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Enhancing Sustainable Disaster Management Solutions on Displacement in Southeast Asia Using Data-Driven Approaches

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Abstract

Countries across Southeast Asia rank as some of the most hazard-prone in the Asia-Pacific region and globally, as many are located along the Pacific Ring of Fire and the region's typhoon belt, exposing its inhabitants to a wide variety of hazards. While there have been many attempts to better prepare through disaster forecasting, predicting the size, location, timing, and impact of hazards with precision has been challenging.

Better preparation toward mitigating the impacts of disasters should not only rely on forecasts. Another way for disaster risk and humanitarian communities to make informed decisions is by using historical data to derive trends and patterns of displacement. We consider four different case studies in Southeast Asia where disaggregated data, both temporally and spatially, can reveal patterns in displacement that can then inform policymakers on certain operational aspects of disaster preparedness — primarily how to mobilise and allocate resources adequately to populations displaced in shelters.

The four case studies illustrate the benefits of data informing important aspects of resource mobilisation during periodic hazards, such as floods and storms. Additionally, they identify key reflections that policymakers need to consider when planning for the next round of similar disasters. There is a need to invest in a better understanding of all aspects of vulnerability to gauge how best to prepare for the worst disasters. This will ensure that disaster management solutions for displacement are based on evidence and sustainable.

Keywords: Displacement, disaster preparedness, seasonality

1. Introduction

Countries across Southeast Asia rank as some of the most hazard-prone in the Asia-Pacific region and globally, as many of them are located along the Pacific Ring of Fire and the region's typhoon belt. A major part of the population in the region lives in riverine plains, deltas, and coastal plains. Hence, the most populous areas are subjected to periodic and extensive hazards, such as floods, tsunamis, and cyclones. Moreover, the unique geographic and climatic conditions make this region one of the world's most vulnerable to disasters caused by sudden-onset hazards, as well as the slow-onset impacts of climate change (United Nations International Strategy for Disaster Reduction [UNISDR] & World Bank, 2010). Almost every year, the powerful typhoons that cause flooding and landslides batter the region. In addition, the region faces risks from earthquakes, volcanic eruptions, tsunamis, and forest fires that threaten life and property, and from drought that leaves serious lingering effects (UNISDR & World Bank, 2010).

Southeast Asia is home to most of the world's population, many of whom live in areas prone to a wide range of hazards, increasing the risk and scale of displacement due to disasters in this region (IDMC & Norwegian Refugee Council [NRC], 2022). Almost 31% of the total disaster displacement recorded in the Asia-Pacific region between 2010 and 2021 has been reported in Southeast Asia (IDMC & Asian Development Bank [ADB], 2022). Of the countries in the region, the Philippines is the most affected by displacements and most at risk of extreme weather events in the Asia-Pacific region and globally (IDMC, 2023b).

Much work has been done to improve the forecasting of disasters by increasing precision and shortening lead times. For instance, sub-seasonal-to-seasonal climate predictions (S2S) done by Rahmat et al. (2020) explore the potential to predict disasters at lead times of one to three weeks before disasters strike. Despite the variety of models available to improve the predictability of disasters, their impact on people remains challenging to predict. The impact forecasting model by CLIMADA provided an estimate of the risk of displacement in Fiji by incoming Tropical Cyclone Yasa in 2020. CLIMADA estimated that between 3,000 and 400,000 people were at risk of being displaced by Yasa (Kam & Ponserre, 2022). The actual displacement recorded was about 23,000 ("Global Internal Displacement Database," n.d.). This illustrates the difficulties of predicting the impacts of disasters on displacement with precision.

While predicting displacement with exact precision is challenging, better data can enable us to be better informed and act before disasters strike, rather than invest primarily in the humanitarian response post-disaster. A way to make informed decisions to mitigate the

impacts of hazards on people is to use historical data to derive trends and patterns of internal displacement.

