

Disaster displacement

Papua New Guinea country briefing



Acknowledgements

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Cover photo: *Displaced family in Papua New Guinea. This young woman and her one-year-old son stand in front of the makeshift shelter they have been living in since an earthquake destroyed their home in February 2018. IDMC recorded nearly 60,000 displacements linked with earthquakes in the country during 2010–2021. (Photo by © UNICEF/ UN0186480/ Nybo)*

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Women in Fisheries Project helps women working in subsistence fishing by providing them loans, training, mentoring, and access to markets to help them develop sustainable, formal businesses. The project is part of the Pacific Private Sector Development Initiative. © Asian Development Bank

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*Children look through the window of their home
in Kimbe, West New Britain, Papua New Guinea.
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Displacement figures at a glance

In 2021:

7,500

New displacements – 2021

17,000

IDPs as of 31 December 2021

In the past decade (2010-2021):

203,000

New displacements – 2010-2021

47

Disaster events reported

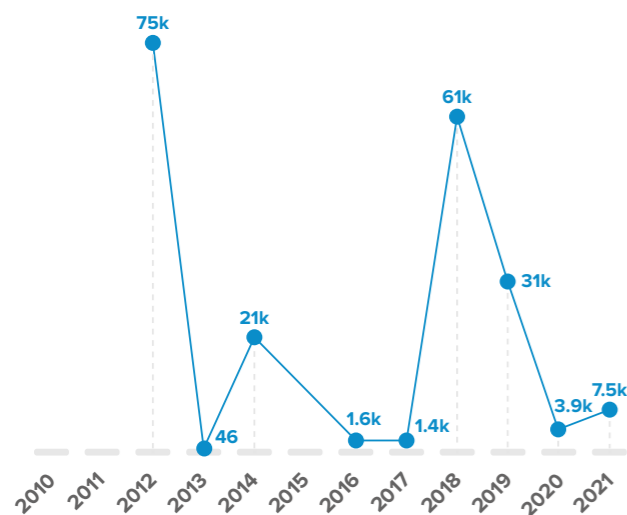


Figure 1: Number of New Displacements Linked with Disasters, Per Year (2010–2021)

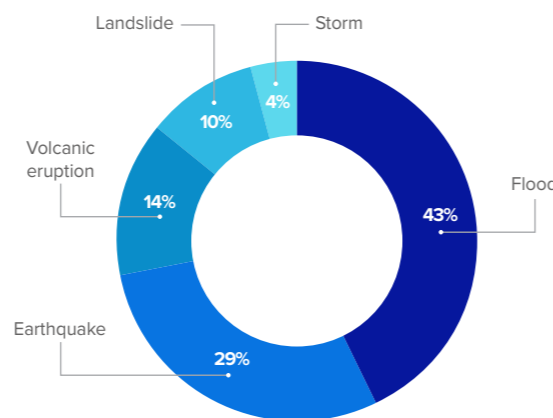


Figure 2: New Disaster Displacements by Hazard Type (2011–2021)



In any given year in the future
31,000 people

on average could be displaced by storm surges, riverine floods, earthquakes, cyclonic winds and tsunamis.

Figure 3: Average Expected Number of Displacements in Any Given Year for Sudden-onset Hazards

Disaster displacement in Papua New Guinea

Drivers of internal displacement

Papua New Guinea (PNG) is one of the most at-risk countries in the world for natural hazards. Weather-related and geophysical events—including floods, storms, landslides, earthquakes, and volcanic eruptions—cause thousands of displacements each year. Most of the displacement goes unreported.¹

Floods have been the main driver of disaster displacement in PNG as the country is regularly affected by heavy rainfall, particularly in the Highlands.² The country faces coastal, river, and surface (flash) flooding. At least 22,000 people are affected by riverine flooding, and another 8,000 people by coastal flooding each year.³

The country is also highly vulnerable to the impacts of climate change, including increasing temperatures, acidification, salinization, and sea level rise.⁴ PNG is more vulnerable to sea level rise than the global average, and coastal erosion has already caused internal displacement.⁵ The country's Carteret Islands were among the first documented cases worldwide of displacement caused by the phenomenon. Tens of thousands of the PNG inhabitants could face permanent inundation by 2070 to 2100.⁶

As a result of climate change and population growth in areas at risk of natural hazards, disaster displacement is expected to increase in the coming years. Recurring disasters, low levels of socioeconomic development, and violence in parts of the country make internally displaced people (IDPs) more vulnerable to repeated displacement.

