Global Rapid Post-Disaster Damage Estimation (GRADE) Report

Venezuela Earthquakes – June 24, 2026

(Report as of July 13, 2026)

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Global Facility for Disaster Reduction and Recovery

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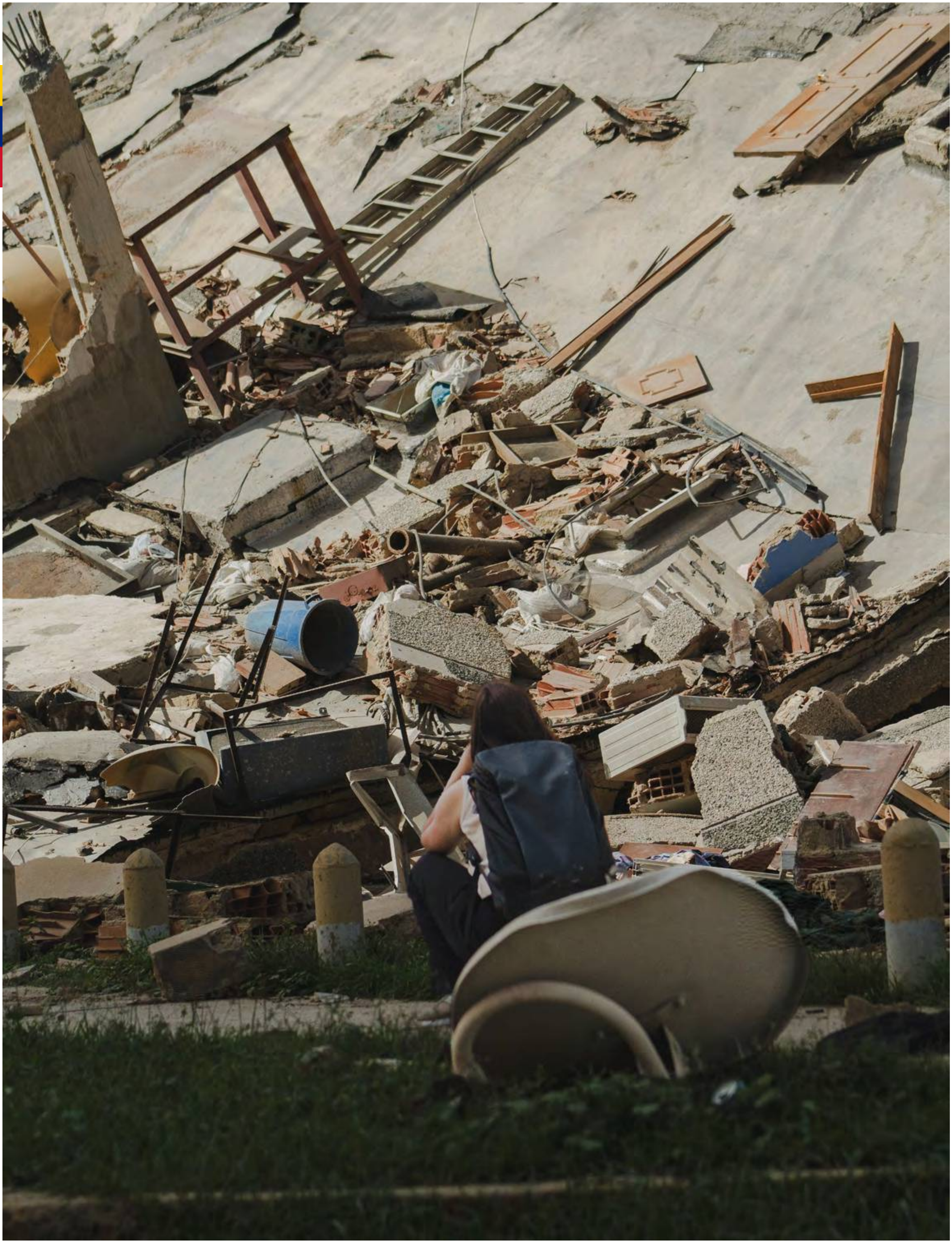
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Cover photo: Valeria Alejandra Marchán Martínez (published with permission)

Acknowledgments

This report was prepared by a team led by Rashmin Gunasekera (World Bank's Disaster Climate Risk Management, KIUSD and the Global Facility for Disaster Reduction and Recovery, GFDRR). The team comprises James Daniell, Harriette Stone, Johannes Brand, Roberth Romero, Mikhail Sirenko, Andreas Schaefer, Annika Maier, and Kerri Cox of the KIUSD's Global Program for Disaster Risk Analytics (GPDRA) team and the Disaster Resilience Analytics and Solutions (D-RAS) team. Contributions on the nexus between the Disaster Risk Management and Fragility, Conflict and Violence (DRM-FCV) contexts are from Karima Ben Bih (Senior Disaster Risk Management Specialist, ILCUR), Lara Loussert (Junior Professional Associate, KIUPR), and Claudia Soto (Senior Disaster Risk Management Specialist, KIUSD). Contributions on gender are from Zoe Trohanis, Mirtha Escobar and Carolina de los Angeles Ferrer Rincon (KIUSD, GFDRR/World Bank). The macroeconomic analysis and sections of the report were prepared by a team led by Erik Von Uexkull (Senior Economist, ELCMU) and included Remzi Baris Tercioglu (Economist, WKPES), Charl Jooste (Lead Economist, WKPES), Olivia D'aoust (Senior Urban Economist, ILCUR), Veronica Sonia Montalva Talledo (Economist, ELCPV), Sahiti Sarva (ET Consultant, DECDG), and Constanza Isabel Vergara Delgadillo (ET Consultant, ELMCU). The map clearance process was supported by the World Bank's Map Clearance team.

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[1] https://www.yummysuperapp.com

Abbreviations and Glossary

Abbreviations

D-RAS	Disaster-Resilience Analytics & Solutions (World Bank Group)
DRM	Disaster Risk Management
ELN	*Ejército de Liberación Nacional* (Army of National Liberation in English)
ENCOVI	*Encuestra Nacional de Condiciones de Vida* (National Survey of Living Conditions in English)
FCV	Fragility, Conflict and Violence
GBV	Gender-Based Violence
GEM	Global Earthquake Model
GFDRR	Global Facility for Disaster Reduction and Recovery
GFZ	Helmholtz Centre for Geosciences
GHSL	Global Human Settlement Layer
GloBFP	Global Building Footprint
GMPE	Ground Motion Prediction Equations
GMVV	*Gran Misión Viviendas Venezuela*
GIS	Geographical Information System
GRADE	Global Rapid Post-Disaster Damage Estimation
IOM	International Organization for Migration
IPE	Intensity Prediction Equations
MMI	Modified Mercalli Intensity
MPPEE	*Ministerio del Poder Popular para la Energía Eléctrica* (Ministry of Electric Power in English)
MPPT	Ministry of Transport Venezuela
M_w	Moment Magnitude
NASA	National Aeronautics and Space Administration
NISAR	NASA-ISRO Synthetic Aperture Radar
NZSEE	New Zealand Society of Earthquake Engineering
OBAT	Open Buildings Attributes Table
OBM	Open Building Map

OSM	Open Street Map
PAHO	Pan American Health Organization
PDNA	Post-Disaster Needs Assessment
SEN	National Electricity System, Venezuela
TEV	Total Exposure Value
UCC	Unit Cost of Construction
UNDP	United Nations Development Programme
UNFPA	United Nationals Population Fund
UNICEF	United Nations International Children's Fund
UNOCHA	United Nations Office for the Coordination of Humanitarian Affairs
UNOPS	United Nations Office for Project Services
USD	United States Dollars
USGS	United States Geological Survey
WASH	Water, sanitation and hygiene
WFP	World Food Programme
WHO	World Health Organization
WSF	World Settlement Footprint

Glossary

Building typology	The classification of buildings based on their characteristics, such as their function, structure, style, age or other defined characteristics.
Damage	The destruction of physical assets.
Exposure	The people, property, and systems that could be affected by a disaster including the value of these assets.
Losses	The value of lost production or income.
Needs	The short, medium, and long-term needs for reconstruction and recovery.
Replacement cost	The cost to construct or replace an asset with equal quality and construction to its pre-disaster state.
Reconstruction cost	The cost to replicate the asset, at current construction prices, to current construction standards and quality.

Photo credit: Luis Alejandro Hernández Maldonado.

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Photo credit: Valeria Alejandra Marchán Martínez.

Executive Summary

This Global Rapid Post-Disaster Damage Estimation (GRADE) report summarizes the direct economic damage[2] to buildings and infrastructure assets caused by the moment magnitude[3] (M_w) 7.2 and the M_w 7.5 earthquakes in Venezuela on June 24, 2026. This report provides critical insights to support response and recovery planning, as well as strategic discussions on risk reduction. The assessment does not consider the disaster losses[4] or needs[5] of the event, which could be assessed through future partner initiatives.

