storm surges associated with tropical cyclones.

The importance of exposure as a component of displacement risk can also be seen in figure 2, which illustrates the distribution of risk by sudden-onset hazard type for all of the countries modelled. Floods account for almost three-quarters of the total modelled displacement, or an average of almost 10 million globally each year.

This may be for a number of reasons. First, flooding occurs almost everywhere in the world, while other hazards – such as tropical cyclones, earthquakes and tsunamis – are more location-specific. Floods also have a shorter return period, which means they are more frequent. They tend to be less devastating than earthquakes, but when added together they cause more displacement overall. With the exception of Philippines, which sits in the path of Pacific cyclones and is highly vulnerable to them, and the US which suffers the impacts of those in the Atlantic, the other eight countries in figure 1 will witness high numbers of people displaced by floods in any given year.

Secondly, large numbers of people live in dense settlements in areas such as flood-prone river basins, because such areas tend to be places of high economic activity.

Figure 2: AAD by hazard type

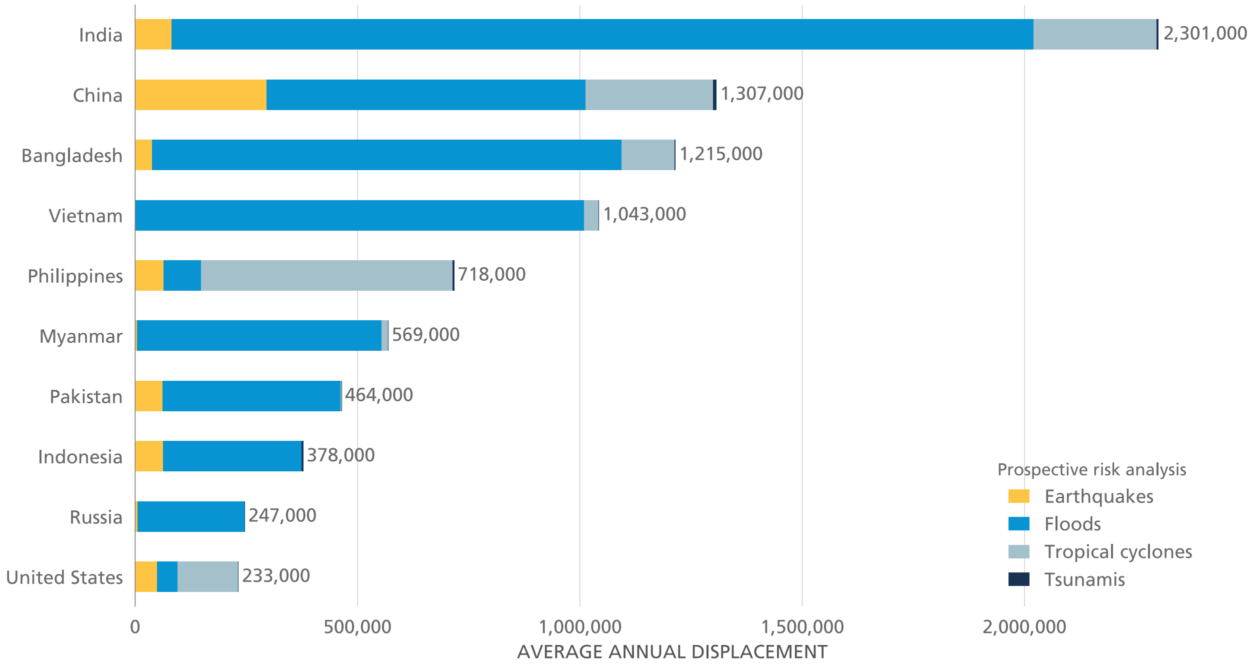


Source: IDMC

Cities themselves can also contribute to flood risk, particularly those without adequate drainage, natural water storage, levees and floodwalls to manage rising floodwaters and run-off.

In contrast, exposure to tropical cyclones in coastal areas and earthquakes along seismic fault lines is relatively low. Exposure to tsunamis is very low because they are the result of a very specific set of geophysical and hydrological circumstances.

Figure 1: Absolute AAD for sudden-onset disasters, based on prospective risk assessment



Source: IDMC

Displaced women smile for the camera in the IDP site Kamal Pokari in Bhaktapur, outside Kathmandu, Nepal. They are digging ditches to make sure rain water and sewage don't reach their makeshift shelters. Photo: Kishor Sharma/NORCAP, January 2016

Figure 3 shows the breakdown of displacement risk by income group, which closely reflects that seen in figure 1. AAD is higher in upper-middle and lower-middle income countries, which together account for more than 80 per cent of the modelled displacement risk.

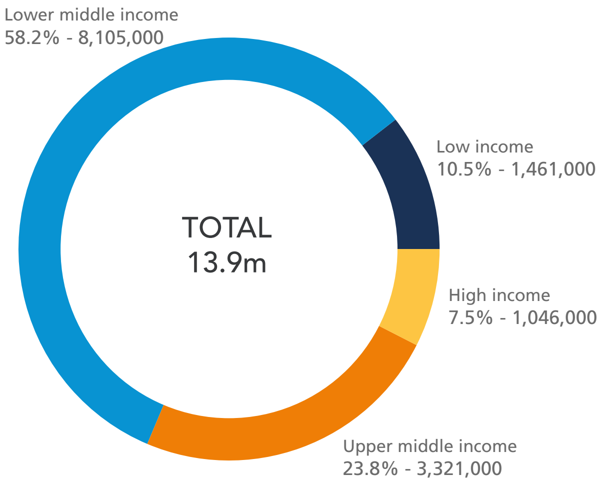
Figure 4 shows that AAD is highest in the South Asia and East Asia and Pacific regions, which together account for two-thirds of the total modelled displacement risk. This is also highlighted in figure 5, where the size of the countries and regions have been adjusted on the map to reflect AAD. South Asia and East Asia and Pacific are expanded significantly, while North America and the Middle East and North Africa are much smaller.

Our data shows that displacement associated with disasters will mainly affect developing countries. This represents a significant challenge for efforts to improve disaster resilience and reduce displacement risk, but it can also be interpreted as an opportunity to invest before disasters and the displacement they are likely to trigger take place. Given, as mentioned above, that most of the disasters that could happen have not occurred yet, our prospective figures reveal an order of magnitude for future displacement in certain countries. They also show the extent to which each hazard type is likely to contribute to overall displacement risk.

This is a sound basis on which to start to establish the necessary governance arrangements to avoid potentially disastrous events and invest in measures to reduce future risk, rather than adopting a "business as usual" approach that will inevitably mean further displacement takes place.

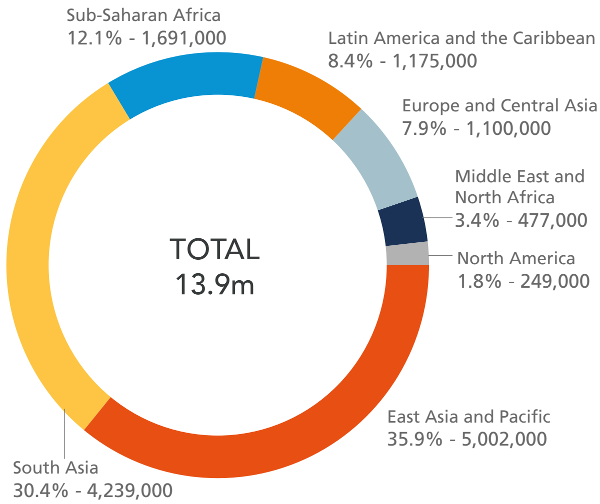
Hydro-meteorological hazards dominate all charts. This highlights the need to adapt to such events, particularly considering that climate change and variability will add to their complexity and intensity. The good news is that hydro-meteorological hazards such as floods and cyclones can be predicted. This means that the projected displacement presented above can be reduced if pre-emptive DRR measures are taken.

Figure 3: AAD by income group



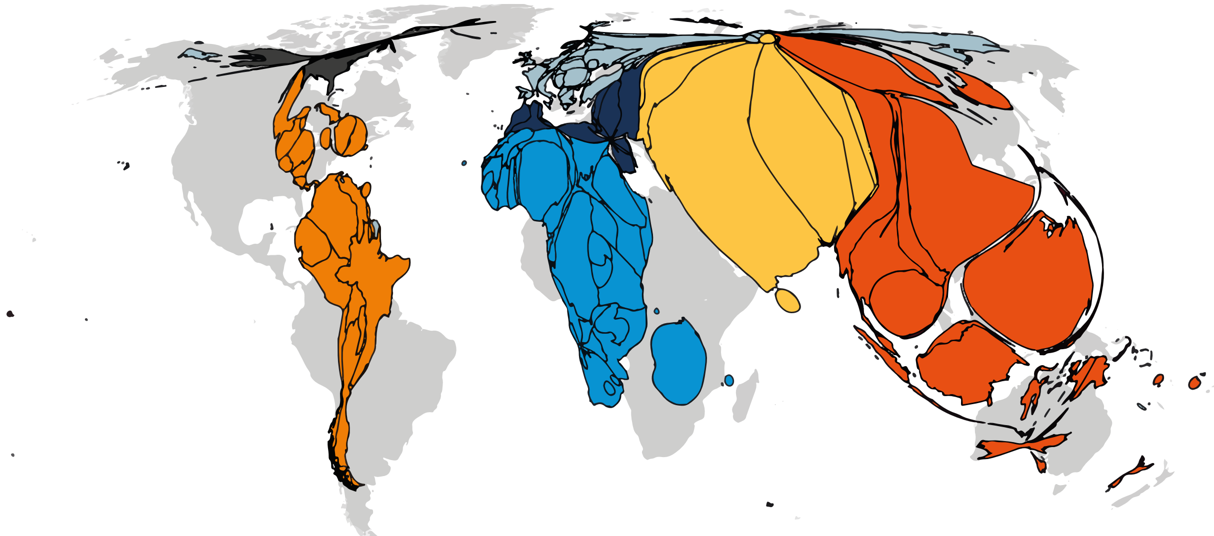
Source: IDMC with World Bank data

Figure 4: AAD by region



Source: IDMC, with World Bank data

***Figure 5:** Map of AAD by country and region.*



Source: IDMC with World Bank data

Simple and low-cost early warning systems are well proven to avoid loss of life and assets, and to reduce forced displacement. There is also plenty of evidence and expertise on flood monitoring and risk reduction that can be applied in countries at high risk, particularly in regions such as south and south-east Asia. If investments in DRR and climate resilience are made now as part of overall sustainable development planning, the scale of future displacement associated with disasters will be dramatically reduced.

NOT ALL DISPLACEMENT IS BAD

The high numbers of IDPs recorded are an obvious cause for concern, but displacement should not always be considered a negative outcome. Our historical estimates of evacuations reflect many lives saved by pre-emptive population movements based on timely early warnings.

DISPLACEMENT RISK RELATIVE TO POPULATION SIZE

Looking at displacement risk relative to countries' population size reveals very different but equally important information in terms of vulnerability and coping capacity. A new layer of displacement risk emerges which, as with that highlighted by our absolute figures, has significant implications for policy-makers.