PNG also has a long history of intercommunal violence fueled by issues ranging from customary land ownership to ethnic and cultural rivalry that also triggers displacement. Criminal violence driven by poverty, unemployment, and the effects of the coronavirus disease (Covid-19) pandemic also led to a surge in displacement in urban areas. Violence

triggered 9,500 internal displacements in 2021, the highest figure ever recorded in PNG. Nearly 24,000 people were displaced because of violence at the end of that year. Many live in areas prone to disasters, where they are exposed to the risk of further displacement.

Scale of displacement

During 2010–2021, 203,000 new displacements associated with 47 disaster events were recorded across PNG. About 43% of them were caused by floods, 29% by earthquakes, 14% by volcanic eruptions, 10% by wet mass movement, and 4% by storms. The events that caused the most displacements were:

Floods:

2012 Floods in January caused 60,000 new displacements across different provinces

2014 Floods in the Gulf Province caused 11,000 new displacements in July

Earthquakes:

2018 Earthquake in the Southern Highlands caused 58,000 displacements in February

2019 Earthquake in Morobe caused 600 displacements in May

Volcanic eruptions:

2019 Volcanic eruptions on Mount Ulawun, New Britain caused 16,000 displacements in June

2019 Volcanic eruptions on Mount Manam, Manam Island caused 4,000 displacements in June

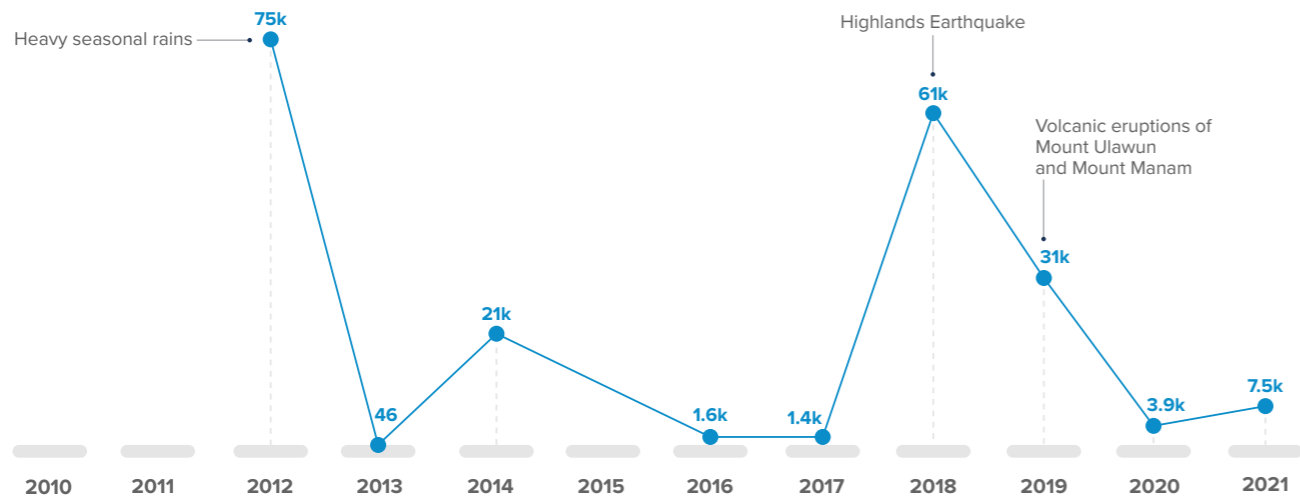


Figure 4: Number of New Displacements Linked with Disasters in Papua New Guinea and Key Events, Per Year (2010–2021)