We considered four different case studies in Southeast Asia where disaggregated data both temporally and spatially revealed patterns in displacement that could inform policymakers on how to mobilise and allocate resources adequately to shelter displaced populations. However, the accuracy of the analysis is reliant on the accuracy and consistency of the data reported. In cases where there is a lack of consistency in the data collection, this can yield incomplete and sometimes erroneous analysis. Insufficient details in the data (such as disaggregation of displaced populations) can also limit the comprehensiveness of responses provided. To be better prepared and informed on anticipatory action, data-driven approaches need to be complemented with sound analysis and consistent and detailed reporting.

2. Data and Methodology

Producing accurate estimates of the scope, scale, and impacts of disaster displacement and predicting future movements are challenging in many countries, given a lack of adequate reporting, differing concepts and metrics, and insufficient geographical and demographic coverage (Housset, 2022). However, many countries in Southeast Asia are exceptions to this, where data on most impacts of disasters, especially displacement, is consistently reported.

For the purposes of this article, we will be using the following terminologies:

1. “Internal displacements” correspond to the estimated number of forced movements of people within their country's borders. In this article, we only consider internal displacements resulting from disasters (also called disaster displacements). These movements could include individuals who have been displaced more than once.
2. “Internally displaced persons (IDPs)” correspond to the total number of people, at a specific point in time, who have been forced to leave their homes due to disasters and have not crossed an internationally recognised border.
3. “Destroyed housing (DH)” corresponds to the number of homes destroyed as a result of disasters and is used as a proxy for displacement if no internal displacement data is available. The number of destroyed houses is typically multiplied by an average household size (AHHS) specific to each country to estimate internal displacements.

Our four case studies look at displacements in Indonesia, Malaysia, the Philippines, and Viet Nam. We use a mix of internal displacements, IDPs, and DH to assess the impact on internal displacements. Data on internal displacements in Indonesia is provided by the country’s National Disaster Management Agency (BNPB), which maintains a publicly available

database on losses and damages (DIBI) that includes information dating back to 1990 on the number of evacuations, affected people, and DH in specific locations.

The National Disaster Management Agency of Malaysia (NADMA) collects daily reports on people seeking shelter in government-owned evacuation centres due to disasters, predominantly floods, which allows for the tracking of the number of IDPs seeking shelters over time. Due to the nature of daily (more precisely, four-hourly) reporting, this allows for a better understanding of when IDPs seek out shelters and for how long they require shelters to be open following a disaster.

In the Philippines, internal displacement data is compiled by the Disaster Response Operations Monitoring and Information Center (DROMIC), which provides information on internal displacements and IDP stocks — both disaggregated by evacuation centres and outside. Data is provided for specific disasters, and the coverage and extent of reporting is long term (even up to one year) for large-scale disasters. For the purposes of this article, we study the displacement impacts following Super Typhoon Rai (locally known as Odette in the Philippines). This super typhoon was the largest disaster to affect the Philippines after Super Typhoon Haiyan (locally known as Yolanda) in 2013. Super Typhoon Rai started on 11 December 2021 and exited the Philippine area of responsibility (PAR) on 21 December 2021. DROMIC began its reporting at the start of the disaster and continued to report on internal displacements consistently until 2023. The most recent report was published on 25 May 2023. All data on IDPs were used to estimate the pace of returns following Rai.

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3. Case Study Two: Assessing Length of Displacement During Seasonal Floods in Malaysia

In this case study on Malaysia, we were interested in looking at how long IDPs tended to stay in government-owned evacuation centres (ECs), particularly during the periods of intensified flooding that typically happen during the rainy season. Like most Southeast Asian countries, Malaysia is affected by two distinct monsoon seasons: the southwest (SW) monsoon, spanning from May to September, and the northeast (NE) monsoon, which lasts from November to March ("Weather Phenomena," n.d.). Amongst these, the NE monsoon emerges as the monsoon period with the greatest intensity in terms of internal displacement, as shown by the displacement data compiled by IDMC between 2016 and 2023 ("Global Internal Displacement Database," n.d.). Through the analysis of three different displacement measures, we tried to determine whether it is possible to isolate certain trends that could influence the development of government policies for sustainable resilience.