The earthquakes caused significant destruction to buildings and infrastructure across northwestern and northern Venezuela impacting tens of thousands of people. As of July 13, 2026, the reported fatalities were 4,561, although these numbers are expected to increase. In absolute numbers, the earthquakes were the most damaging in economic terms, as well as the deadliest in Venezuela since 1812.

The GRADE methodology[6] is a well-established rapid, remote-based damage estimation approach that estimates direct economic damage to physical assets through a mix of earthquake damage modelling, scientific and engineering methods, and an assessment of the value of the capital stock, drawing on catastrophe modelling techniques and publicly available data. This assessment utilized local seismic data, preliminary satellite damage assessments, building exposure information, and available damage reports from the government, humanitarian agencies, civil society and development partners, including community-based organizations and academic institutes (see Annex A for a complete list) to heavily calibrate and validate the modeled damage. This mixed approach, combining modeling of the hazard, exposure, and vulnerability of the earthquake-affected area, together with ground truthing through calibration with available damage reports was completed using data as of July 13, 2026.

Key findings of the GRADE assessment (Table ES1) include the following:

- **Total direct damage to physical assets is estimated to be US$19.6 billion.** Residential buildings suffered the most damage, accounting for US$9.31 billion (47 percent of total damage). Non-residential buildings incurred damage valued at US$5.03 billion (26 percent), and infrastructure damage totaled US$5.24 billion (27 percent).
- **La Guaira and Distrito Capital were the most severely impacted states in terms of total damage**, accounting for around 47 percent of the total damage (US$5.0 billion and US$4.3 billion, respectively). In the state of La Guaira, damage ratio is considerably high, estimated at 17 percent of its capital stock exposure value, and in Distrito Capital much less at 2 percent. Nationally, 1.39 percent of the total exposure in Venezuela was damaged in the earthquakes (Table 3).

2 Economic damage is defined as the cost of damage to building and infrastructure assets.
3 https://www.usgs.gov/faqs/moment-magnitude-richter-scale-what-are-different-magnitude-scales-and-why-are-there-so-many
4 The value of lost production or income.
5 The short, medium, and long-term needs for reconstruction and recovery.
6 World Bank. (2018). Methodology Note on the Global Rapid Post-Disaster Damage Estimation (GRADE) approach. Washington D.C. Available at: https://www.gfdrr.org/en/publication/global-rapid-post-disaster-damage-estimation-grade-approach

- **Together, La Guaira, Distrito Capital, Miranda and Carabobo make up 85 percent of damage.** The damage in Miranda, and Carabobo is also significant with US$3.8 billion and US$3.7 billion in damage, respectively.

Table ES1. Damage estimated by GRADE by sector and by state, in US$ millions. The color bars indicate the relative magnitude of damage within each asset class (i.e. each column)

State	Total Residential Damage incl. Contents ($US mn)	Total Non-Residential Damage incl. Contents ($US mn)	Total Infrastructure Damage ($US mn)	Total Damage ($US mn)
La Guaira	2,624	1,279	1,078	4,982
Distrito Capital	1,665	1,705	917	4,286
Miranda	1,404	1,216	1,166	3,785
Carabobo	1,887	486	1,337	3,710
Aragua	933	223	313	1,469
Yaracuy	524	71	251	846
Falcón	219	41	132	392
Lara	19	4	10	33
Guárico	14	2	10	26
Cojedes	9	1	8	19
Anzoátegui	6	3	7	16
Other States	10	1	4	15
Total	9,312	5,031	5,235	19,579

Buildings (residential and non-residential) have been severely impacted by this event, accounting for over 73 percent of the damage. Understanding the driving factors behind risk to all hazards across Venezuela and considering the national risk landscape is critical to ensure that recovery plans act to build resilience for future generations.

Many of the building typologies observed to have suffered damaged are made from masonry, or reinforced concrete frames with masonry infill. Residential apartment buildings and non-residential larger buildings were particularly vulnerable to the ground motions which occurred towards the east as a result of the directivity and large ground displacements. While education and health sectors have suffered significant impacts (e.g. 34 percent of schools in Distrito Capital are reported by UNICEF as damaged[7]), infrastructure related to energy has had relatively minor impacts.

Following the completion of the GRADE assessment, the results were integrated into macroeconomic models to evaluate how the earthquakes and subsequent recovery efforts could potentially affect the country's economic outlook. The findings indicate that the pace of reconstruction will play a decisive role in shaping economic and social impact. If public and private investment remain at their current levels, reconstruction would need to be financed by diverting resources away from other productive investments, and completion would likely lag beyond 10 years. Furthermore, productive capacity, GDP

[7] UNICEF. (2026). *Venezuela Humanitarian Situation Report No.3 (Earthquake)* Available at: https://reliefweb.int/report/venezuela-bolivarian-republic/unicef-venezuela-humanitarian-situation-report-no3-earthquake-02-july-2026

and consumption would all remain below pre-earthquake paths until at least 2036. These impacts can be mitigated by scaling up public and private investment to accelerate reconstruction. The report models potential policy response packages to help illustrate this point. If the fiscal envelope is expanded, higher public investment could front-load reconstruction and transfers to affected households would mitigate consumption losses. Complementary policy measures to unlock higher private investment would further support the pace of reconstruction.

Prior to the earthquake, the affected states had different yet overlapping pressures. Social vulnerability modelling conducted following the GRADE assessment shows that consumption impacts are uneven across social groups and may be higher among households with greater care and health needs or less secure forms of employment. Recovery measures may therefore be most effective when they combine physical reconstruction with continuity of essential services and targeted household support.

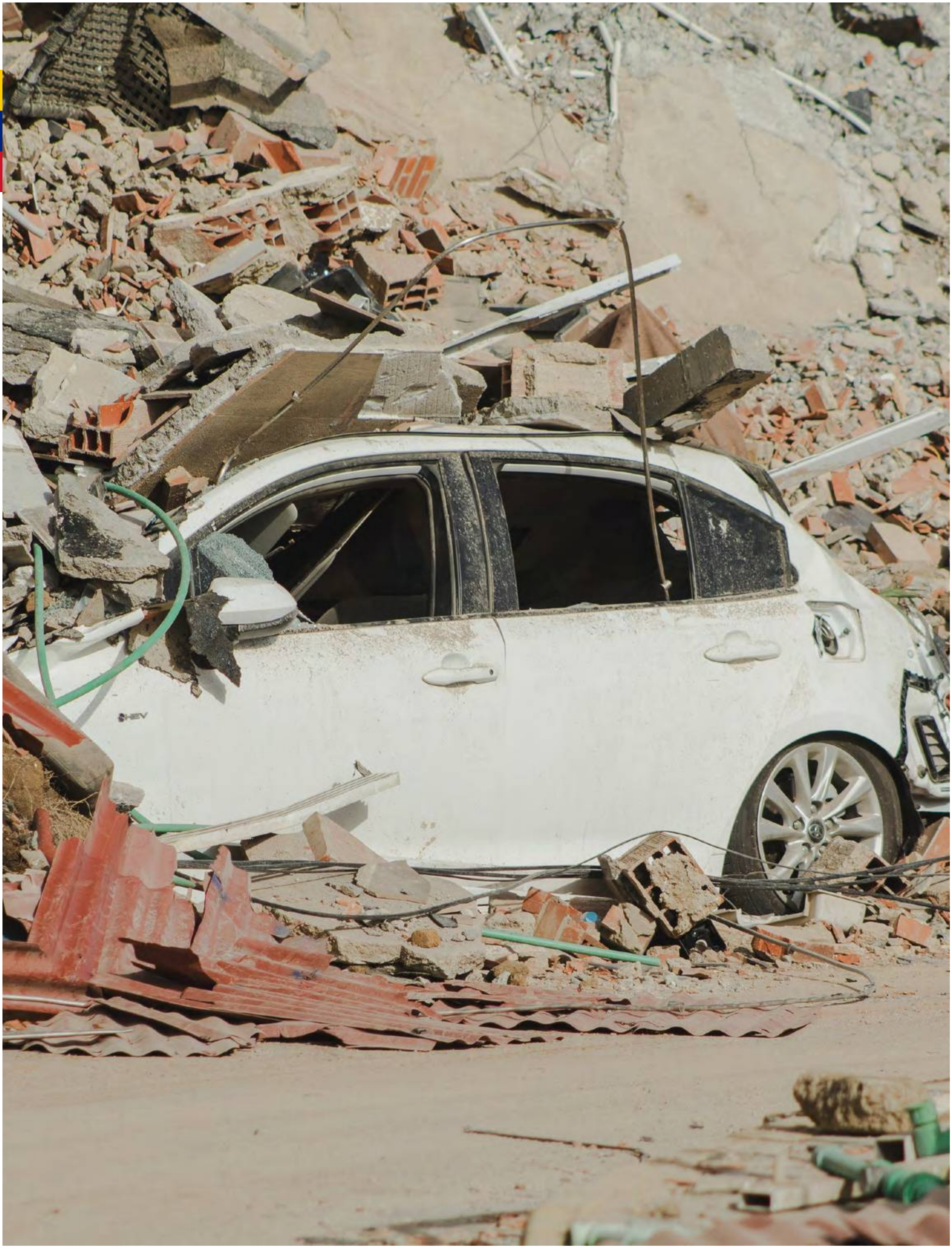


Photo credit: Valeria Alejandra Marchán Martínez.