More than 7,500 new disaster displacements were recorded in 2021, compared with 3,900 in 2020. Most displacements were caused by unusually high tides in early December that destroyed the homes of thousands of people in coastal communities. In East Sepik Province, 7,200 people were displaced as flooding submerged homes and gardens.⁷ Several South Pacific islands—including the Marshall Islands, Solomon Islands, and the Federated States of Micronesia—reported coastal flooding caused by high tides over the same period.⁸

Heavy rains fueled by an active La Niña caused localized floods and landslides, which also forced hundreds of people from their homes in 2021. River and surface flooding were mainly recorded in the Western and Southern Highlands provinces, where more than 260 people were displaced throughout the year. As of 31 December 2021, 17,000 people remained in a situation of displacement because of disasters. Floods and landslides will continue to represent a major risk to the country as the climate warms, potentially displacing tens of thousands of people each year.⁹

Disaster displacement risk

The risk of future disaster displacement is determined not only by the risk of hazards but also by how social, economic, environmental, and policy influence exposure and vulnerability of people to hazards. Building upon the disaster risk analysis developed by the United Nations Office for Disaster Risk Reduction (UNDRR), IDMC’s global disaster displacement risk model assesses the likelihood of such population movements in the future.¹⁰ The analysis considers sudden-onset hazards—such as riverine

floods, earthquakes, tsunamis, cyclonic winds, and storm surges—their likelihood, and their potential to cause housing damage, which serves as a proxy for displacement. More information on the methodology is available on IDMC’s website.

Figure 2 summarizes the main results for PNG, highlighting the high risk of disaster displacement associated with sudden-onset hazards. On average, 31,000 people could be displaced in any given year in the future by earthquakes, tsunamis, riverine floods, storm surges, and cyclonic winds. This estimate does not include volcanic risk (ash, pyroclastic flows, lava flows) and pre-emptive evacuations or displacements linked with small-scale and very localized events, such as landslides, that can also add up to large numbers of displacements.

Flood risk

PNG is home to one of the wettest climates in the world. Annual rainfall in many areas of the country exceeds 2,500 mm, with the heaviest events occurring in the highlands.¹¹ The wet season runs from November to April during which rivers swell, causing damage to villages, crops, and land and threatening people and livestock that remain within the river basins.¹²

Floods are the hazard associated with the highest risk of displacement in PNG. Because of their location in the Western Pacific Warm Pool, islands in the north of the country experience rain throughout the year. As a result, Kavieng’s average annual rainfall is three times higher than that in the capital city of Port Moresby where most of the rainfall comes from the West Pacific Monsoon.¹³

On average, almost 24,000 people are expected to be displaced per year given all the events that could occur over the return periods. In terms of probable maximum displacement (PMD), there is an 18% probability that floods will displace about 375,000 people at some point in the next 20 years.

Earthquake risk

The archipelago of PNG is in a seismically active area, located in a complex tectonic setting between the converging Ontong Java Plateau on the Pacific plate and the Australian continent which results in a high earthquake displacement risk.¹⁴ Each year on average the country experiences more than 100 earthquakes of magnitude five or greater.¹⁵

Almost 6,800 people on average are expected to be displaced per year given all the events that could occur over the return periods. In terms of PMD, there is an 18% probability that an earthquake will displace about 100,000 people at some point in the next 50 years.

Tsunami risk

PNG is particularly vulnerable to tsunamis. During a tsunami, waves push a large amount of water above sea level onto the shore. This is known as the run-up. The maximum vertical height above sea level reached by a tsunami onshore is estimated to be around 4 m to 6 m for most of the coastal areas at risk. In certain areas, it could be much higher, as demonstrated by the 7.0 magnitude earthquake on 17 July 1998 that was followed by three catastrophic tsunami waves with run-up heights reaching more than 10 m on a 25 km stretch of the coastline from the villages of Sissano to Teles.¹⁶

PNG lies within the Coral Triangle.¹⁷ Part of the archipelago is somewhat protected by coral reefs that can dissipate wave energy, but the islands are still vulnerable to significant damage from tsunamis, the effects of which are greatly amplified when they coincide with high or king tides.