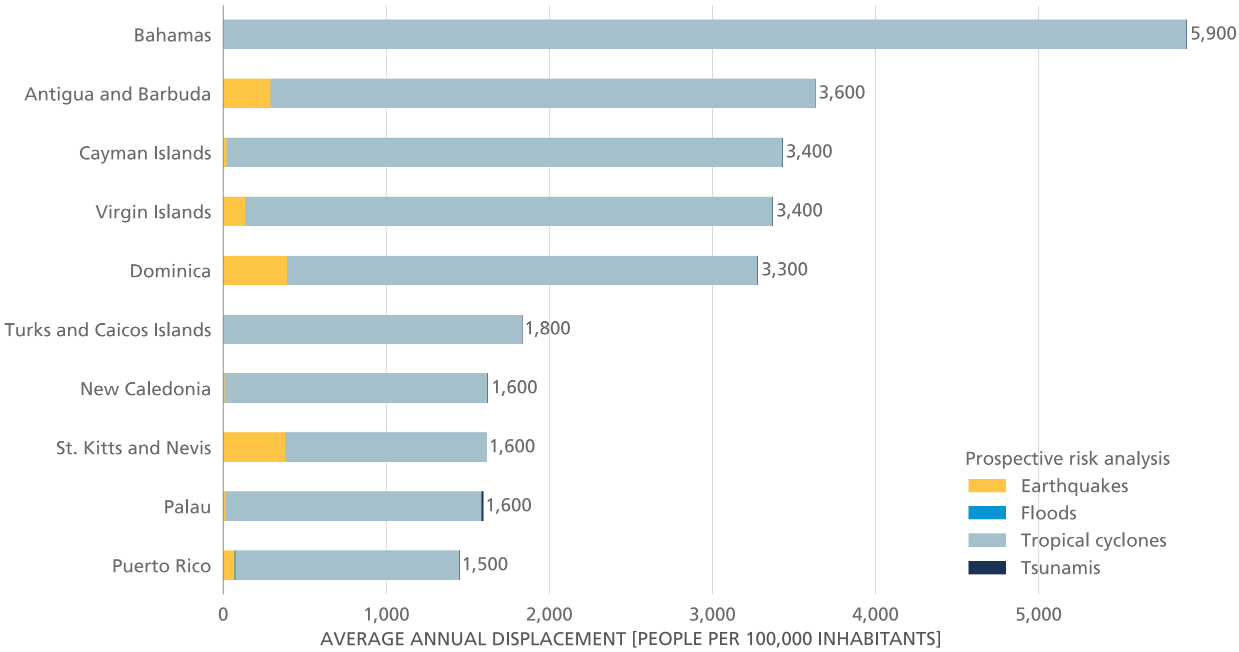
Figure 6 shows the 10 countries with the highest relative AAD. They are all small island developing states (SIDSs), either in the Caribbean or the Pacific, and they are highly vulnerable to earthquakes and tropical cyclones. The chart highlights the fact that, despite their lower absolute risk compared with more populous countries, SIDSs will experience very different and highly significant consequences in terms of displacement relative to their population size. The Bahamas, for example, can expect an annual average of 5,900 people per 100,000 inhabitants, or 5.9 per cent of its population, to be displaced by tropical cyclones.

Figure 7 reveals that as with absolute AAD by income group, when measured relative to population size the lower-middle income category has the highest rate. Low income countries have a proportionately higher rate when their population size is taken into account. The fact that they tend to have poor coping capacity when it comes to disasters is a concern, because it also means that people are likely to remain displaced for longer, particularly in the absence of insurance or adequate social safety nets. Upper-middle income countries, by contrast, have a lower relative AAD rate.

As shown in figure 8, a similar pattern emerges when relative AAD is viewed by region. South Asia and East Asia and Pacific still have significant displacement relative to population size, while regions such as Latin America and the Caribbean and Sub-Saharan Africa have higher AAD rates.

This is clearly seen in figure 9, where countries' sizes are displayed according to their relative AAD. It is striking to see how some, such as SIDSs in the Caribbean and the Pacific, increase in size dramatically, while North America shrinks.

Figure 6: AAD relative to population size (number of people displaced per 100,000 inhabitants)



Source: IDMC with UN Population Division data

Figure 7: AAD relative to population size by income group

Source: IDMC with World Bank data

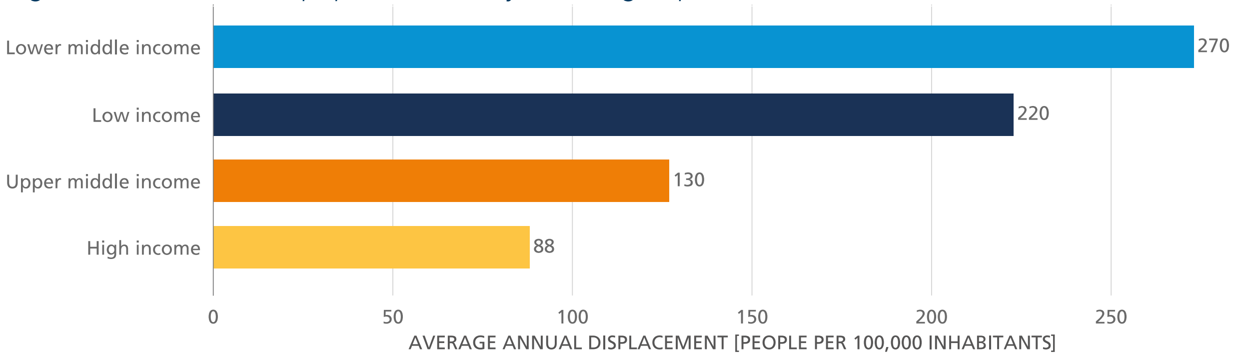


Figure 8: AAD relative to population size by region

Source: IDMC with World Bank data

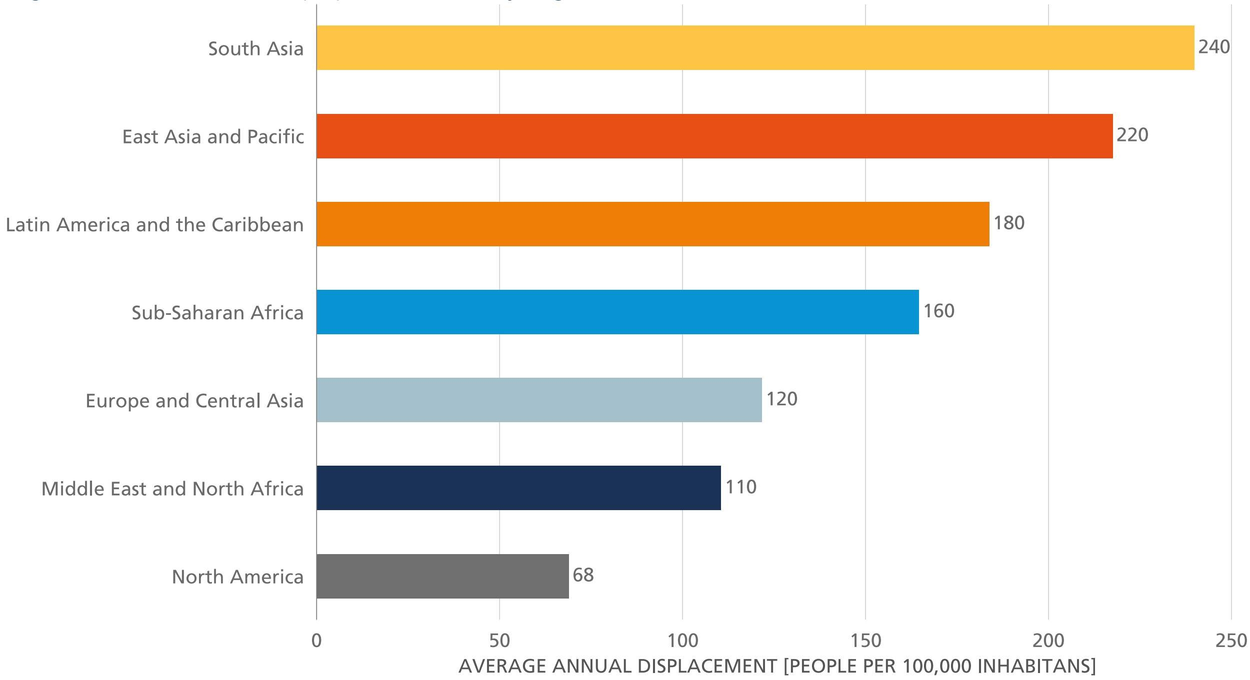
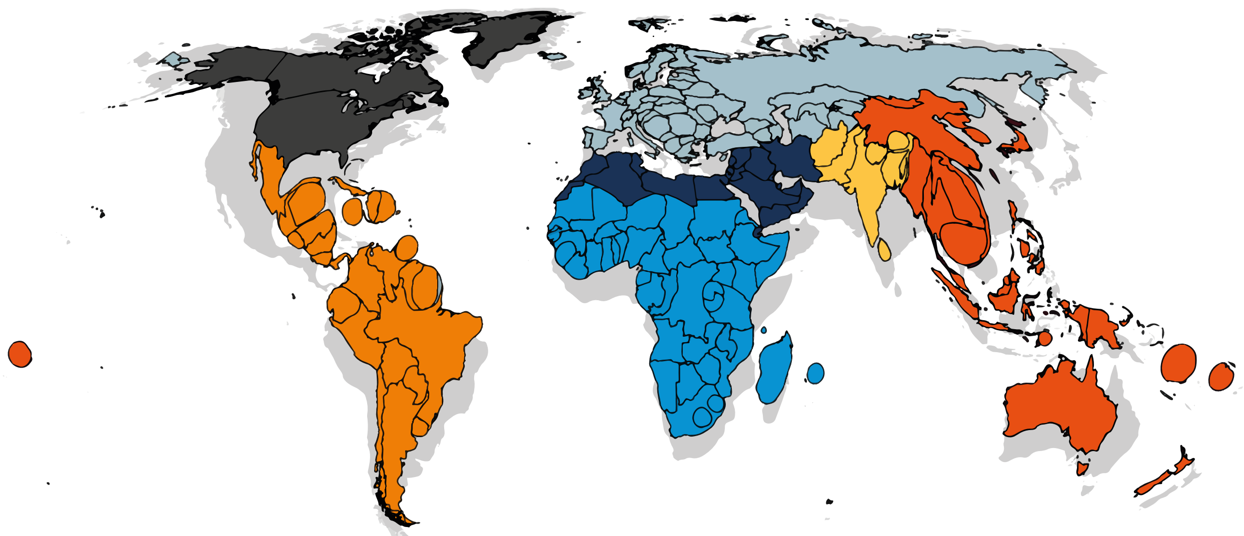


Figure 9: Map of AAD relative to population size by region

Source: IDMC with World Bank data



UNDERSTANDING THE DRIVERS OF DISPLACEMENT RISK

Policy-makers need to better understand the context in which displacement risk is concentrated both in absolute and relative terms if they are to put in place more effective policies to prepare for, respond to and recover from such events.

In order to better understand this context we used the INFORM risk index, "a composite indicator that identifies countries at risk of humanitarian crisis and disaster that would overwhelm national response capacity".[18]

We considered the following main components of the index:

- *Natural hazards and exposure:* This represents events that might occur and exposure to them. The main metric considered is the annual average exposed population (AAEP) or, when hazard maps for different return periods are not available, annual exposed population (AEP). The hazards included are earthquakes, tsunamis, floods, tropical cyclones and drought.
- *Socioeconomic vulnerability:* This quantifies what makes a population vulnerable when faced by a hazard. It is calculated using development, deprivation, inequality and aid dependency as components. It considers country-level indicators such as the UN Development Programme (UNDP)'s human development index, the GINI index – which represents the income or wealth distribution of a nation's residents, and is the most commonly used as a measure of inequality – and the total official development assistance per capita in the last two years.
- *Institutional lack of coping capacity:* This evaluates governments' priorities and institutional capability in implementing DRR activities. It is calculated on the basis of the Hyogo Framework for Action's self-assessment reports, the World Bank's government effectiveness index and Transparency International's corruption perception index.

Analysis in relation to INFORM's components helps to put displacement risk into context and as such to better suggest effective policy entry points to reduce it.