1.0
Introduction and Context

This Global Rapid Post-Disaster Damage Estimation (GRADE) report presents a rapid estimate of the direct economic damage to physical assets, including buildings and infrastructure, from the moment magnitude (M_w)7.2 and the M_w 7.5 earthquakes in Venezuela on June 24, 2026. The assessment does not consider the losses[8] or needs[9] of the event. It is intended to support response planning, inform recovery strategies, and guide future risk reduction interventions.

This report includes: (i) a characterization of the seismic event, (ii) the development of an exposure model of Venezuela's built environment, (iii) an estimation of economic damage to buildings and infrastructure, and (iv) a high-level discussion on the potential macro and socio-economic and recovery implications of the disaster. It draws on seismic data, preliminary satellite damage assessments, building exposure models and data, and available damage reports from the Government, humanitarian agencies, and development partners, including community-based organizations and academic institutes.

1.1 Country Context

Venezuela's total population was estimated to be 28 million in 2025, of which approximately 85 percent live in coastal and Andean areas and an estimated 1.8 – 2.0 million people live in the Distrito Capital where the capital city, Caracas, is located. The main areas impacted by the June 24, 2026, earthquakes include the north-central and northwestern states of La Guaira, Distrito Capital, Miranda, Carabobo, Aragua, Yaracuy, and Falcón.

The earthquakes struck when socioeconomic conditions in Venezuela were already precarious, despite some improvements in poverty and inequality over the 2021–25 period. According to the National Survey of Living Conditions (ENCOVI)[10], overall poverty declined from 94.6 percent in 2021 to 76.4 percent in 2025, and the Gini coefficient narrowed from 62.9 to 52.1. In international comparison, Venezuela remains the second poorest country in the region.

1.2 Summary of Historical Earthquakes and other Disasters

Venezuela has a long history of seismic activity, due to its position at the junction of the Caribbean and South American plates. See Annex B for a record of historical earthquakes in Venezuela of M_w 6.0 and

[8] The value of lost production or income.
[9] The short, medium, and long-term needs for reconstruction and recovery.
[10] *Encuestra Nacional de Condiciones de Vida* (National Survey of Living Conditions in English)

over[11]. Event times are listed in Greenwich Mean Time (GMT), and the reported economic damage and death tolls represent best estimates compiled from multiple academic sources.

The 1812 earthquake was the largest in recent centuries. While there are similarities when compared to the June 24, 2026, earthquakes, the event in 1812 was more damaging due to a number of factors, including the prevalence of seismically vulnerable masonry buildings, severe ground amplification effects, a larger affected region, and likely greater ground shaking. Much of Caracas was destroyed by the earthquake, but the impacts extended over a very large area. The epicenter was offshore from present day La Guaira, which was heavily impacted, as were Puerto Cabello, Tocuyo, Maiquetía, and other towns along the coast (O'Loughlin and Lander, 2003; Choy et al., 2010). Fiedler (1961) described it as probably the worst earthquake in Caracas' history. The earthquake caused fatalities of 10,000 in Caracas, 4,000 - 5,000 in Barquisimeto, 5,000 in Merida, 3,000 in La Guaira, and 3,000 in San Felipe. Contemporary estimates range from 1,500 to 40,000 but most likely in the order of 20,000 fatalities. Fielder's (1962) isoseismic mapping suggested that there might have been a series of three earthquakes with epicenters in Caracas, San Felipe/Barquisimeto, and Merida. Other earthquakes such as the 1530, 1641, 1875, 1894, 1900, 1929, and 1967 earthquakes also were extremely deadly among many other smaller damaging earthquakes recorded over the last five centuries.

More recently, La Guaira (then known as Vargas) suffered severe impacts from landslides in 1999 in the same area most devastated by recent earthquakes. Heavy rainfall triggered thousands of landslides on steep slopes of the Sierra de Avila north of Caracas. Flooding and debris flows severely damaged coastal communities and infrastructure. 8000 individual residences and 700 apartment buildings were destroyed or damaged. Roads, telephone, electricity, water and sewage systems were severely disrupted and thousands perished.

1.3 Earthquake Characteristics and Description

On June 24, 2026, two large earthquakes struck Venezuela, starting at 18.04 Venezuela Legal Time (HLV or Hora Legal de Venezuela in Spanish) or 22.04 Coordination Universal Time (UTC). The first measured M_w 7.2[12] and had a depth of 27.6 km and the second, which struck just 39 seconds later, measured M_w 7.5[13] with a depth of 10 km. The epicenters were around 10 km apart in the Veroes Municipality, to the northeast of San Felipe, the capital of the state of Yaracuy. The earthquakes were likely caused by the rupture of the San Sebastián fault and caused intensive ground shaking and surface displacements of up to 60 cm westwards across a large area.[14]

The United States Geological Survey (USGS) reported that ground shaking reached a maximum of IX (violent) on the Modified Mercalli Intensity (MMI) scale in parts of Yaracuy state, with around 117,000 people exposed to that level of shaking. Approximately 1.25 million people were reportedly exposed to an MMI of VIII (severe)15. Since the main shock on June 24, authorities have reported over 1,200 aftershocks[16].

[11] Daniell, J., Schaefer, A., Skapski, J.-U., Vervaeck, A., Pomonis, A., & Gunasekera, R. (2018, April). *Global socioeconomic losses from natural disasters for the year 2017 and their place in the yearly loss estimates since 1900 [Conference abstract]. EGU General Assembly Conference Abstracts, p. 10385.*

[12] https://earthquake.usgs.gov/earthquakes/eventpage/us6000t7zc/executive

[13] https://earthquake.usgs.gov/earthquakes/eventpage/us6000t7zp/executive

[14] https://science.nasa.gov/earth/earth-observatory/where-venezuelas-earthquakes-shifted-the-ground/

[15] https://earthquake.usgs.gov/earthquakes/eventpage/us6000t7zp/pager

[16] https://reliefweb.int/report/venezuela-bolivarian-republic/earthquakes-venezuela-situation-report-20-13-july-2026-time-0900-pm

1.4 Key Reported Impacts of the Earthquake

As is common after a large disaster, especially in contexts like Venezuela, accurate and reliable information about the impacts can be challenging to access in the immediate aftermath of the event. Table 1 presents a summary of the key impact areas as reported by other stakeholders, while Annex C presents this information in more detail.

Table 1. Summary of reported impacts on key sectors

Sector	Brief summary of impacts as reported by others
Human impacts	As of July 17, 2026, the number of deaths stood at 4,930, with 16,740 people injured. More than 128,000 families have received assistance from the authorities and agencies deployed on the ground[17]. UNICEF estimates that 1.8 million people, including 680,000 children, are in need of humanitarian assistance. The earthquake has compounded a situation where, it is estimated that before the earthquake, 7.9 million people needed humanitarian support.[18]
Housing sector	The latest official assessments report 856 affected buildings, including 190 that have collapsed; however, other early assessments estimate the number to be in the thousands[19]. Authorities report that approximately 17,907 persons have been left homeless[20].
Education sector	In Distrito Capital, 432 schools (34 percent) have been damaged[21] and in Carabobo, at least 425 schools (30 percent) have been damaged. Overall, more than 900 schools across nine states have been affected[22]. The earthquakes affected an education system already operating under severe infrastructure constraints.
Health sector	Overall, 38 hospitals have been affected. In Distrito Capital, 13 facilities have been damaged and in Miranda, five facilities have been damaged. In La Guaira, there are nine facilities damaged, with three non-operational or experiencing severely limited functionality. The earthquakes affected a health system already operating under severe infrastructure constraints.
Transport	Damage to transport infrastructure has been reported across seven states (La Guaira, Caracas, Miranda, Falcón, Aragua, Carabobo and Yaracuy), including major highways, bridges, and tunnels. The main international airport that serves Caracas remains closed to commercial flights and is receiving restricted humanitarian aid. The Port of La Guaira also remains closed with cargo diverted to other functioning ports in Venezuela.