On average, 159 people are expected to become displaced per year considering all the events that could occur over the return period. In terms of PMD, there is a 10% probability

PMD AAD

Probable Maximum Displacement (PMD) is the maximum displacement expected within a given time period, and determines outlier events that could occur during it.

STORM SURGES
There is a 39% probability that storm surges will displace around 10,000 people at some point in the next 50 years.

RIVERINE FLOODS
There is an 18% probability that riverine floods will displace around 375,000 people at some point in the next 20 years.

EARTHQUAKE
There is an 18% probability that earthquake will displace around 100,000 people at some point in the next 50 years.

CYCLONIC WINDS
There is a 39% probability that cyclonic winds will displace around 1,000 people at some point in the next 50 years.

TUNAMIS
There is a 10% probability that tsunamis will displace around 15,000 people at some point in the next 50 years.

Average Annual Displacement (AAD) is a compact metric that represents the annualized accumulated effect of small to medium and extreme events and predicts the likely displacement associated with them on a yearly basis.



In any given year in the future
31,000 people

on average could be displaced by storm surges, riverine floods, earthquakes, cyclonic winds and tsunamis.

Figure 5: Papua New Guinea’s disaster displacement risk levels and uncertainties for selected sudden-onset hazards.

that a tsunami will displace about 10,000 people at some point in the next 50 years.

Storm Surges risk

As a cyclone and tropical depression move across an ocean, its winds push the water into a wall as it nears landfall, creating a storm surge. Its impacts depend on coastal topography and the tides. The risk of displacement enters uncharted territory with king tides, which occur when extreme weather events coincide with uncommonly high tides caused when the gravitational pull of the moon and the sun are aligned.¹⁸

The displacement risk associated with storm surges in PNG is moderate. On average, 234 people can be expected to be displaced per year by the phenomenon.

In terms of PMD, there is a 39% probability that a storm surge will displace about 10,000 people at some point in the next 50 years. Oro and West New Britain are the most exposed provinces, and there is a high probability that they will experience storm surges of around 1m soon.

Cyclonic wind risk

Cyclonic risk in PNG is low to moderate. The country is located to the south of the equator in the South Pacific convergence zone, which is known for frequent cyclones.

Cyclones use warm, moist ocean air as fuel to gather force. They stay strong for longer periods in the South Pacific convergence zone because they are not obstructed by large land masses that would deprive them of their fuel and slow them down with greater friction than exists on the sea surface.¹⁹

In PNG, projections tend to show a decrease in the frequency of tropical cyclones by the late 21st century and an increase in the proportion of more intense storms.²⁰

On average 2,134 people are expected to be displaced per year considering all the events that could occur over the return period. Winds with speeds greater than 130 km/h could strike the north and south of the archipelago, in particular islands in the south of Milne Bay Province. In terms of PMD, there is a 39% probability that a cyclonic wind will displace about 1,000 people at some point in the next 50 years.

IDMC's disaster displacement risk model relies on a resolution of 5 km², and 1 km² along the coast. This level of granularity is not suitable for informing land use and urban planning decisions, and further analysis must be conducted to refine these initial results. Better data on pre-emptive evacuations and small-scale events could also help to calibrate the model. In addition, information is needed on people's vulnerability and exposure to hazards—including economic, social, environmental, and governance factors that affect disaster displacement risk—to complement the model's analysis of physical damage to housing.



As years went by, people started to move on to higher ground because of flooding, especially when the king tides came in. After the king tides, the water was not good and we lived in a crowded house.

– Representative of a local disaster management entity



The cost of disaster displacement

Protracted displacement can have repercussions on displaced people's welfare and well-being. Displacement frequently affects displaced people's livelihoods, housing conditions, health, education, security, social life, and environment.²¹ These impacts also result in new costs and can lead to financial losses. The loss of a home, for example, may also mean a loss of capital and assets, and entail new rental expenses.