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A thorough study of the available data reveals December as one of the months most affected by flood displacements during the NE monsoon in Malaysia. The total number of internal displacements during December from 2019 to 2022 regularly surpassed 10,000 per year, culminating in a notable peak of almost 106,000 in December 2022. January also displayed substantial flood displacements of over 10,000 people in 2017, 2018, 2021 and 2023, while November showed noteworthy displacements. This indicates that the initial months of the NE monsoon are consistently the most affected by flood displacements. However, this conclusion must be approached with a caveat due to the inherent variability of monsoon intensity across different years, as exemplified by the extraordinary peak of nearly 95,000 flood displacements recorded in March 2023.

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It is during this initial week that the authorities must be prepared to concentrate their efforts, taking into consideration the fact that certain regions must potentially be able to accommodate several tens of thousands of people in their infrastructures, as was the case in March 2023 with more than 40,000 IDPs seeking shelters due to floods in Batu Pahat, Johor ("Country Profile: Malaysia," 2022). To effectively prepare for large-scale flood displacements akin to those experienced in Batu Pahat, governments must anticipate and address a multitude of challenges, from ensuring that there are enough emergency shelters available to accommodate the displaced population to organising emergency logistics. An example of the logistics that need to be considered is the organising of transportation to safely move people from affected areas to emergency shelters, especially considering the potential for disrupted transportation routes. Such analysis can, thus, have real operational benefits that could not have been realised without having the right information in place. Further disaggregation of this data, such as in the demography of IDPs, can further assist in preparing targeted responses. Identifying potential language barriers in specific localities and in the share of vulnerable populations, such as the elderly, children, pregnant women and people with disabilities, can be useful in mitigating the adverse effects of being displaced amongst these populations. This could further facilitate a smooth and swift return of IDPs back to their homes.

4. Case Study Three: Assessing Rate of Returns in Different Types of Shelters in the Philippines

While disasters tend to be common and frequent in the Philippines, their scale tends to vary quite considerably. Extreme storm situations have affected the country quite often, and with each experience, the country has learnt to strengthen its early warning action and system.

The recurrence of storms and other weather-related hazards has prompted the Philippine authorities to strengthen their monitoring systems to produce more actionable data that has been used to inform policy and operations for disaster risk reduction and durable solutions to internal displacement.

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Super Typhoon Rai killed 405 people, caused 3.9 million displacements in the Philippines, destroyed around 435,000 homes, and partially damaged around 1.6 million across the archipelago (National Disaster Risk Reduction and Management Council [NDRRMC], 2022). Its effects were comparable to Yolanda, which was known as one of the deadliest storms in the Philippines on record. It killed at least 6,300 people in that country alone, displaced close to four million people, destroyed 551,000 houses, and partially damaged 589,000 homes (NDRRMC, 2013).

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Super Typhoon Rai displaced 3.9 million people across 10 regions in the Philippines with the highest displacements reported in Western Visayas, Central Visayas, and Caraga. Slightly over 50% of the displaced sought shelter in ECs, while the other half were sheltered with family and/or friends (Figure 5.8). This implies that people have an equal preference to stay either in ECs or non-ECs after a large-scale disaster like Super Typhoon Rai.

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In general, the pace of returns in ECs was lower than that of non-ECs (Figure 5.9). We define *t* as the day of the first IDP stock reported in ECs and non-ECs. We then plotted the days the IDP stock decreased since *t*. Based on IDMC's estimates, the first reports of displacements occurred between one and five days, while the peak IDP in ECs (the busiest day in ECs) was recorded on day 10 (i.e., 10 days after Rai entered the PAR). It took almost a month for at least 80% of those displaced in ECs to leave these shelters — the pace being the fastest in Western Visayas, which was the most affected region. On the other hand, it took between one to 14 days for people to move to non-ECs, and people generally stayed for a shorter period of time: almost 80% of these people moved out within a week. It may be that these people shifted from non-camps to ECs as their homes were being rebuilt, though there was no information on where people went upon departure from these locations.

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