17 https://www.elnacional.com/2026/07/venezuela-eleva-a-4-561-la-cifra-de-fallecidos-por-los-terremotos/. N.B. Reported values as of July 13, 2026 or before, were included in analysis.
18 UNICEF. (2026). *Venezuela Humanitarian Situation Report No. 2 (Earthquake).* Available at: https://reliefweb.int/report/venezuela-bolivarian-republic/unicef-venezuela-humanitarian-situation-report-no2-earthquake-27-june-2026
19 https://www.theguardian.com/world/2026/jun/30/tonnes-and-tonnes-of-rubble-more-than-58000-buildings-estimated-to-have-been-destroyed-in-venezuela-earthquakes
20 https://reliefweb.int/report/venezuela-bolivarian-republic/earthquakes-venezuela-situation-report-20-13-july-2026-time-0900-pm
21 UNICEF. (2026). *Venezuela Humanitarian Situation Report No.3 (Earthquake)* Available at: https://reliefweb.int/report/venezuela-bolivarian-republic/unicef-venezuela-humanitarian-situation-report-no3-earthquake-02-july-2026
22 https://cecodap.org/almenos-de-900-escuelas-en-nueve-estados-de-venezuela-estan-afectadas-tras-los-terremotos/

Sector	Brief summary of impacts as reported by others
Water, sanitation, and hygiene	Supplies have been severely disrupted, with restoration figures around 86 percent by July 8[23].
Power networks	Network damage caused outages but, as of July 14, 95 percent of the national electricity demand was functioning.
Telecommunications networks	Damage to the network caused outages of around 35 percent in the affected areas. This recovered to 77 percent functionality within 48 hours.

[23] http://eltiempo.com/mundo/venezuela/a-dos-semanas-del-doble-terremoto-en-venezuela-la-guaira-la-zona-mas-afectada-recupera-la-electricidad-en-un-96-y-el-agua-potable-en-un-3570313. N.B. Reported values as of July 13, 2026 or before, were included in analysis.

2.0
Rapid Post-Disaster Damage Estimation Methodology

The assessment follows the World Bank (2018) GRADE methodology. It provides a rapid, first-order approximation of the direct economic damage to physical assets which can be used to inform decisions in a timely fashion. Damage to residential and non-residential buildings and their contents, and infrastructure are estimated. Losses and needs are not estimated.

In the past 11 years, the World Bank's Disaster-Resilience Analytics and Solutions (D-RAS) team has produced 14 earthquake-related GRADE assessments and 77 assessments in total across multiple hazards (World Bank, 2025). The GRADE methodology estimates damage in three stages:

1. Data collection, monitoring, and checking.

2. Comparison of damage estimates across historical events.

3. Modelling, cross-checking, calibration and validation.

This GRADE assessment estimates the direct damage caused by the 2026 Venezuela earthquakes, through an approach that utilizes a mix of earthquake damage modelling, catastrophe risk modelling, calibration and validation, and an assessment of capital stock value of different assets and sectors. This rapid and remote assessment used a range of datasets to assess damage, including historical data, scientific data such as ground motion, information on the built environment and population, engineering information on structural vulnerability, as well as reported damage data from government, development partners, community-based organizations, the media and social media (Figure 1). A comprehensive list of data sources used is given in Annex A. Overall, official data for this event has been limited, particularly as it relates to comprehensive estimates of damage, however, there has been a wealth of valuable data from other sources (Annex A).

2.1 Hazard Analysis

The GRADE team developed a combined hazard model for the earthquake sequence using ground-shaking datasets, observed building and infrastructure damage patterns, seismological research, seismic hazard models for Venezuela and neighboring regions, fault-slip models, ground-failure observations, other available hazard assessments (see Figure 2), and ground displacement data (Figure 3).

Given the limited strong-motion station data, the complexity of the rupture and the occurrence of multiple large earthquakes, including the June 24 earthquakes, a combination of alternative source and ground-motion models was used to develop an ensemble of ShakeMaps rather than relying on a single deterministic solution.

The resulting GRADE ShakeMap is given in Figure 4. More detail is given on the hazard analysis in Annex D.

Figure 1. Overview of methodology and examples of key datasets used for GRADE assessment.

Hazard Model

Input data includes:

- Own/USGS/GFZ/Other Shakemaps and felt intensity data
- NZSEE studies on specific seismic directivity
- Academic research on seismic conditions in the region
- Historical earthquake data

Shake Map

Exposure Model

Input data includes:

- 2011 housing census data
- Local GMVV construction data and other studies
- Global Earthquake Model exposure layer
- Building footprint/ Cadastral data in the layer
- Venezuela Building Codes (past and present)

Exposed values according to asset type and structural characteristics

Vulnerability Model

Input data includes:

- Structural engineering studies on seismic behaviour of buildings and infrastructure
- Past earthquake event damage data
- Modelled building and infrastructure performance data

Vulnerability functions according to structural characteristics

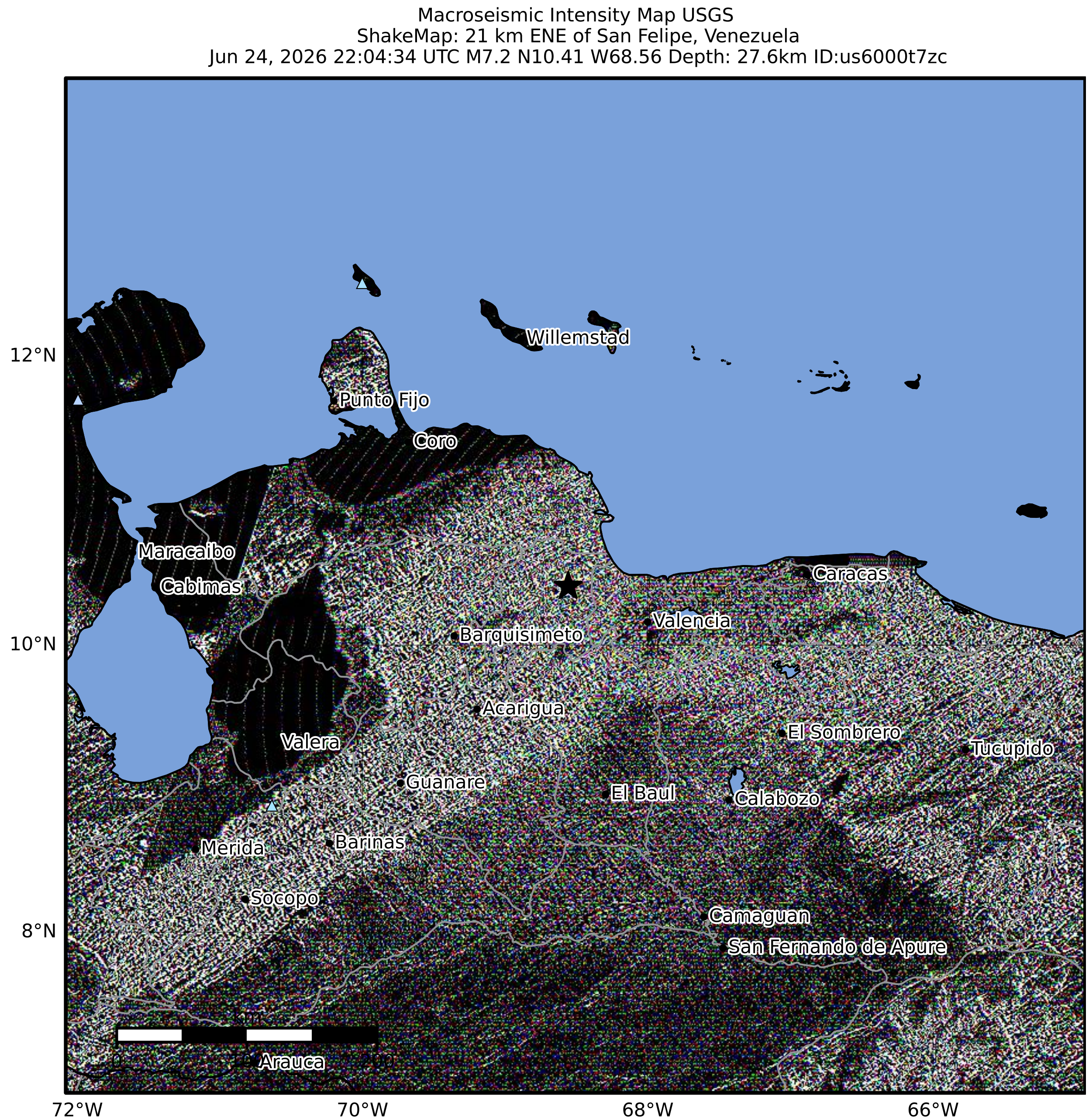
Damage Calibration

Input data includes:

- Engineering damage surveys from the ground
- Community reporting of damage from the ground
- Social and local media posts
- Satellite damage data and analysis
- Local company datasets (e.g. M'card & Yummy)

Calibrated damage values

Figure 2a. USGS ShakeMap for the First Earthquake M_w7.2 (Version 7, July 4, 2026)