Between 22,000 and 26,000 people are affected by floods each year in Papua New Guinea, leading to 6,000 to 8,000 displacements and costing \$8 million to \$12 million in damages annually.²² Sea level rise, coastal flooding, inland flooding, rising sea temperature, acidification, and landslides—and related displacements—are the greatest climate change impacts in the country.²³

The frequency and intensity of these hazards and the related disasters, displacements, and economic impacts are expected to increase in the coming years. For that reason,

a better understanding of their causes and consequences is essential for planning, prevention, and preparedness. Data on how these events affect people's lives and lead to financial costs and losses, however, are lacking. The limited assessments available mostly account for disaster-related damage and losses to infrastructure and the productive economy, but not for the cost of disaster displacement.

IDMC conducted a study of people displaced by sea level rise and related disasters near Port Moresby in early 2022 to help fill this knowledge gap and highlight the need to collect more information on the socioeconomic impacts of displacement associated with disasters amid climate change in Papua New Guinea. IDMC surveyed 150 displaced people and 152 non-displaced people in the same area. Key findings are highlighted in this section, and the full dataset along with the methodology and limitations are available on the IDMC website.

The results focus on people who had to leave their homes because of sea level rise or related disasters—including coastal erosion, inundation, and salination—in 2018 or 2019. Most of them settled further inland on land they already owned and previously used for subsistence farming.

Most respondents were only displaced once, but nearly 9% had to move multiple times. Along with sea level rise, 59% mentioned floods and 15% mentioned conflict, violence, or insecurity as an additional cause of their displacement. Sea level rise has led to increased flooding, coastal erosion, and the deterioration of the quality of water in the area. The gradual reduction of land available for people to live on and off has resulted in overcrowding, which was mentioned by several informants as a reason for moving elsewhere. One-third of non-displaced respondents share their home with at least one displaced person, who are mostly members of their own family.



Figure 6: Impacts of Internal Displacement

“As years went by, people started to move on to higher ground because of flooding, especially when the king tides came in. After the king tides, the water was not good and we lived in a crowded house.” – Representative of a local disaster management entity

Housing conditions

In the village near Port Moresby where the survey was conducted, people started to move from “where the sea is now” a generation ago, in the early 2000s. According to informants, the move was gradual. Initially, only a few people moved, then entire families, with a significant increase since 2016. This movement was not coordinated by any authority. As the level of the sea rose and led to more floods and soil erosion, people moved to other parcels of land they owned on higher grounds that used to be only for farming.

Upon their arrival inland, people initially set up tents and makeshift shelters where they lived for a couple of years before building a more durable structure. Most displaced respondents (55%) are equally satisfied with their housing conditions now compared with before their displacement, but 25% are more satisfied and 19% less so. Those who are more satisfied say that their new home is less crowded and that they have more privacy. They also cite a lower risk of exposure to weather and disasters and improved security. Those who are less satisfied mention poorer sanitary conditions and exposure to rain, cold, or heat, and reduced access to basic services, public facilities, and livelihood opportunities compared with before their displacement.

Living conditions are similar for displaced and non-displaced respondents, but the average value of the displaced respondents' homes is lower, at about K19,000 (about \$5,400) compared with K26,000 for non-displaced respondents. Most people in both groups own the house they live in, but only a few have written proof of ownership. A small amount of the displaced respondents (6%) are hosted by someone else, 4% live in a collective shelter and 3% live in a makeshift shelter or the open air. One-quarter of non-displaced respondents reported having additional expenses since the arrival of displaced people in the area, noting an increase in the price of food, goods, and utilities, and the support they provide to displaced people who share their homes. They estimated this average cost to be K800 per month.

Livelihoods

Displacement has had an impact on the livelihood of those who left their homes. Many (67%) displaced respondents used to earn money from work before their displacement, but only 59% do now. Some respondents (17%) lost their income entirely or became unemployed upon their displacement, and 88% of them remained without income for more than a year. Those who do earn money from work now earn less: K1,420 per month on average, compared with K1,830 before their displacement. Only 28% of displaced respondents feel they had enough financial resources to fulfill all their needs and wants.

More men than women earned money from work before their displacement, but women earned slightly more than men. The situation was reversed after displacement, as 72% of the female respondents earn money from work now compared with 44% of men, with women earning on average K662 per month and men K848.