Natural hazards and exposure

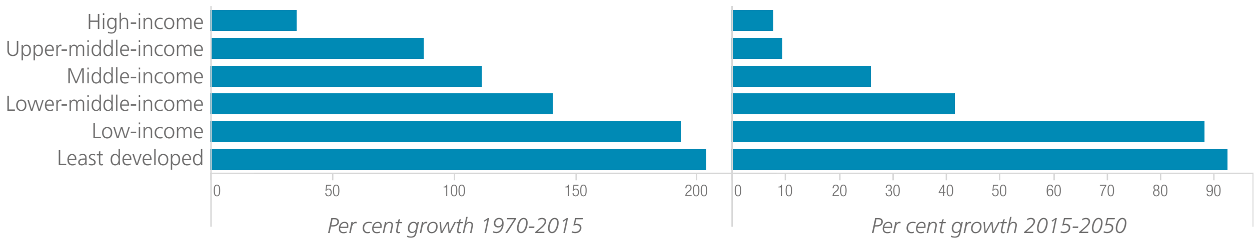
The primary driver of increasing absolute displacement risk is population growth, particularly in areas prone to hazards. In its 2012 report on disasters and climate change, the Intergovernmental Panel on Climate Change (IPCC) concluded that "exposure and vulnerability are key determinants of disaster risk and of impacts when risk is realized" and that disaster impacts in the near future would be driven by changes in those determinants.[19]

Exposure has risen fastest in the most vulnerable countries over the past 40 years, and the trend is projected to continue through to 2050, as shown in figure 10. This implies that disaster displacement risk is expected to increase significantly in the future, especially in low-income and least developed countries.

This is supported by figure 11, which shows that more than 80 per cent of global displacement risk is concentrated in countries that INFORM ranks either "very high" or "high" in terms of exposure to natural hazards.

The IPCC also found that "rapid urbanisation and the growth of megacities, especially in developing countries, have led to the emergence of highly vulnerable urban communities, particularly through informal settlement and inadequate land management".[20] This is a perilous combination of factors that has increased displacement risk significantly. Informal settlements combine high exposure with high vulnerability, because despite being close to income-earning opportunities they tend to be located on marginal land that is too prone to risk for formal commercial or residential development.[21]

Figure 10: Population growth by income group: historical (1970 to 2015) on the left; projected (2015 to 2050) on the right

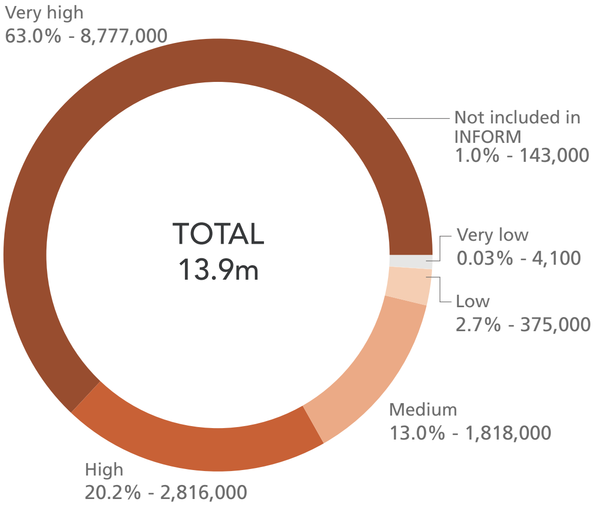


Source: UN DESA

Of the 20 countries with the highest absolute AAD, INFORM ranks 11 "very high" in terms of their exposure to natural hazards, as shown in the left-hand panel of figure 12. They are mainly countries in South Asia and East Asia and the Pacific, such as India, China, the Philippines and Japan, but INFORM also ranks the US "very high" because a significant proportion of the population is exposed to floods and tropical cyclones. The only country in the Middle East ranked "very high" is Iran, where a significant proportion of the population is exposed not only to geophysical hazards such earthquakes and tsunamis, but also to riverine floods.

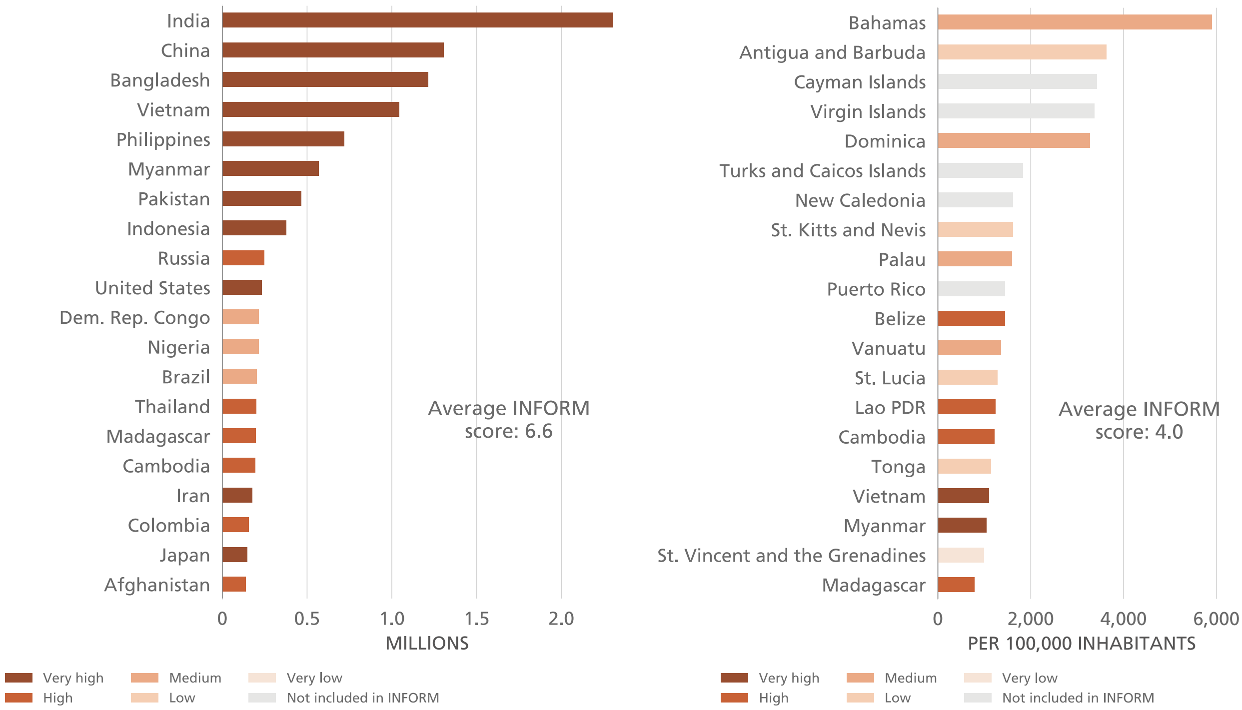
The right-hand panel of figure 12 suggests that overall exposure is not the main driver of displacement risk when population size is accounted for. INFORM only ranks two of the 20 countries with the highest AAD per capita as "very high" risk. SIDS – which have fewer people exposed to natural hazards in absolute terms but a much larger proportion of their total populations at risk of displacement, mainly from tropical cyclones – are at the top of list.

Figure 11: Absolute AAD by INFORM's natural hazards and exposure classification.



Source: IDMC with INFORM data

Figure 12: Countries with the highest absolute AAD (left) and relative AAD (right) by INFORM's natural hazards and exposure classification.



Source: IDMC with INFORM data

Socioeconomic vulnerability

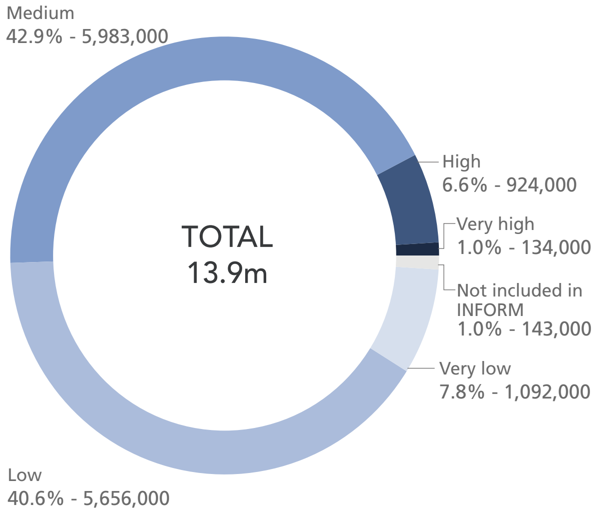
If exposure continues to increase, the only way to mitigate displacement risk is to reduce vulnerability. This means tackling the factors related to low levels of human development, and high levels of inequality and aid dependency that combine to increase a population's vulnerability to disasters. Left unattended, these factors could constitute a vicious cycle. Shocks induced by natural hazards tend to increase inequality and aid dependency, which in turn could make vulnerability to future hazards worse.

Poverty and inequality also limit people's means to increase their resilience and reduce their vulnerability. Standard insurance products to protect homes from fire, flooding and storm damage are not a viable option for people living in informal settlements or slums.

Socioeconomic vulnerability seems to be less correlated with AAD in absolute terms, with only about eight per cent of the total displacement risk concentrated in countries INFORM ranks either "high" or "very high" risk, as shown in figure 13.

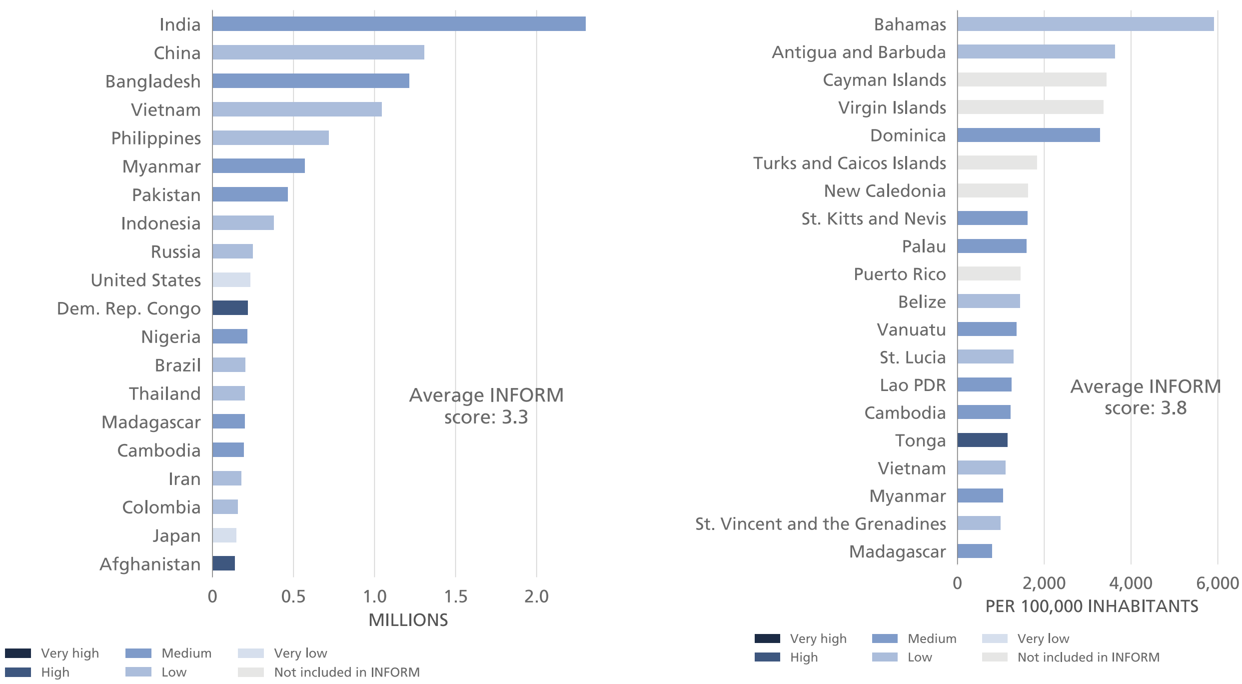
When INFORM's average score for socioeconomic vulnerability is considered, the figure for countries that head the list for relative AAD – shown in the right-hand panel of figure 14 – is higher than for those that head the list for absolute AAD, which are shown on the left. This means that vulnerability mainly correlates with a population's overall risk, i.e. the relative risk.