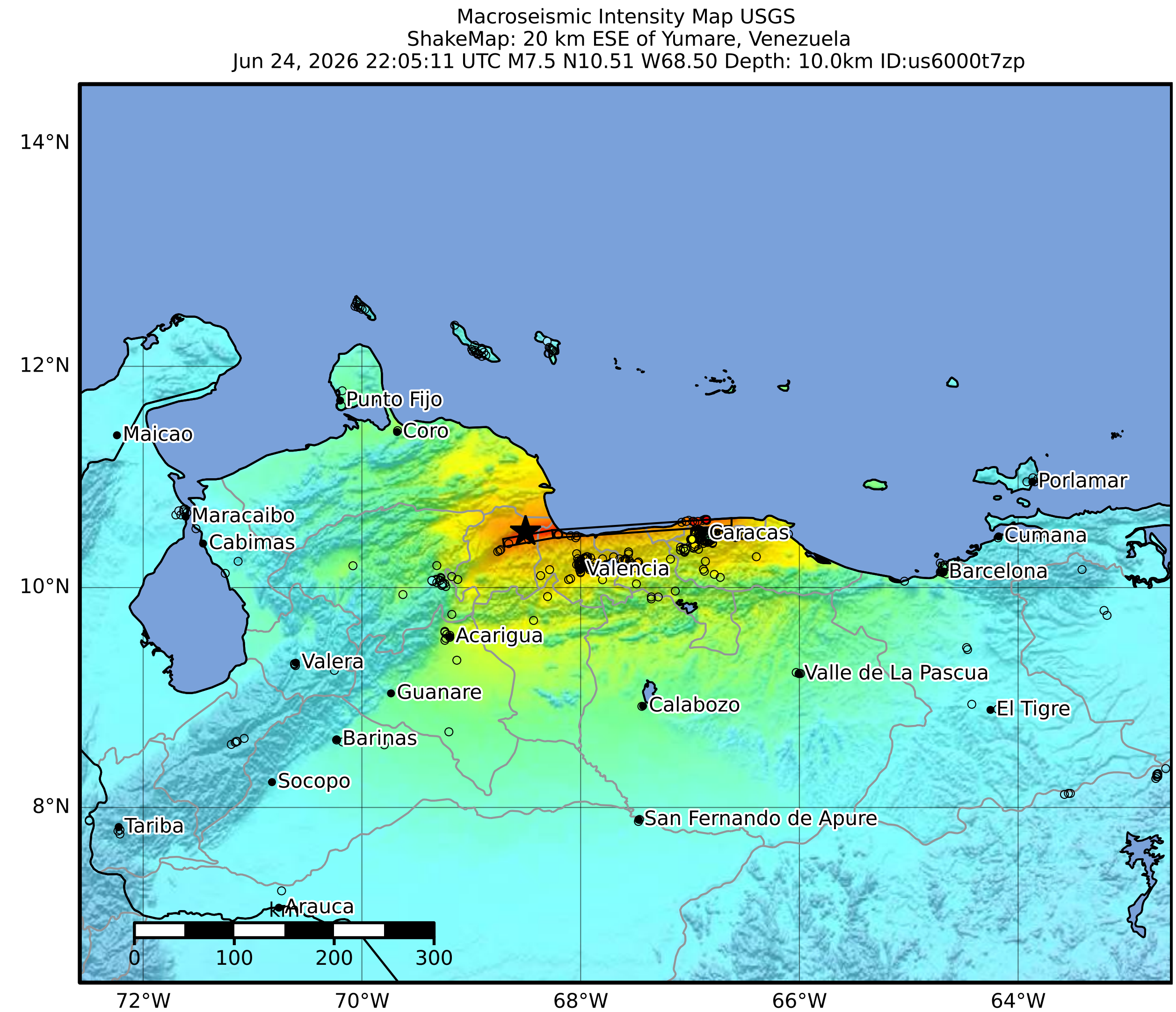


SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
DAMAGE	None	None	None	Very light	Light	Moderate	Moderate/heavy	Heavy	Very heavy
PGA(%g)	<0.0464	0.297	2.76	6.2	11.5	21.5	40.1	74.7	>139
PGV(cm/s)	<0.0215	0.135	1.41	4.65	9.64	20	41.4	85.8	>178
INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

Scale based on Worden et al. (2012) Version 7: Processed 2026-07-04T22:58:23Z

△ Seismic Instrument ○ Reported Intensity ★ Epicenter

Figure 2b. USGS ShakeMap for the Second Earthquake M_w7.5 (Version 12, July 13, 2026)



SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
DAMAGE	None	None	None	Very light	Light	Moderate	Moderate/heavy	Heavy	Very heavy
PGA(%g)	<0.0464	0.297	2.76	6.2	11.5	21.5	40.1	74.7	>139
PGV(cm/s)	<0.0215	0.135	1.41	4.65	9.64	20	41.4	85.8	>178
INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

Scale based on Worden et al. (2012) Version 12: Processed 2026-07-13T04:17:10Z

△ Seismic Instrument ○ Reported Intensity ★ Epicenter ▭ Rupture

Figure 3. Ground Displacement as seen from (NASA-ISRO Synthetic Aperture Radar (NISAR) showing the greatest displacements and reasons for significant damage in the locations seen (NASA Earth Observatory/Lauren Dauphin)

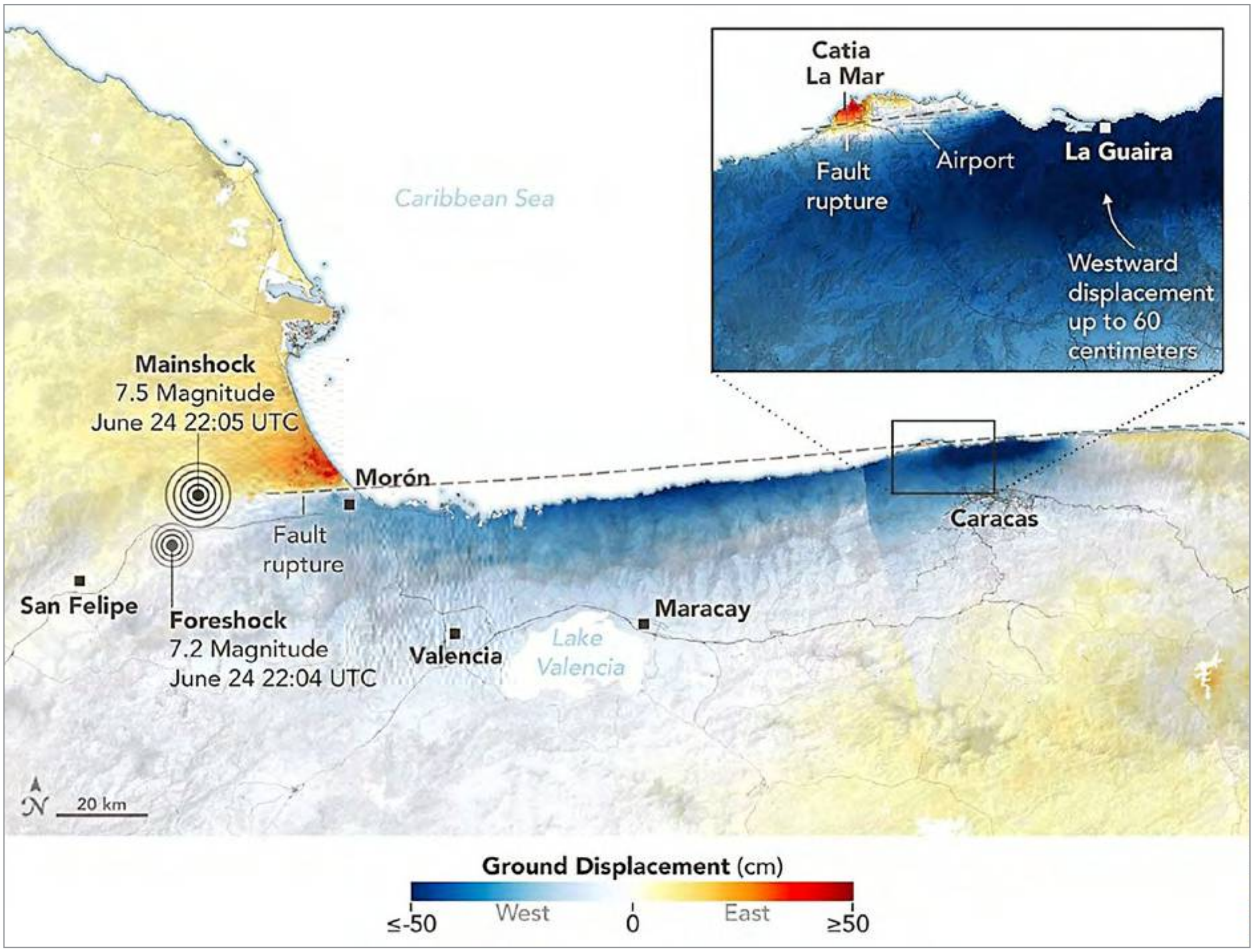
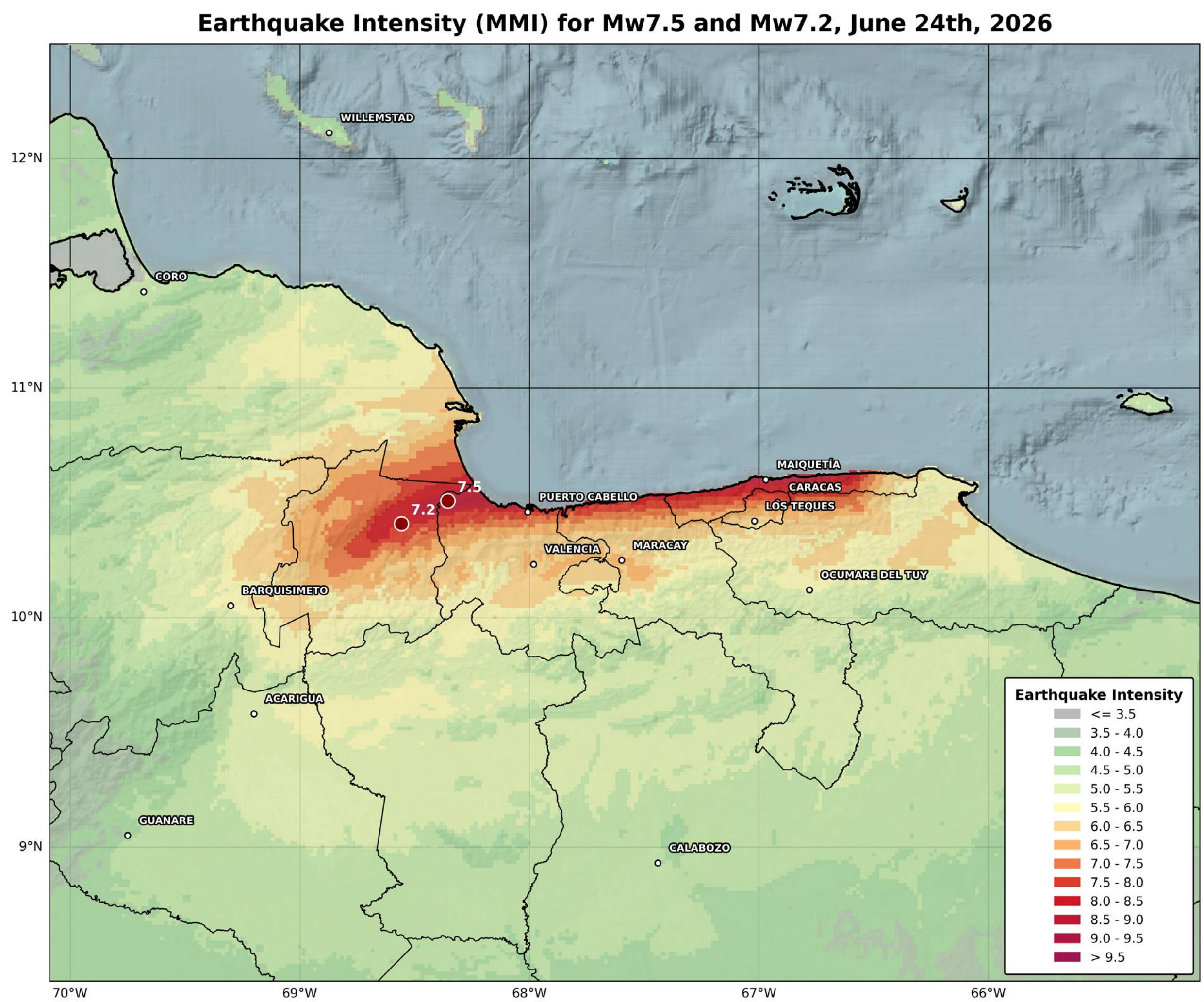