The main sources of income are selling produce from the land they farm at the market or along the roads, and fishing. Some also work as vendors or owners of small businesses. Livelihood opportunities are similar for non-displaced people in the area, with displaced and non-displaced people earning an average income of K1,350 per month.

The receipt of remittances—or financial assistance from family or friends—is widespread in the area. About one-quarter of displaced respondents and one-third of non-displaced respondents reported receiving this type of support, for an average amount in both cases of K225 per month. Some of the displaced households (6%) also reported receiving financial support from the government because of their displacement, at an average of K145 per month. This compares with 7% of non-displaced respondents receiving government support, at an average of K338 per month.

Education

More children go to school now than before their displacement. Only 59% of displaced respondents reported that their child used to go to school before displacement, but 84% said they now do, a similar rate to that of non-displaced children. Almost half (44%) said their child suffered an interruption in their education at the time of their displacement, which lasted less than a month for 61% of them. It was found

that 37% stayed out of school for one to three months and 3% for 9 to 12 months.

More than 90% of the respondents must pay for their children's education, but the displaced respondents reported an average cost of K97 per month, and the non-displaced respondents pay K154 per month. These costs include school materials and uniforms, tuition, school meals, and transportation. Some non-displaced respondents (14%) reported receiving financial support for their child's schooling, compared with only 5% of displaced respondents.

Nearly two-thirds of displaced respondents are equally satisfied with their children's education now compared with before their displacement, but 20% are less satisfied and 17% more so. Those who are less satisfied say the school was farther away from home than before and speak of overcrowding in the classroom. Those who are more satisfied mention better-trained teachers and better education quality and infrastructure.

Displaced and non-displaced children receive the same education in the same schools, but displaced students often come from farther away. This can result in occasional tardiness and more fatigue in class. The main barrier to education for displaced children is the limited financial resources of their families. Some leave school early to work and help their parents.

Health

Displacement does not appear to have significantly deteriorated the physical health of displaced people. Most displaced respondents feel that their health has remained the same compared with before their displacement. Their most common health issues are diarrhea and water-related diseases.

"As you have seen in this village, flooding has devastated their (displaced people's) gardens. The well's drinking water is contaminated, and the overall environment is unhealthy. They have lots of water-borne diseases." – **Representative of a nongovernment organization working in health**

Limited financial resources are a major barrier to healthcare: only 17% of displaced respondents have access to free healthcare. There is a local health facility that has been without medical professionals, drugs, or equipment for years. People must travel to other villages to access healthcare, and only those who can afford to pay for transport

and care do so. Displaced people estimated the average cost of a basic visit to a healthcare provider at about K160.

"We only treat minor issues like colds, fevers, and coughs, but we refer complicated issues to the town or urban health services. If it's an emergency, that could cost up to K50 or K100 because you would have to hire a vehicle for transport." – **Medical worker**

One-third of the displaced and non-displaced respondents reported that they have less access to healthcare now compared with before displacement. This can be the result of overcrowding in nearby health facilities.

The way forward

Results from this assessment of the impacts of displacement linked with sea level rise near Port Moresby show that the effects on housing conditions, livelihoods, education, and health are felt by the displaced and non-displaced communities in the affected area. Many non-displaced people share their homes and financial resources with displaced relatives or friends, and all share the limited local infrastructure, services, and livelihood opportunities.

Most displaced people seem to have overcome the immediate disruptions resulting from their displacement, including loss of work or interrupted education, and have returned to conditions like those of their non-displaced neighbors. They continue, however, to earn less, on average than before their displacement. Their houses are of lower value than those of their non-displaced neighbors and they spend less on the education of their children, with some displaced children even forced to leave school to work and help their families.

Displacement caused by slow-onset disasters has impacts that can be difficult to see and measure. They are, however, present and can last for years if unaddressed. All affected people need multisector support to ensure durable solutions in communities faced with sea level rise and other disaster-related displacements. Conducting similar assessments to identify priority needs and tailored responses is a necessary first step to better prepare for and manage this growing issue.