Figure 13: Absolute AAD by INFORM's socioeconomic vulnerability classification



Source: IDMC with INFORM data

Figure 14: Countries with the highest absolute AAD (left) and relative AAD (right) by INFORM's socioeconomic vulnerability classification



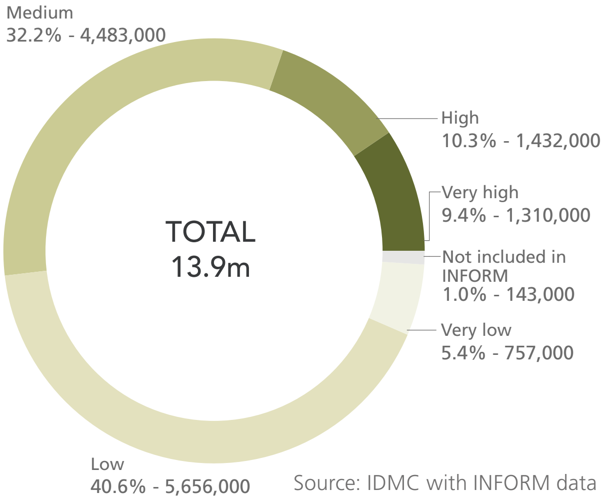
Source: IDMC with INFORM data

Institutional lack of coping capacity

Displacement risk is an inevitable element of disasters that should be prepared for, and there are a number of measures that institutions and individuals can adopt to mitigate it in the future[22]. Displacement risk is highest in lower-middle and low income countries, where the people affected tend not to have the capacity to respond to, and recover from disasters. As such, local and national institutions are mainly responsible for developing contingency plans to foster communities' resilience and their capacity to respond.[23]

Coping capacity usually refers to institutions' ability to react to a hazard once it has struck, mainly during the emergency response phase. As the IPCC has said, however, an "effective response also requires substantial ex ante planning and investments in disaster preparedness and early warning".[24]

Figure 15: Absolute AAD by INFORM's institutional lack of coping capacity classification

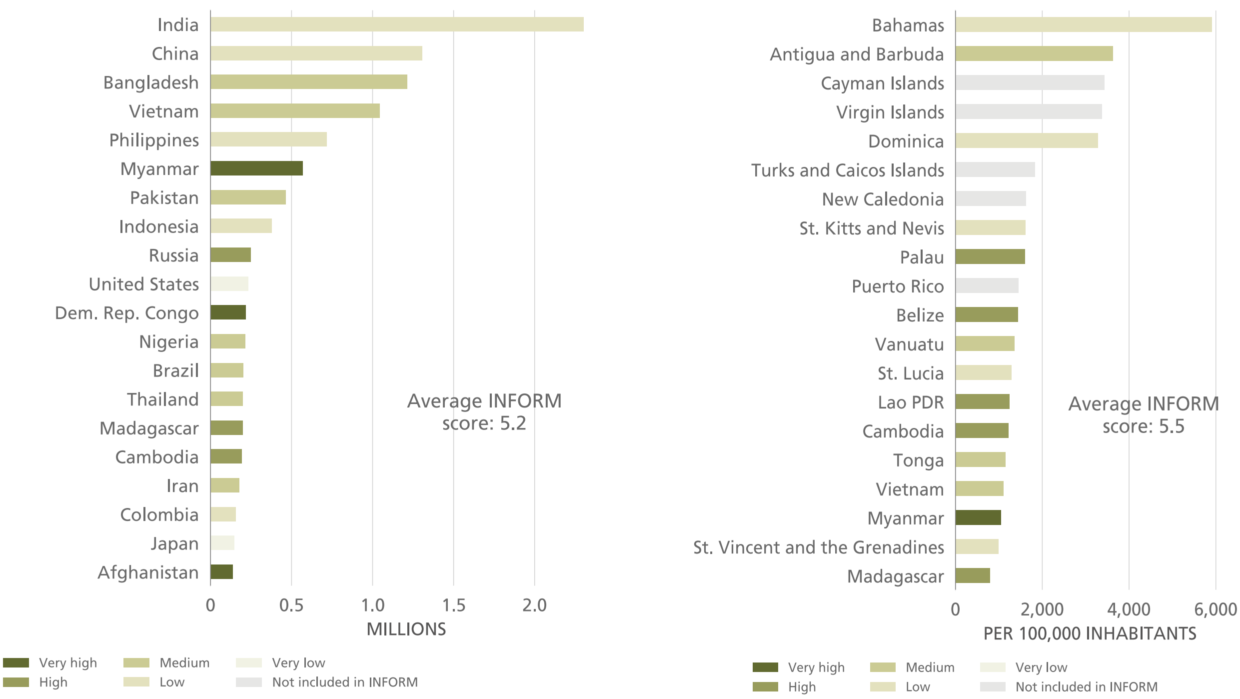


Source: IDMC with INFORM data

Around 20 per cent of global AAD is concentrated in countries that INFORM ranks either "high" or "very high" in terms of their lack of institutional coping capacity, as shown in figure 15. Of the countries ranked "very high", Myanmar, the Democratic Republic of the Congo and Afghanistan have the highest AAD.

As observed for socioeconomic vulnerability, countries that head the list for relative AAD – shown in the right-hand panel of figure 16 – score higher in terms of institutional lack of coping capacity than those that head the list for absolute AAD, shown on the left. This highlights the fact that their vulnerability and limited capacity to reduce disaster risk are the overriding factors that determine displacement risk, rather than exposure. People displaced in these countries are likely to face more hardships while displaced and remain displaced for a longer period of time since governments have less ability to respond to the crisis.

Figure 16: Countries with the highest absolute AAD (left) and relative AAD (right) by INFORM's institutional lack of coping capacity classification



Source: IDMC with INFORM data

HUMAN AND ECONOMIC IMPACT OF DISASTERS

Our global risk model focuses on the human impact of sudden-onset disasters, providing a global baseline for the displacement they trigger. Natural hazards, however, are not only a human but also an economic burden. The UN Office for Disaster Reduction (UNISDR) analyses the economic losses caused by disasters triggered by sudden-onset events in its 2015 Global Assessment Report (GAR).[25]

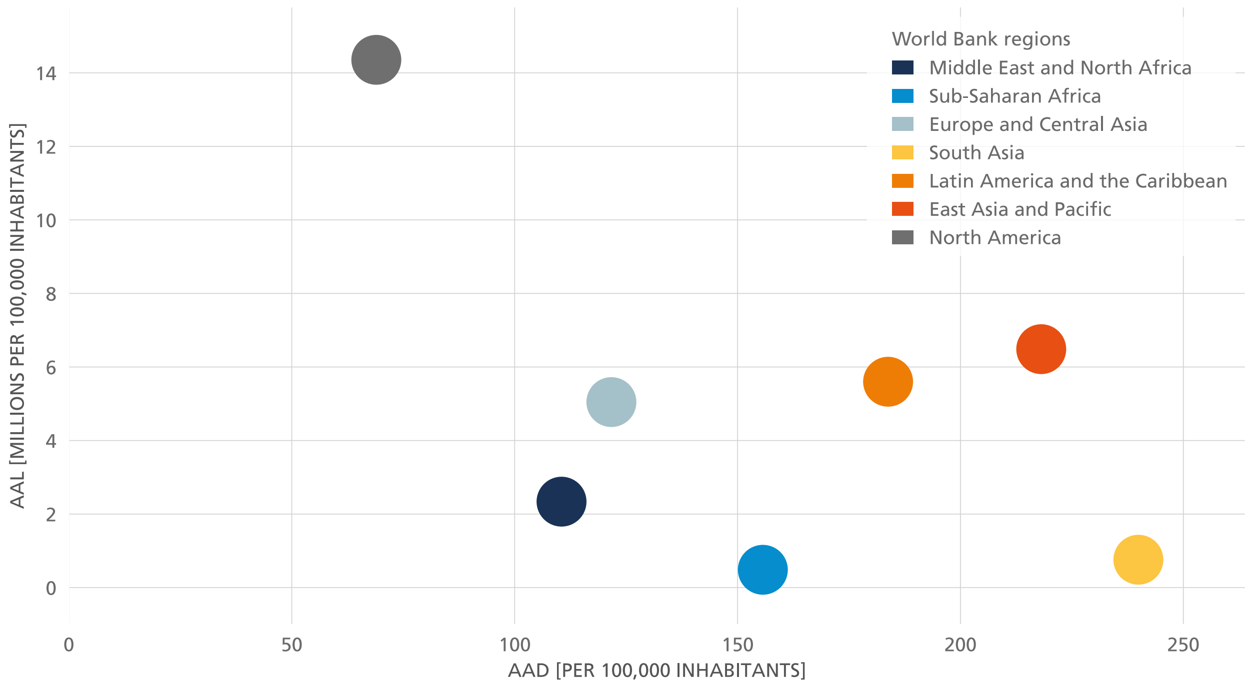
Similarly to AAD, average annual loss (AAL) quantifies expected economic losses annualised over an extended timeframe. It determines the amount of money that countries would have to set aside each year to cover the cost of future disasters in the absence of insurance or other disaster risk financing mechanisms. AAL only takes into account the direct economic impact of disasters – damage to homes, services, roads and other infrastructure. It does not include indirect and long-term impacts such as the loss of jobs and productivity, land degradation and reduced access to education, healthcare and other economic, social and cultural rights.

Displacement adds to the economic impact of disasters in a number of ways. High levels of population exposure and vulnerability increase the need for emergency measures and costly evacuation and resettlement plans, and IDPs are most likely to lose access to their main economic, social and cultural rights, including employment, education and healthcare. There is also evidence of hundreds of thousands of people living in protracted displacement for years following disasters in countries as different as Japan in the case of its 2011 earthquake and tsunami, and Haiti in the case of its 2010 earthquake, which further increases their economic impact.[26]

We decided to look at relative rather than absolute economic loss to better reflect the human perspective. This tells us the losses populations are exposed to, rather than giving a purely economic view of the exposure of countries' assets. Relative economic loss is usually reported either as a percentage of social expenditure, capital investment or capital stock lost.

As figure 17 shows, relative AAD is significantly higher than relative AAL in Sub-Saharan Africa and South Asia. The disasters that strike the countries in these regions have a predominantly human impact. These countries also tend to have less capacity to cope with the effects of disasters and the highest levels of vulnerability.

Figure 17: Correlation between relative AAD and relative AAL by World Bank region



Source: IDMC with World Bank and UNISDR data

Nor is the "disaster market" profitable for insurance companies, making recovery harder and slower. Parametric insurance and risk transfer products could be effective tools to help countries in these regions to recover, and the analysis presented in this report provides a helpful basis for them to do so.[27]

Countries in regions such as North America and Europe, by contrast, have to deal with extremely high economic losses in addition to a sizable displacement risk.

The large variance between relative AAD and AAL should not be interpreted solely in relation to income, but rather from a broader development perspective. To highlight this we looked at the correlation between the two and the human development index.[28] UNDP created the index to "emphasize that people and their capabilities should be the ultimate criteria for assessing the development of a country, not economic growth alone". It is a composite index that includes life expectancy, education and per capita income indicators.