Figure 4. GRADE ShakeMap for the June 24, 2026, doublet M_w 7.2 and M_w 7.5 Venezuela Earthquakes



2.2 Exposure Modeling

The GRADE assessment included the development of a comprehensive building, contents, and infrastructure exposure model[24] for Venezuela, building on prior national and regional exposure studies, capital stock modelling, engineering assessments, construction sector information, and a wide range of spatial datasets. A more detailed description of the methodology is given in Annex E.

The building exposure model distributes the building stock across 53 principal typologies, comprising 18 residential and 35 non-residential typologies, with additional differentiation by urban and rural setting, building height and number of stories. The non-residential stock includes commercial, industrial, public, institutional and other forms of fixed capital. Unit costs of construction (UCCs) were developed for the different structural typologies, occupancies, locations, quality levels and building finishes.

[24] An exposure model is a structured, geospatial inventory of the physical assets that could be damaged or destroyed by a hazard event, together with the attributes needed to estimate how much value is “exposed” and how vulnerable each asset is.

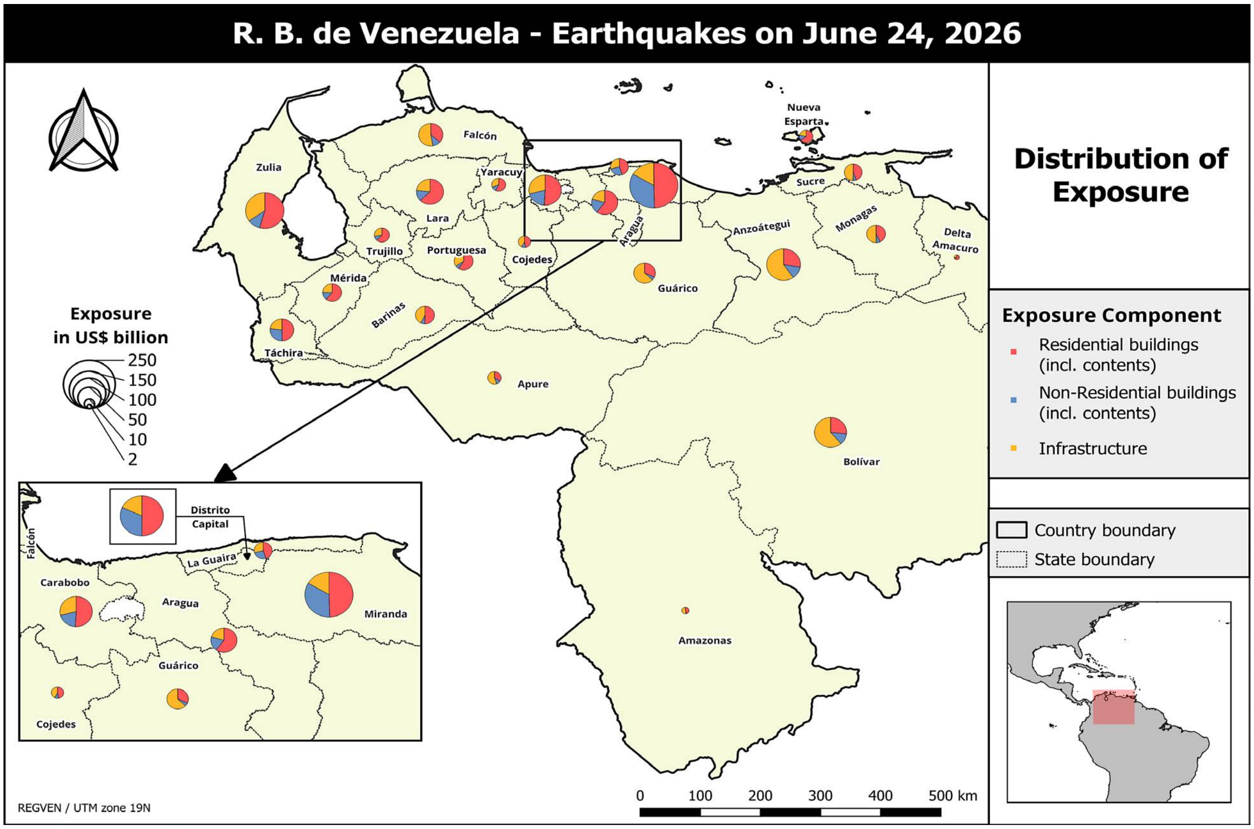
Infrastructure exposure was developed using global and local databases, including transport, power, Information and Communications Technology (ICT), industrial, and water infrastructure. Replacement values were assigned using asset-specific unit costs, lengths, areas, capacities and engineering characteristics, with checks against sectoral capital stock and reported project costs and overall capital.

The estimated nationwide exposure value shown in the table amounts to approximately US$1.41 trillion, including building contents (Table 2 and Figure 5). Residential building and contents exposure is estimated at approximately US$667.3 billion, while non-residential building and contents exposure is approximately US$264.7 billion. The combined building stock therefore accounts for approximately US$932.0 billion, or around 66 percent of the modelled built capital stock. Infrastructure exposure is estimated at approximately US$474.0 billion, representing the remaining 34 percent.