Fisherman showing off their catch at the Port Moresby, Papua New Guinea. Private Sector Development Initiative (PSDI) aims at improving the business environment in Pacific Islands by promoting effective PSD policies and practices within the context of ADB country assistance strategies.
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Capacity to prevent and respond to disaster displacement

The capacity of a country to prevent and respond to internal displacement depends on the scale, drivers, and impacts of the displacement it is faced with, as well as the resources it dedicates to addressing the phenomenon.²⁴ Policies, frameworks, strategies, or plans focused on or including disaster displacement are a clear indication of government commitment as well as a useful guide for its action and that of its partners. These policies must be accompanied by sufficient financial, technical, and human resources to be implemented. Information on internal displacement—including the number of displaced people and people at risk of future displacement, their location, and needs—is essential to tailor effective interventions.

PNG does not have a dedicated policy on internal displacement, but other official documents mention the issue and the need to prevent and respond to disaster displacement. Data are available on disaster displacement from government and nongovernment sources. It is not, however, systematically reported nor sufficiently detailed to inform comprehensive support for IDPs.

Policies and implementation

The 2010 PNG National Disaster Mitigation Policy and 2012 Strategic Programme for Climate Resilience recognize displacement resulting from disasters, including the displacement of communities because of the effects of climate change.^{25,26}

The National Disaster Risk Reduction Framework (2017–2030) acknowledges the need to support policies and programs addressing disaster displacement and strengthening the resilience of affected populations.²⁷ The Disaster Risk Reduction Framework and the Papua New Guinea Development Strategic Plan (2010–2030) include measures to prevent disaster displacement, support resettlement and relocation of “climate refugees,” and minimize impacts on host communities.²⁸

The National Disaster Centre within the Department of Provincial and Local Government Affairs was established by an act of parliament to coordinate rapid responses to the impacts of disasters. The Climate Change and Development Authority coordinates efforts by PNG to mitigate and adapt to climate change, but not specifically to prevent or respond to related displacement.²⁹ Funding for disaster risk reduction remains a challenge for the government.³⁰

Data

Disaster displacement data are collected by local and national authorities, civil society—including national and international nongovernment organizations—multilateral organizations including the UN, and the media.

There is no systematic collection and publication of data on internal displacement associated with disasters in Papua New Guinea. For specific disasters, the International Organization for Migration collects data disaggregated by location, age, and sex. Systematic reporting of disaster displacement data throughout the year and across all provinces would allow for a more comprehensive understanding of the issue.

Disaggregation of data on IDPs by age and sex could inform more tailored responses. So would measures of disaster displacement impacts on various aspects of the lives of IDPs and their host communities.

Another data gap for PNG relates to slow-onset disasters and the effects of climate change, including sea level rise and coastal erosion. As the country is already heavily affected by these phenomena and will likely be more so in the future, data on the way these events lead to displacement are essential to designing effective prevention and response mechanisms.