Figure 18 shows a clear pattern. Higher displacement risk and lower economic loss risk is associated with lower development. This highlights the fact that a purely economic approach to DRR is not an effective way of reducing the human impacts of displacement.

Governments and others in the development sector should invest in the overall development of the country, including education, health and life expectancy.

In order to estimate the economic and the human impact of disasters at the country level we calculated the ratio between AAL and AAD. This reveals the average amount of money lost per person displaced each year by sudden-onset disasters. Figure 19 shows the 20 countries with the greatest economic loss per person displaced, all of which the World Bank categorises as high income. In Liechtenstein almost $1m is lost for each person displaced, making DRR a mainly economic rather than humanitarian and development priority.

The only two regions not represented in the list are Sub-Saharan Africa and South Asia. Sub-Saharan countries, however, dominate the list of those with the lowest economic loss per person displaced, as shown in figure 20. Liberia's economic loss per IDP is almost 4,500 times lower than Liechtenstein's. All of the countries on the list fall into the World Bank's low income group, except for Cambodia which is categorised as lower-middle income.

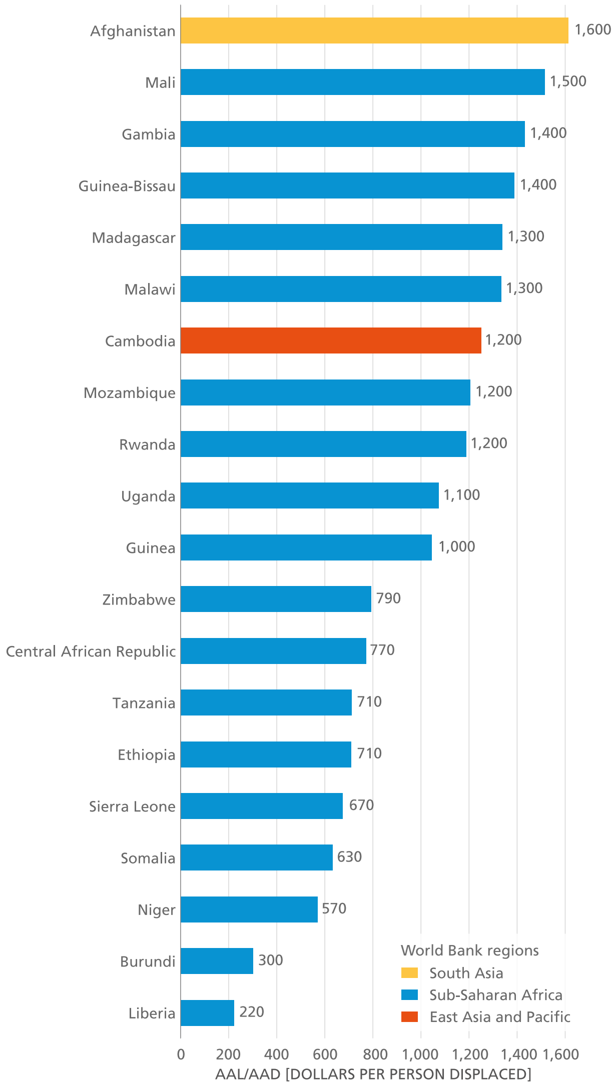
Figure 18: Correlation between relative AAD and relative AAL by UNDP's human development index ranking

Source: IDMC with UNISDR and UNDP data

Figure 19: Countries with the highest average economic loss per person displaced each year by sudden-onset disasters

Source: IDMC and UNISDR

Figure 20: Countries with the lowest average economic loss per person displaced each year by sudden-onset disasters



Source: IDMC and UNISDR

CONCLUSION AND NEXT STEPS

This report details what we have learned from our initial analysis of displacement risk using our probabilistic model. We hope the baseline we have established and our findings prove useful for policy-makers working to implement the Sendai Framework for Action, the UNFCCC's Paris Agreement and the Warsaw International Mechanism and the Agenda for Humanity.

We have revealed a number of important features of displacement risk and discussed some of their implications. Absolute displacement risk mainly correlates with high levels of population exposure to natural hazards. The risk is mainly associated with floods and tropical cyclones that affect highly urbanised countries in the lower-middle and upper-middle income groups.

When relative displacement risk is considered, floods and tropical cyclones remain the principal cause of displacement, but mainly in low and lower-middle income countries. Rather than exposure, socioeconomic vulnerability and institutional lack of coping capacity drive the risk.

We have also produced a first comparative analysis of the economic and human impacts of disasters, showing that comprehensive DRR and coping strategies should also address displacement associated with natural hazards.

That said, a number of questions important to the understanding, reduction and management of displacement risk remain unanswered. We are currently working on the following:

- What is the risk at the subnational level? Are there displacement risk "hotspots"? If so, where are they and what explains the concentration of risk there?
- Is displacement risk increasing or decreasing? What are the main factors behind any trends identified?
- Economic loss risk associated with disasters is disproportionately concentrated in urban areas. Is that true of displacement risk as well?
- What is the relative significance of the different components or drivers of displacement risk? Which sub-components best explain the processes that result in exposure and vulnerability to hazards?
- Do these factors vary when the drivers of extensive and intensive displacement risk are compared?
- What is the displacement risk associated with slow-onset hazards and gradual processes such as drought, desertification and sea-level rise?
- What is the displacement risk caused by conflict, violence and the combination of human and natural hazards?
- What metrics (e.g. displaced person-days) are needed to understand the volume and duration of displacement and measure this risk?
- This report presents a snapshot of displacement risk. How will the impacts of climate change and socioeconomic and demographic trends affect that risk?
- For those responsible for national disaster loss databases, what data should be collected, how often and for how long?

By answering some of these questions we hope to help governments and other stakeholders to better understand risk and "all its dimensions of vulnerability, capacity, exposure of persons and assets, hazard characteristics and the environment".[29] Doing so would allow them to manage risk better, reduce future displacement risk and respond to any displacement that does occur in an efficient and effective way that also helps them to "build back better".[30] This in turn would avoid creating the same risk conditions that caused the displacement in the first place.

NOTES

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GLOBAL DISASTER DISPLACEMENT RISK MODEL: METHODOLOGY

COMPLEMENTING A DETERMINISTIC WITH A PROBABILISTIC APPROACH

As highlighted in UNISDR's GAR, "while historical losses can explain the past, they do not necessarily provide a good guide to the future. Most disasters that could happen have not happened yet".[1]

Deterministic approaches are limited by the fact that they only use empirical data going back 20 to 50 years. Probabilistic models complement this information by reproducing the physics of hazards, replicating the intensity of a large number of theoretical events and using mathematics to simulate future displacement.

Our global disaster displacement risk model combines the analysis of historical data - retrospective risk assessment - with a probabilistic approach - prospective risk assessment - to assess the displacement risk associated with sudden-onset hazards such tropical cyclones - the winds and storm surges they cause - earthquakes, tsunamis and riverine floods.

A sample of a preparedness plan to address both manmade and natural disaster in Ethiopia. © UNICEF/Mersha, 2016

Retrospective risk assessment

The disaggregated information contained in national disaster loss databases does not systematically include the number of people displaced. Such databases do, however, tend to cover the number of houses severely damaged or destroyed and this information can be used as a proxy for displacement.

Using our GIDD to validate the information contained in national disaster loss databases, we found that the best correlation between our displacement figures and DesInventar's information was given by the number of houses destroyed, so we estimated the number of people displaced by multiplying the latter by AHHS. The retrospective risk assessment is based on ground-validated data and as such on direct observation of the impacts of past disasters.

We found the main limitation of this approach to be its spatial and temporal coverage. National disaster loss databases usually only have data going back a few decades. This limits the estimation of risk to frequent and low-impact events for which we have enough data to conduct a probabilistic analysis. Nor is the approach global because it is limited to those countries and regions for which systematic national disaster inventories exist.[5]

Retrospective risk metrics are calculated by a probabilistic analysis of events recorded in national loss databases. The expected displacement for each event is calculated by multiplying the number of houses destroyed by AHHS. The information gleaned is then used to calculate the expected return period and to build the retrospective risk profile of a given country.

Data sources

IDMC's global internal displacement database (GIDD) aims to provide comprehensive information on the phenomenon worldwide. It covers all countries and territories for which we have obtained data, and provides information on internal displacement associated with conflict and generalised violence between 2003 and 2016, and that associated with sudden-onset natural hazards and the disasters they triggered between 2008 and 2016.[2]

DesInventar is a conceptual and methodological tool for the generation of national disaster inventories and the construction of databases on damage, losses and the general effects of disasters. UNISDR is the host and main sponsor of its development and worldwide dissemination.[3]

IDMC's average household size (AHHS) database provides annually updated and standardised data for all of the countries we monitor. Primary sources often report the number of homes rendered uninhabitable or the number of families displaced, which we convert into a figure for the number of IDPs by multiplying the reported numbers by AHHS.[4]

Prospective risk assessment

To overcome these gaps and limitations in the historical data, we also developed a prospective risk assessment methodology in which hazard, exposure and vulnerability are used in a model that estimates a risk profile for each country. The methodology is similar to that used for UNISDR's GAR 2015, but with a specific focus on displacement.[6]

The prospective risk assessment allowed us to estimate the expected impact of disasters over a return period of tens of thousands of years, extending and completing the picture painted by the retrospective analysis. The model also has almost global coverage because it includes all of the countries considered in GAR 2015.

Prospective disaster displacement risk is expressed as a function of hazard, exposure and vulnerability:

Risk = Exposure x Hazard x Vulnerability

The prospective risk profile is calculated using the hazard scenarios provided by our partners as input. These events represent all of the possible disasters that could affect a country over different return periods. For each grid cell in the exposure map, which has a resolution of between 1km x 1km in coastal areas to 5km x 5km inland, the expected impact of a hazard is calculated using vulnerability curves to determine an expected level of damage to homes and other structures based on the hazard's intensity. Whenever the simulated damage to a home is more than 55 per cent, it is considered uninhabitable and the household displaced.

Data Sources

The data sources we used for our prospective risk assessment were the same as those used for GAR 2015.

Hazard: The hazard models for cyclones and earthquakes were developed by the International Centre for Numerical Methods in Engineering (CIMNE) and INGENIAR Ltda with inputs from the Global Earthquake Model (GEM). Those for floods were developed by the International Centre on Environmental Monitoring (CIMA) and UN Environment's global resource information database (UNEP-GRID); and those for tsunamis and volcanoes by Geoscience Australia with the Norwegian Geotechnical Institute (NGI) and the Global Volcano Model Network (GVM) respectively.

Exposure: The global-level exposure model was developed by UNEP-GRID and CIMNE in collaboration with the World Agency for Planetary Monitoring and Earthquake Risk Reduction (WAPMERR), the European Commission's Joint Research Centre (EU-JRC), Kokusai Kogyo and Beijing Normal University.

Vulnerability was modelled by CIMNE with INGENIAR Ltda for Latin America and the Caribbean, and by Geoscience Australia for the Asia-Pacific region. In other regions, the Hazus software developed by the US Federal Emergency Management Agency (FEMA) was used. Agricultural drought risk assessments were undertaken by the Arab Center for the Studies of Arid Zones and Dry Lands (ACSAD) and the Famine Early Warning Systems Network (FEWS NET).

Hybrid risk assessment

When possible we pulled the outputs of our retrospective and prospective analyses together in a hybrid risk assessment. This gives the most thorough representation of disaster displacement risk because it combines direct information on high-frequency and low-impact events from the retrospective analysis and low-frequency catastrophic events from the prospective analysis.