Table 2. Exposure for Venezuela by asset class and administrative division. Total exposure refers to the sum of the buildings and infrastructure exposure. The data bars illustrate both the relative magnitude of the exposure in each state and the differing composition of residential, non-residential and infrastructure capital. The color bars indicate the relative exposure of each state as a proportion of national exposure within each asset class (i.e. each column)

State	Total Residential Exposure incl. Contents ($US mn)	Total Non-Residential Exposure incl. Contents ($US mn)	Total Infrastructure Exposure ($US mn)	Total Exposure ($US mn)
Distrito Capital	86,878	55,423	31,763	174,065
Amazonas	2,224	149	2,681	5,054
Anzoátegui	29,721	13,559	63,832	107,112
Apure	5,793	1,785	9,455	17,033
Aragua	38,505	12,292	13,083	63,881
Barinas	17,198	2,199	14,470	33,867
Bolívar	25,794	11,639	59,268	96,701
Carabobo	50,055	19,689	28,634	98,378
Cojedes	6,722	1,427	6,052	14,202
Delta Amacuro	1,795	196	728	2,719
Falcón	20,231	5,889	29,265	55,385
Guárico	13,887	2,296	27,513	43,697
Lara	43,507	9,505	16,107	69,119
Mérida	20,454	4,701	8,437	33,591
Miranda	107,630	73,763	35,815	217,208
Monagas	14,199	2,357	16,639	33,195
Nueva Esparta	11,186	2,331	3,724	17,241
Portuguesa	19,623	2,269	11,436	33,328
Sucre	13,156	1,820	14,650	29,626
Táchira	26,206	14,355	12,213	52,775
Trujillo	13,381	2,180	5,931	21,492
Yaracuy	10,494	2,131	5,711	18,336
Zulia	75,070	15,047	47,860	137,977
La Guaira	13,549	7,704	8,715	29,968
Total	**667,260**	**264,707**	**473,983**	**1,405,949**

Figure 5. Exposure map for Venezuela by state and exposure asset class.



The GRADE exposure model consists of the costs of direct physical damage rather than the wider economic losses arising from disruption, reduced production, displacement or interruption of services, which should be assessed in future studies. It contains the value of repair or replacement of affected assets based on their pre-event, or "as was", capital replacement values. Actual reconstruction costs can be significantly higher with build back better costs or other improvements.

There is a higher degree of uncertainty than usual in the GRADE exposure estimates due to:

- Volatile construction cost indices resulting from high inflation (in the order of 60 percent annually), as well as fluctuations in the exchange rate.
- Material costs that are currently highly volatile are typically higher and more volatile after major disasters. While this primarily impacts reconstruction and recovery costs rather than damage estimates, this is still a major source of uncertainty.

These uncertainties have been dealt with rigorously through assessments of datasets for accuracy and completeness, calibration and validation, and cross-checking and triangulation of sources and data.

3.0
Estimation of Direct Damage to Physical Assets

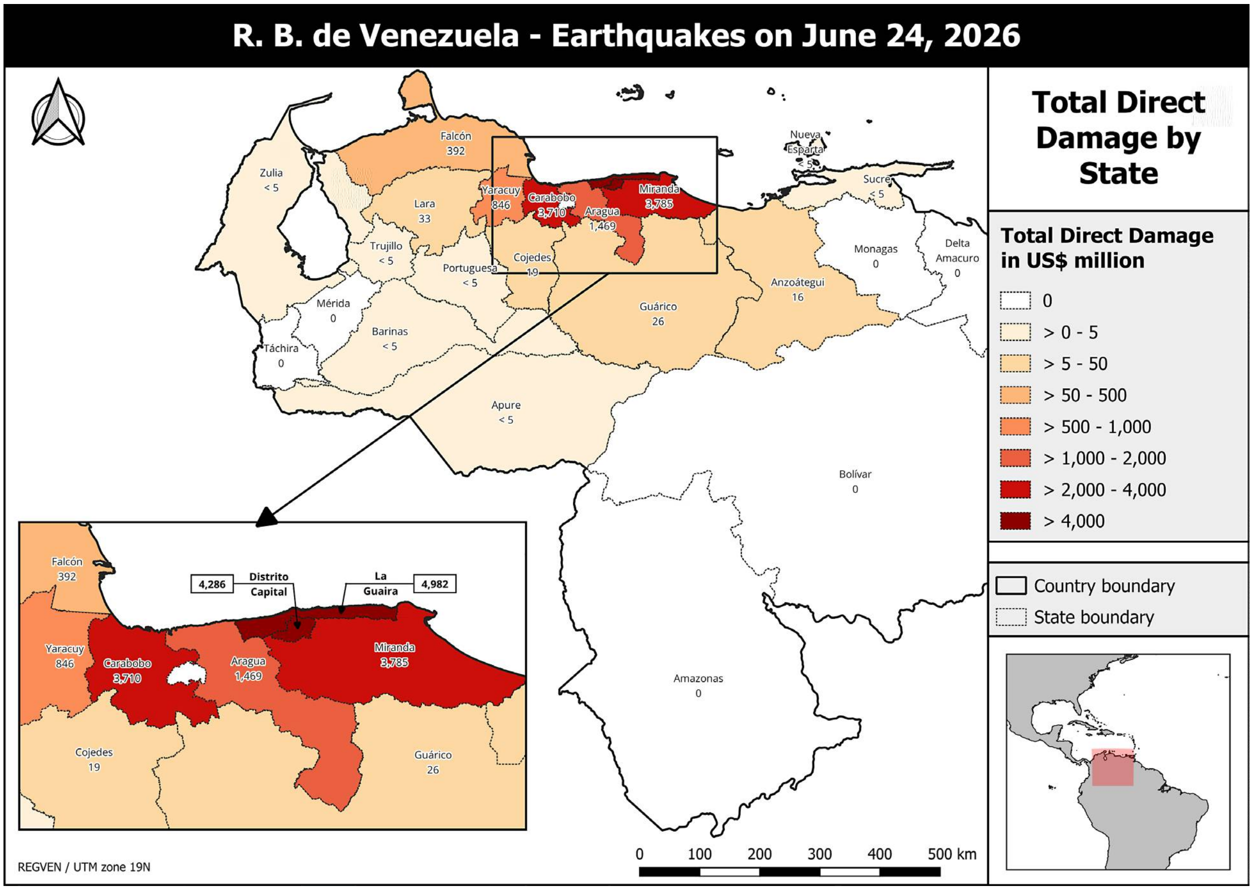
Direct damage from the earthquakes is estimated at US$19.6 billion. The direct damage is dominated by damage to residential buildings (US$9.3 billion or 47.5 percent of total damage), and non-residential buildings (US$5.0 billion or 25.7 percent of total damage), while effects on infrastructure were slightly higher at US$5.2 billion or 26.7 percent of the total damage. The GRADE report only considers damage and does not calculate losses or needs due to the event.

Of the total damage, 25.4 percent occurred in the state of La Guaira (population 0.3 million), followed by 21.8 percent in Distrito Capital (population 1.8–2.0 million) and 19.8 percent in Miranda state (population 2.8 million) (see Table 3 and Figure 6). There was also major damage in Miranda and Carabobo states in addition to Aragua, Yaracuy and Falcon. See Annex F for maps of damage by asset class.

Table 3. Damage estimated by GRADE by asset class and by state, in US$ millions.

State	Total Residential Damage incl. Contents ($US mn)	Total Non-Residential Damage incl. Contents ($US mn)	Total Infrastructure Damage ($US mn)	Total Damage ($US mn)
La Guaira	2,624	1,279	1,078	**4,982**
Distrito Capital	1,665	1,705	917	**4,286**
Miranda	1,404	1,216	1,166	**3,785**
Carabobo	1,887	486	1,337	**3,710**
Aragua	933	223	313	**1,469**
Yaracuy	524	71	251	**846**
Falcón	219	41	132	**392**
Lara	19	4	10	**33**
Guárico	14	2	10	**26**
Cojedes	9	1	8	**19**
Anzoátegui	6	3	7	**16**
Other States	10	1	4	**15**
Total	**9,312**	**5,031**	**5,235**	**19,579**

Figure 6. Map of the estimated total damage by state in absolute values (in US$ million).



Damage as a proportion of total exposed value (TEV) is highest in La Guaira, as shown in Table 4 and Figure 7**.** In La Guaira, damage is estimated at 19.4 percent of the residential exposure value, 16.6 percent of non-residential exposure value, and almost 12.5 percent of infrastructure exposure. Distrito Capital experienced lesser shaking and has higher exposure values, so damage is estimated at just 1.9 percent of residential buildings exposure, 3.1 percent of non-residential buildings exposure, and 2.9 percent of the infrastructure exposure value. Yaracuy and Carabobo had 4.6 percent and 3.8 percent of their capital stock damaged, respectively.

Table 4. Damage estimated by GRADE by asset class and by state, as a proportion of total exposed value (TEV).

