A methodology to estimate the average annual cost of internal displacement

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- Between 2008 and 2028, over 32M internal displacements triggered by disasters have been registered by IDMC
- Over 29M have been triggered either by floods or storms
- For internal displacement risk to be managed, it first needs to be measured and a prospective approach is needed
- We propose a methodology to estimate, in a prospective manner, the average annual cost of internal displacement with a scalable and peril-agnostic approach
- Two main components: a) estimation of average annual IDPs, and b) estimation of the average annual displacement duration

Previous studies

 IDMC first developed a global internal displacement risk model considering multiple hazards



- Those results provide an estimate of the average annual number of IDPs per hazard, but it is only a part of the picture
- For historical events in Mexico and the Caribbean (EQ and TC), the estimates of the internal displacement costs have been made



Available (and missing) data

- IDMC first developed a global internal displacement risk model, considering multiple hazards and over 200 countries
- Those results provide an estimate of the average annual number of IDPs per hazard, but it is only a part of the picture
- Historical data on IDPs were systematically recorded since 2008. However, human mobility patterns and the duration of the displacement are rarely captured in the databases
- IDMC has carried out extensive research to estimate the average annual cost of attending an IDP. For disaster-triggered events, that value has been set in \$290
- Ongoing research to establish relationships between physical damage levels and recovery/reconstruction times

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Assumptions and limitations:

- Only sudden-onset events are to be modelled
- All displacements are assumed to be internal
- IDPs will all return home once the recovery/reconstruction activities are finished
- The model cannot describe where IDPs will go to
- Evacuation measures are not included (of relevance for some hazards, such as TC)
- Protracted displacement (i.e., 5+ years) is not accounted for



Step 1: estimate the average annual IDPs (by hazard)

- Risk as a function of hazard (synthetic catalog of events), exposure (for residential buildings and population), and physical vulnerability (relationship between the hazard intensity measures and the expected losses)
- The methodology allows for a probabilistic representation of all components, analogous to what is used in the catastrophe risk modelling field
- For each event, the expected damage level and IDP are calculated.
- The average annual values are the sum of the product of these expected values times the occurrence frequency of each simulated event



Proposed methodology

Step 2: estimate the average displacement duration, using the damages on the residential buildings as a proxy









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Step 3: multiply the average annual IDPs by the annual cost.

Additional remarks:

- The proposed methodology is fully scalable and peril-agnostic
- Average Annual Displacements are a quantity that can be arithmetically added, facilitating the comparison and integration of the results into a MH context
- The effects of CC can be included in the analysis (e.g., baseline vs. future scenario comparisons) through simulations or counterfactual analyses



Application for TC Idai (2019)

- Massive damage to housing and infrastructure as well as 478,000 IDPs (IDMC)
- Modelled flood depths by PIK



Mester et al. (under rev.)



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Application for TC Idai (2019)

- Physical damage estimates for different building typologies
- Weighted average displacement duration based on the characteristics of the buildings
- The coastal global exposure database (UNDRR) and its attributes, with a 1x1km resolution level, were used for this case-study



Turne	Chara	Deceyary time (yrs)	
Туре	Snare	Recovery time (yrs)	
1 story	40%	2	
2 stories	45%	0.33	
3-4 stories	10%	2	
5+ stories	5%	2	



- For TC Idai, the internal displacement cost, with an average 1.9yr duration, was established in \$265M
- These values are to be added to those related to direct losses and emergency costs
- Estimates for future climate scenarios were carried out for year 2050

Year 2050						
SSP	IDPs lower estimate	IDPs high estimate	Displacement cost lower estimate (USD M)	Displacement cost high estimate (USD M)		
1	478,000	489,950	\$ 265	\$ 271		
5	478,000	573,600	\$ 265	\$ 318		

Possible uses of the method and results

- Quantify the different facets of internal displacement risk and enhance its prospective management, reducing its burden on individuals and communities
- Prepare for disaster-triggered internal displacement (i.e., prevent future displacement)
- Respond to disaster-triggered internal displacment, in combination with forecast-based initiatives (i.e. support life-saving activities, including evacuations)