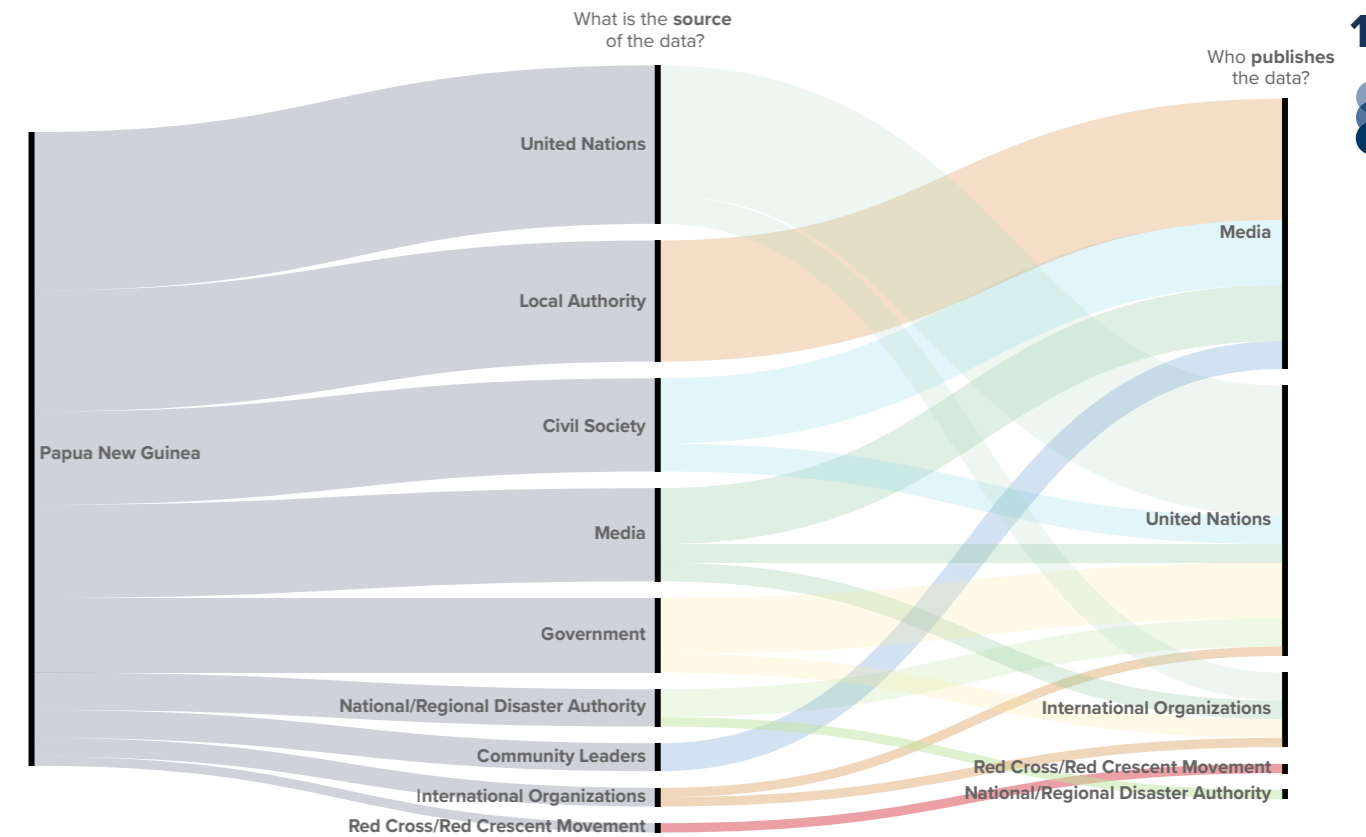


Figure 7: IDMC's Sources of Data on Disaster Displacement in Papua New Guinea



1

Papua New Guinea is heavily affected by disaster displacement, with 203,000 displacements recorded during 2010–2021.

2

Climate change and low levels of human development increase the risk of disaster displacement. On average, 31,000 people could be displaced in any given year in the future by riverine floods, earthquakes, tsunamis, storm surges, and cyclonic winds.

3

Papua New Guinea has adopted comprehensive policies and strategies to prevent and respond to disaster displacement. Funding to fully address disaster displacement is still challenging for the government.

4

Analyses on risks, drivers, scale, and impacts of disaster displacement would benefit from more systematic, comprehensive, and granular data on the phenomenon across all provinces.

5

Information on people's vulnerability and exposure to hazards—including economic, social, environmental, and governance factors—can strengthen displacement risk analyses and support better prevention and preparedness.

6

Better data on displaced people's sex, age, and other key socioeconomic characteristics can help design more inclusive and comprehensive assistance.



Villagers visit the Tsinjipai Community Health Post for information and treatments. © Asian Development Bank

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Children play at their home in Kimbe, West New Britain, Papua New Guinea. Kimbe is located on Kimbe Bay, which boasts amazing coral reefs and diving expeditions.

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Every day, people flee conflict and disasters and become displaced inside their own countries. IDMC provides data and analysis and supports partners to identify and implement solutions to internal displacement.

Join us as we work to make real and lasting change for internally displaced people in the decade ahead.



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