UNDERSTANDING THE KEY DISPLACEMENT RISK METRICS AND CONCEPTS

Displacement risk

The displacement that is likely to occur in a society or a community over a specific time period, determined probabilistically as a function of hazard, exposure, vulnerability and capacity.

Return period

The return period is the expected average time between two events of a given intensity, calculated over long periods. It is usually expressed as one in X years, but the concept is often misunderstood. If an event has a one in 50-year return period, it does not mean that it will occur every 50 years, but that it will occur *on average* every 50 years if a large time span is considered.

Return periods can be thought of in a different manner, as the likelihood of a hazard occurring during a specific time period. This is called *displacement exceedance probability* and is calculated based on the Poisson probability distribution. For a one in 50-year event, there is two per cent probability of it occurring in any given year, and 33 per cent probability of it occurring in a 20-year timeframe (see table 1 below). The *displacement exceedance rate* is usually defined as the reciprocal of the return period.

Displacement exceedance curve (DEC)

DECs provide the most comprehensive information about displacement risk. They represent the correlation between displacement, the displacement exceedance rate and return period, and they can be plotted using retrospective, prospective or hybrid assessments.

Probable maximum displacement (PMD)

PMD is the maximum displacement expected within a given time period. It is the inverse representation of the DEC, as the period is the reciprocal of the frequency. It answers the question: what is the maximum expected displacement within a time range of X years?

Extensive displacement risk

Displacement risk calculated from low-impact, high-frequency events is usually referred to as extensive displacement risk. The term "extensive" refers to the widespread risk associated with persistent hazard conditions of low or moderate intensity. Such hazards are mainly but not exclusively highly localised, but their cumulative impact can account for a significant proportion of the total displacement in a country. Extensive risk is shown on our DEC curves in the upper-left corner of our graphs.

Table 1: Probabilities for different return periods

Return period (years)	Probability of displacement exceedance per year	Probability of displacement exceedance in 20-year timeframe	Probability of displacement exceedance in 50-year timeframe
25	4.0%	56%	87%
50	2.0%	33%	64%
100	1.0%	18%	39%
250	0.4%	8%	18%
500	0.2%	4%	10%
1,000	0.1%	2%	5%

Intensive displacement risk

Intensive displacement risk is that associated with high-impact, mid to low-frequency events. Many such events are major hazards, globally or regionally significant events such as earthquakes, tsunamis, large volcanic eruptions, flooding in large river basins and tropical cyclones.[7]

Understanding the curve shapes of the different hazard types

DECs are plotted separately for each hazard type or category, as shown in figure 21. Their shape depends on the type of event considered. The curves for weather-related hazards, such as floods, storm surges and winds associated with tropical cyclones, tend to be relatively flat in the extensive risk area. This is mainly because their return period increases proportionally with their intensity.

Once a given intensity is reached - the return period depends on the hazard type – the curve drops, meaning that the event's impact increases at a much lower rate than its return period. This corresponds to extremely rare and very high-impact events that displace a significant proportion of the exposed population.

In other words, above a given displacement risk almost all of the exposed population is vulnerable to the hazard. Any further increase in intensity and return period beyond that point will not lead to significantly more displacement. This is the case for flooding in large river basins and severe tropical cyclones. The value at which the drop occurs depends on the proportion of the population exposed to a particular hazard.

Geophysical events tend to have flatter DECs than weather-related hazards. This is mainly because, unlike most weather-related hazards, earthquakes are not limited to coastal areas or river basins areas. As such, the size of the exposed population keeps increasing with an earthquake's intensity. For an earthquake of sufficient magnitude, the entire population of a country could potentially be exposed to the same hazard.

How to read DECs

DECs can be used to calculate displacement risk over different time scales, as shown in figure 21. When a disaster happens, its DEC can be used to extrapolate the expected return period for this type of event. It can also be used to calculate PMD - the maximum displacement that might be expected within a given time period – over different return periods.

Figure 21: Schematic representation of DEC

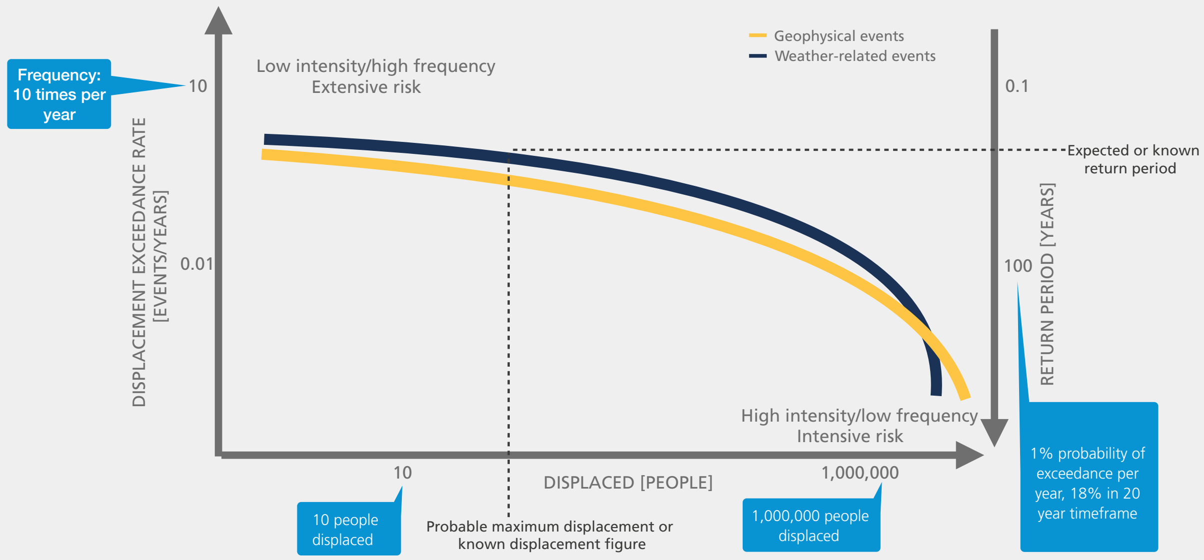
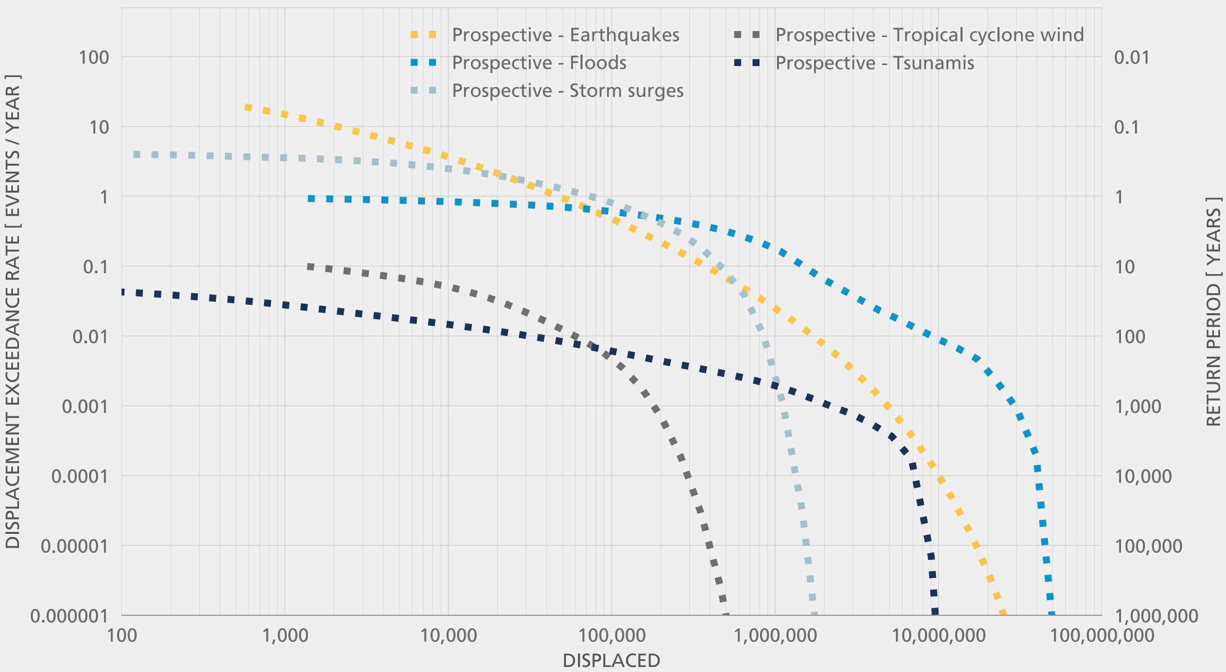


Figure 22: DECs for major hazards in China.



Source: IDMC

Examples

With an AAD of more than 1.3 million people, China is second only to India in terms of absolute prospective displacement risk. Figure 22 shows the country's prospective DECs for different hazards. Extensive displacement risk, shown in the upper-left area of the graph, is mainly driven by storm surges and small-scale earthquakes. Small-scale tsunamis, floods and high winds play a less significant role.

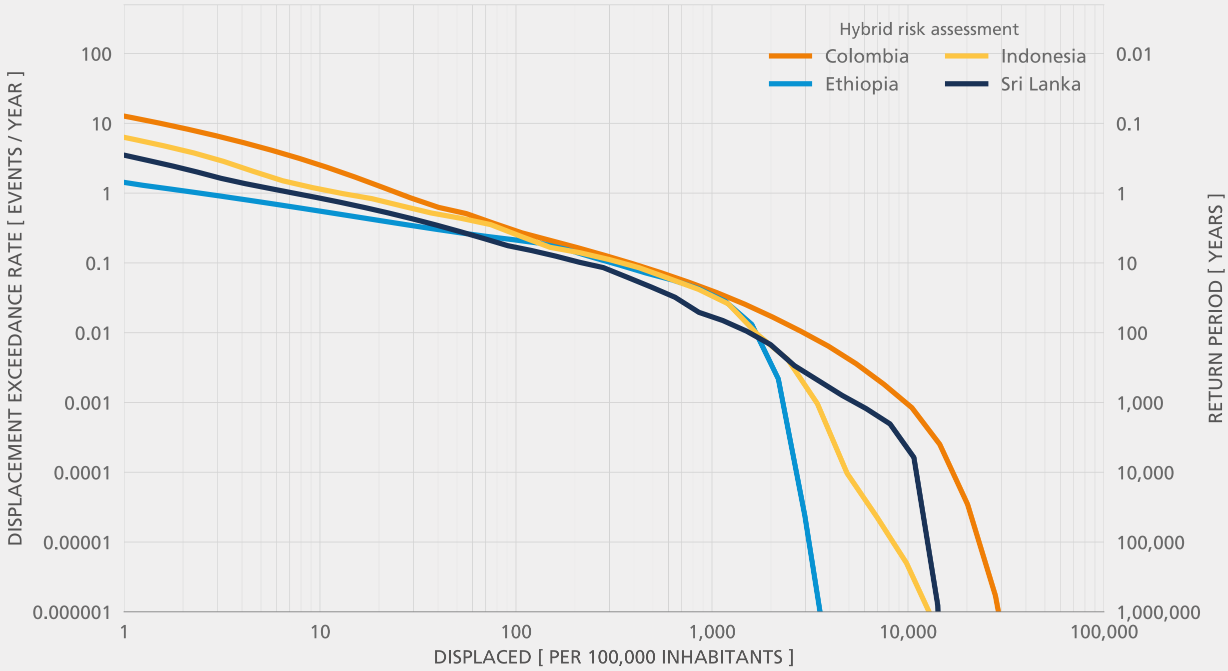
Floods are the main trigger for major displacement events. The first episode of Yangtze river flooding in 2016 displaced almost two million people. The drop in the DECs for high winds and storm surges happens before that for earthquakes and floods because less of the population is exposed to such events. A larger proportion of the population is exposed and vulnerable to large-scale earthquakes and floods, as indicated by the shape of the DEC curves for these hazards in the lower-right area of the graph.

Figure 23 shows the hybrid DECs for Colombia, Ethiopia, Indonesia and Sri Lanka. Because the size of their populations differs significantly, we divided their displacement risk by their 2016 population figures to produce relative DECs.

Colombia has the highest relative displacement risk, both extensive and intensive, mainly driven by floods and earthquakes respectively. In Ethiopia, as in many other African countries, floods are the main trigger of both small and large-scale displacements associated with sudden-onset disasters. The relative DECs for Sri Lanka and Indonesia show similar behaviour, particular in terms of extensive risk.

The impact of drought and other slow-onset hazards on food and livelihood security are not systematically recorded and modelled. Relative displacement risk would certainly increase, particularly for countries in the Horn of Africa, if these hazards were included in global and sub-regional data.

Figure 23: Multi-hazard DECs relative to population size.



Source: IDMC with UN Population Division data

WE HAVE CREATED AN INTERACTIVE PLATFORM TO VISUALISE AND EXPLORE THE RESULTS GENERATED BY OUR GLOBAL DISPLACEMENT RISK MODEL. YOU CAN PLAY WITH THE DATA AT http://www.internal-displacement.org/database/global-displacement-risk-model.

REALITY CHECK: HOW DOES OUR RISK MODEL COMPARE WITH THE DATA WE REPORT?

Historical data on past displacement associated with disasters helps to calibrate and check the robustness of our displacement risk model. This section compares the historical data we have collected with our modelled figures for different hazard categories.

Figure 24 compares the retrospective AAD based on our database figures for 2008 to 2016 with the prospective AAD estimated by our model, broken down by hazard category. The prospective AAD of almost 14 million is significantly lower than the retrospective figure of about 25 million. The difference arises because the risk model only uses data on housing destruction as a proxy indicator of displacement, while our historical data also includes the number of people evacuated. Future evacuations are difficult to assess from a probabilistic point of view.

The modelled figure could be reduced dramatically if investments in disaster resilience are made. If, for example, land use and urban planning regulations were to prohibit human settlements in areas prone to flooding, the risk of floods would be greatly diminished, as would the risk of housing damage that triggers displacement. This reinforces the argument for prospective thinking when it comes to development interventions.

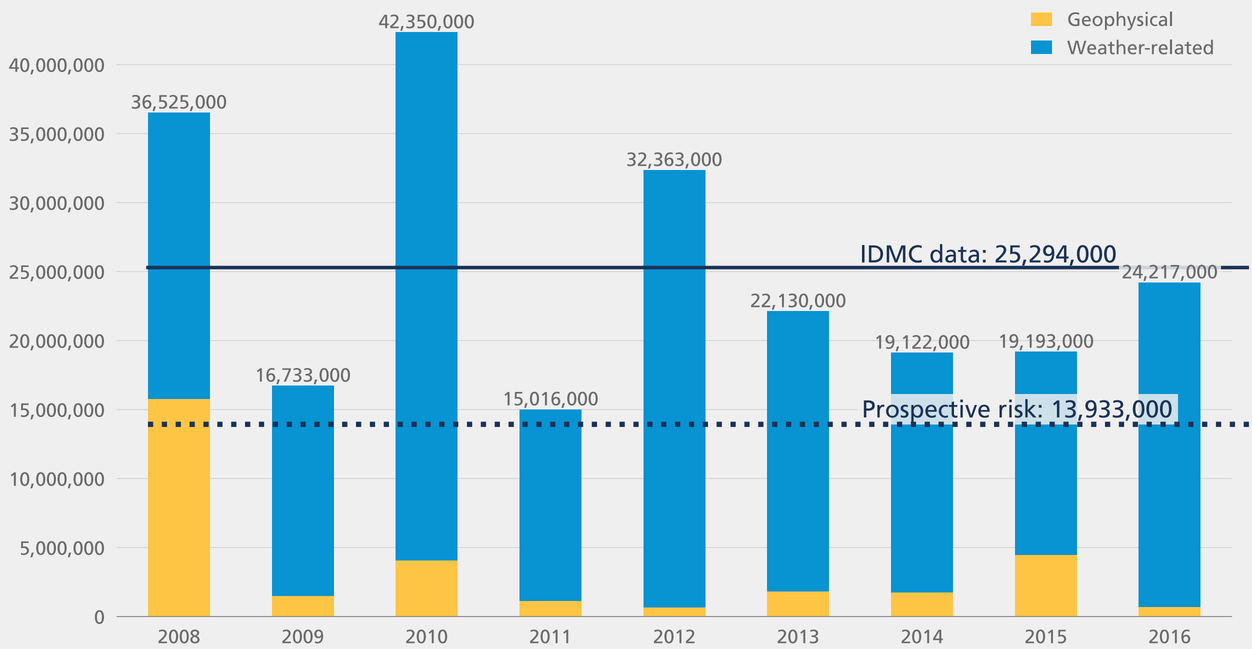
Geophysical events

When we consider disasters triggered by geophysical events, principally earthquakes, the difference between the retrospective AAD of about 3.5 million and prospective AAD of about two million appears much smaller but is actually similar in relative terms to that mentioned above (see figure 25).

Given, however, that unlike many weather-related events earthquakes do not allow for pre-emptive evacuations, there must be a different explanation for the discrepancy. One is that during the period covered by our historical data, an extremely devastating earthquake displaced 15 million people in China's Sichuan province during the period covered by our historical data.

This kind of event has a significantly higher return period than the eight years covered by our dataset, meaning that the inclusion of the 2008 Sichuan earthquake in our calculation of retrospective AAD significantly distorted the figure. This bias is not present in the prospective AAD figure, because the model calculates it over a much extended timeframe.

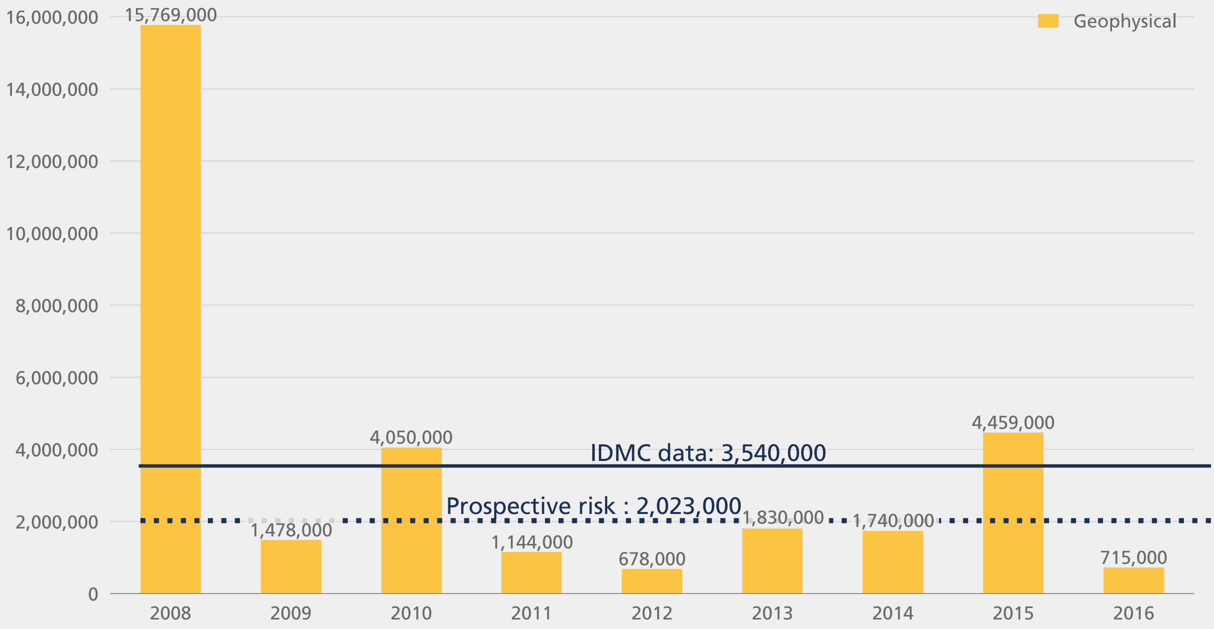
Figure 24: Retrospective AAD by hazard category compared with model results



Source: IDMC

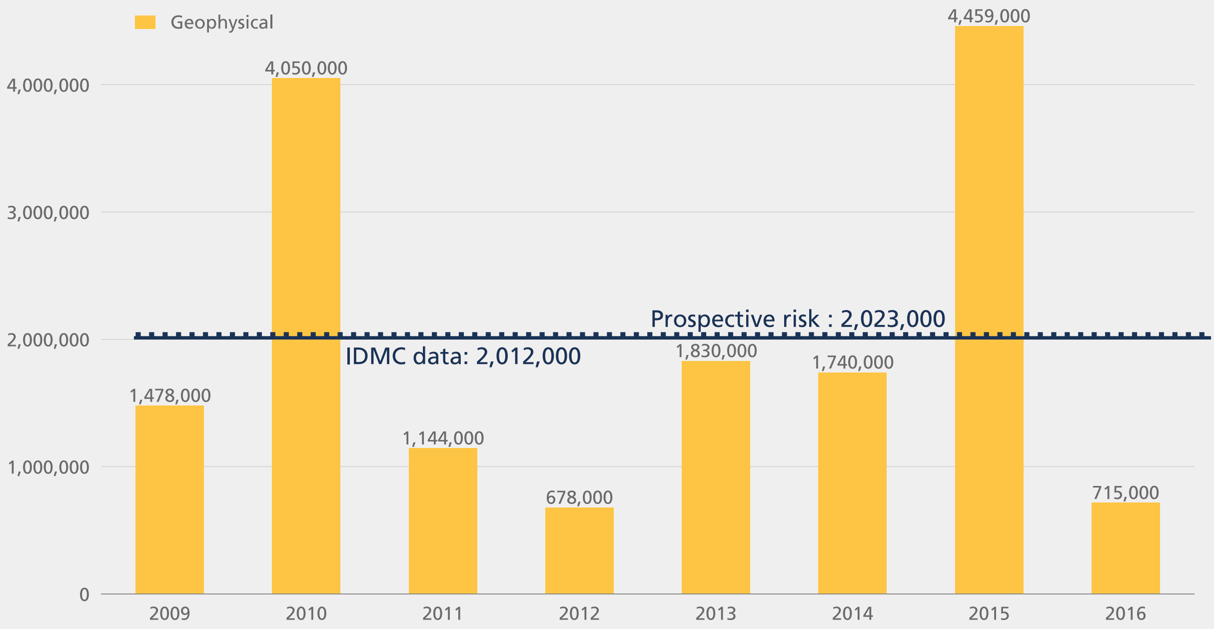
The above explanation is borne out if we remove our database figures for 2008 - and with it the Sichuan earthquake - from our calculation of retrospective AAD. As shown in figure 26, the difference between the retrospective and prospective figures is dramatically reduced. The close agreement between the data and the model represents a good validation of the model's results.

Figure 25: Retrospective AAD for geophysical events compared with model results



Source: IDMC

Figure 26: Retrospective AAD for geophysical events between 2009 and 2016 compared with model results



Source: IDMC

Weather-related events

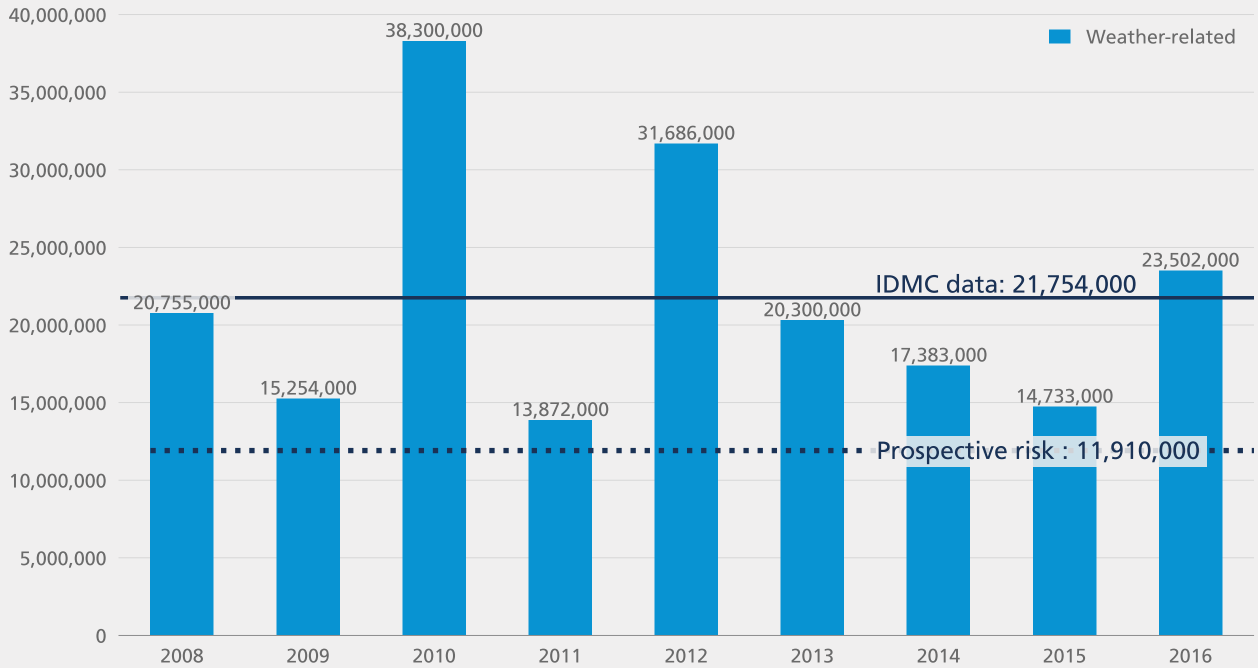
Forecasting tools and new technologies mean that many weather-related hazards can be predicted, but tracking and modelling the displacement associated with them is still a complex task. This is because of a number of factors, including pre-emptive and emergency evacuations undertaken as part of local authorities' early warning and disaster management measures, and the voluntary and temporary displacement of individuals and families based on their own perceptions of risk.

This complexity is clearly reflected in figure 27. When compared with the figures for geophysical disasters, the discrepancy between retrospective and prospective displacement risk for weather-related hazards is much greater. Once outliers such as the Sichuan earthquake were removed from our calculations for geophysical hazards, the figures confirmed the accuracy of the model. The figure of almost 22 million derived from our dataset for weather-related hazards, however, is very significantly higher than the modelled figure of almost 12 million.

As eluded to above, the discrepancy comes about because our historical estimates are calculated using two main proxy indicators - destroyed, collapsed and uninhabitable housing, and evacuations both before and during disasters. Housing damage and destruction can be modelled prospectively, but the number of evacuees cannot because early warning systems and evacuation procedures vary significantly from country to country. As such, the prospective AAD of almost 12 million should be interpreted as very conservative.

The following case studies highlight the fact that while housing provides some insight into displacement risk it does not always reflect actual displacement, which tends to be much greater than modelled, particularly for events that involve large evacuations. They also emphasise the fact displacement associated with housing destruction tends to last longer than that undertaken as pre-emptive or early action, because people left homeless are unable to return quickly once a hazard has passed.

Figure 27: Retrospective AAD for geophysical events compared with model results



Source: IDMC

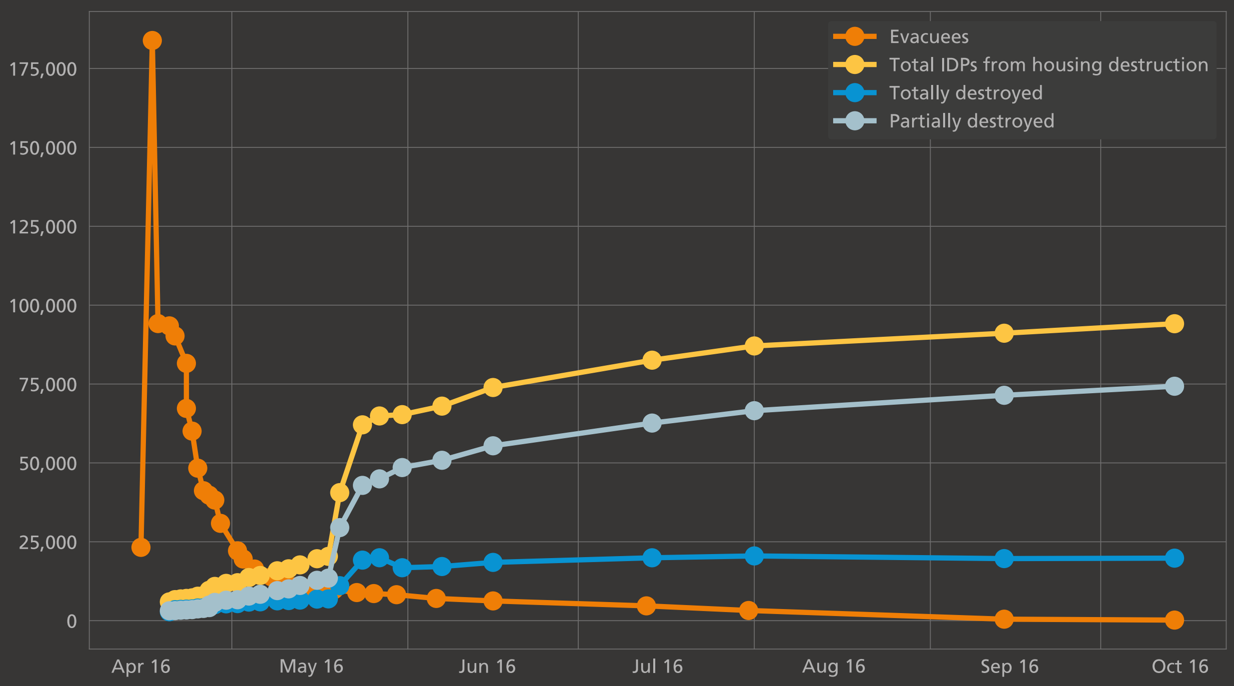
KUMAMOTO EARTHQUAKE JAPAN, 2016

Several earthquakes, including one of magnitude 7.0, struck Japan's southern prefecture of Kumamoto in April 2016. The country's cabinet office tracked both the number of people who sheltered in evacuation centres and the number of homes destroyed.[8] More than 180,000 people were evacuated during the first days of the disaster, and as of October 2016 more than 8,000 homes had been recorded as completely destroyed and 30,000 as partially destroyed.

If destroyed housing is used as a proxy, based on an AHHS for Japan of 2.4, the displacement risk for an event of this type and magnitude works out at around 19,800 people. If partially destroyed housing is used, the figure rises to 94,000, but this is still significantly fewer than the true number of people displaced and registered at an evacuation shelter.

The number of evacuees in shelters decreased significantly in the first weeks after the earthquakes, but the number of houses damaged or destroyed rose around a month after the disaster struck, presumably once circumstances allowed for reasonably thorough assessment. A year later, almost 11,000 people were still living in temporary accommodation, and another 31,000 in commercial apartments and other housing rented by municipalities and offered free to those displaced by quakes on a temporary basis.[9] The duration of displacement and the challenges inherent in tracking long-term displacement and IDPs' progress toward durable solutions add to the complexity of assessing displacement risk.

Figure 28: Comparison of different methodologies to estimate the number of people displaced by the 2016 Kumamoto earthquake

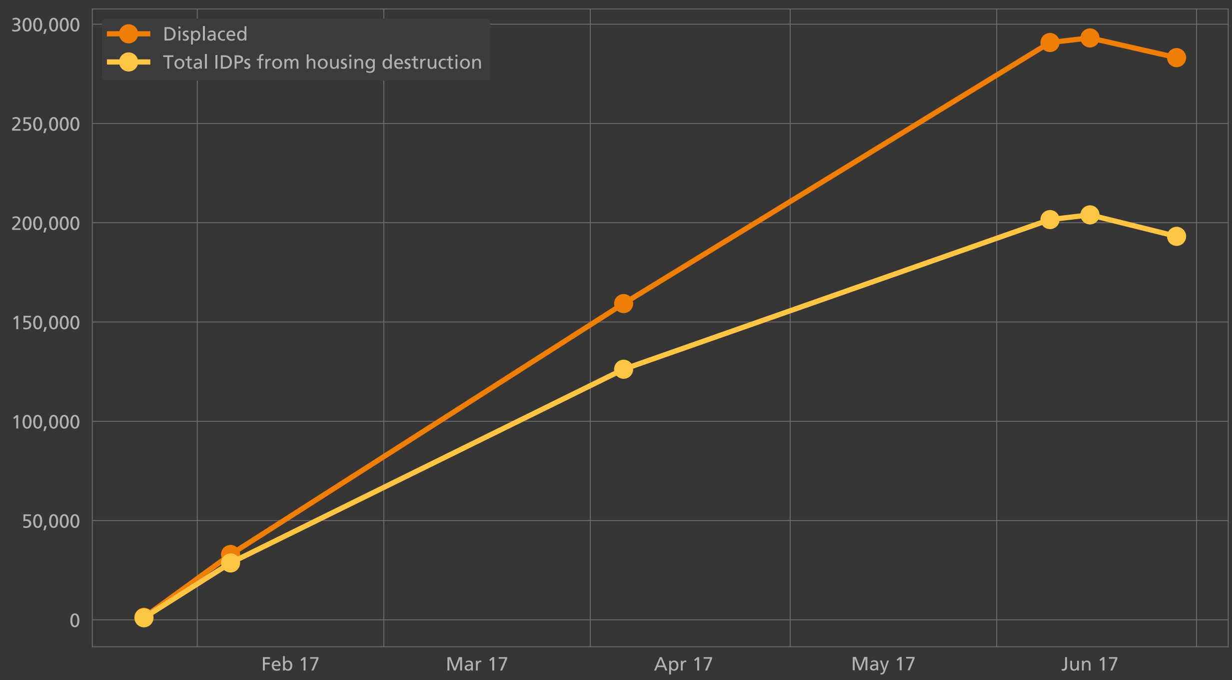


Source: Cabinet Office Japan, Disaster Management

PERU RAINY SEASON, 2017

The case of Peru's 2017 rainy season adds to the evidence that while using housing as a proxy can provide some insight into displacement risk, it tends to underestimate actual displacement. More than 290,000 people were displaced between January and June, and more than 58,000 houses were classified as destroyed or uninhabitable.[10] The trend between actual and modelled displacement broadly correlates, but the figures increasingly diverge with time.

Figure 29: Comparison of different methodologies to estimate the number of people displaced during the 2017 rainy season in Peru



Source: Instituto Nacional de Defensa Civil

The Internal Displacement Monitoring Centre (IDMC) is the leading source of information and analysis on internal displacement worldwide. Since 1998, our role has been recognised and endorsed by United Nations General Assembly resolutions. IDMC is part of the Norwegian Refugee Council (NRC), an independent, non-governmental humanitarian organisation.

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