State	Total Residential Damage incl. Contents (as a % of TEV)	Total Non-Residential Damage incl. Contents (as a % of TEV)	Total Infrastructure Damage (as a % of TEV)	Total Damage (as a % of TEV)
La Guaira	19.37%	16.60%	12.37%	**16.62%**
Yaracuy	5.00%	3.34%	4.39%	**4.62%**
Carabobo	3.77%	2.47%	4.67%	**3.77%**
Distrito Capital	1.92%	3.08%	2.89%	**2.46%**
Aragua	2.42%	1.81%	2.39%	**2.30%**
Miranda	1.30%	1.65%	3.26%	**1.74%**
Falcón	1.08%	0.69%	0.45%	**0.71%**
Cojedes	0.13%	0.10%	0.14%	**0.13%**
Guárico	0.10%	0.08%	0.04%	**0.06%**
Lara	0.04%	0.04%	0.06%	**0.05%**
Other States	<0.02%	<0.02%	<0.02%	**<0.02%**
Total	**1.40%**	**1.90%**	**1.10%**	**1.39%**

Figure 7. Map of the estimated damage by state as a proportion of exposed asset class.

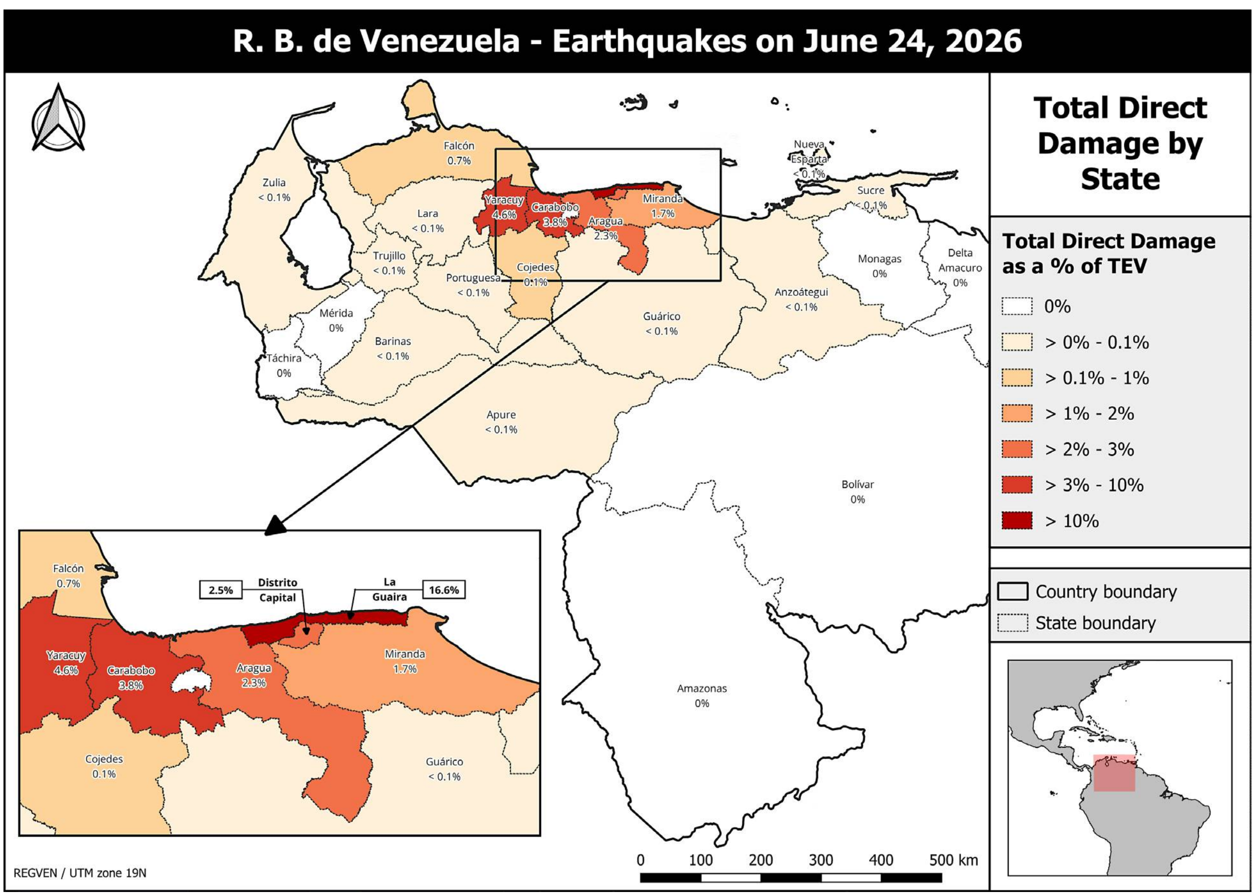


Photo credit: Luis Alejandro Hernández Maldonado.

4.0 Discussion and Interpretation of Results

4.1 Results

The estimates are dominated by damage to buildings which account for over 73 percent of the total US$19.6 billion in damage. Residential buildings account for 47 percent of the total, while damage to non-residential buildings account for 26 percent of the total. Apartment buildings and non-residential larger buildings were particularly vulnerable to the ground motions which occurred towards the east as a result of the directivity and large ground displacements. Overall, smaller buildings also showed a range of damage states, from slight damage to total collapse, but the highest fatalities were caused by the pancake collapse of mid- to high-rise apartment buildings, especially in La Guaira.

Many of the building typologies observed to have suffered damaged are made from masonry, or reinforced concrete frames with masonry infill, which when not designed properly with adequate seismic structural detailing, can be very vulnerable to ground shaking. This has been observed consistently in the most damaging earthquakes in recent history across Latin America (e.g. Earthquake Engineering Field Investigation Team (EEFIT), 1985; 1999; 2008; 2010; 2016).

In terms of damage patterns, the M_w 7.5 earthquake directed a significant amount of the ground shaking towards the east, causing major damage in La Guaira, Miranda, Distrito Capital and other locations along the fault rupture such as Yaraguy, Aragua, and Carabobo. The M_w7.2 also played a role in the damage towards the west. Damage in La Guaira amounts to nearly 17 percent of the state's capital stock, which is very high and indicative of the substantial destruction experienced in this state.

Factors such as proximity to fault lines, soil/ground conditions, engineering code compliance, and stakeholder and community preparedness can have a huge bearing on concentrations of seismic risk. As reconstruction strategies and plans are developed, it will be critical for decision makers to fully understand the details of the risks faced across Venezuela.

Critical infrastructure also suffered considerable impacts, although compared to damage patterns observed from other earthquakes, the impacts on infrastructure are relatively lower (when compared to the damage to buildings). This pattern is most likely due to spatial distribution of infrastructure assets and the specific characteristics of the ground shaking which was of a frequency and duration that would tend to cause more damage to buildings.

4.2 Limitations of GRADE

The cost of building back better through, for example, structural improvements or upgrading the construction type, are not included in GRADE estimations. GRADE calculates the replacement cost of the asset to reinstate it to the state it was in just prior to the earthquake. As previously indicated, the reconstruction costs, which include the costs of upgrades as well as debris clearance and related costs, can be two to two-and-a-half times the replacement costs.

Further, GRADE does not calculate losses or needs. Patterns from past events globally indicate that they could be between 50 and 200 percent of the damage in such earthquakes. Most lie between 70 and 150 percent; however, there are outliers in both directions. Although nearly 60 years ago, it is interesting to note that for the Caracas 1967 event, the losses and needs were over 100 percent of the direct damage in some estimates; for Ecuador in 1987 with large issues for their oil pipeline that were not observed in Venezuela (so the value of comparison is limited), the losses were over four times the value of the damage. In Guatemala in 1976, a similar scale event as the present event, the loss value was similar to the damage value. Further afield, for the 2015 Nepal earthquake, the losses and needs were estimated as 159 percent of the damage, a relatively high value primarily due to large infrastructure losses that caused substantial impacts on economic sectors, and the needs of a large number of poor and remote affected communities.

GRADE is a first-order estimation that assesses damage remotely. While calibration is a large part of the methodology, this is completed remotely using whatever data is available. In the first weeks after a disaster, comprehensive and accurate information about damage is usually not available, resulting in uncertainties in the process; and while the GRADE methodology mitigates these uncertainties, some do remain. As time passes after a disaster, better information about the damage is available and therefore assessments that take longer can rely on improved data for their analysis. Despite this large advantage, on average, GRADE delivers results with around 90 percent accuracy compared to the longer assessments (World Bank, 2025).

GRADE is not the only approach that has estimated the damage caused by the earthquakes in Venezuela, and as is often the case, there are some large variations in published estimates. The differences between estimates can be due to numerous factors, but usually key differences are three-fold. First, different approaches include, or exclude, or classify assets differently. For example, some assessments include buildings contents and others do not. Second, there can be large methodological differences as different models are used to generate estimates, but often differences arise in the levels of calibration and validation, if any, that is undertaken. Third, there are discrepancies caused by the use of different datasets and the associated assumptions made. GRADE draws in data from multiple publicly available sources to ensure it is reliable and our assumptions are well researched, justified, and transparent. GRADE relies heavily on reported damage date to calibrate and ground-truth the modelled results. It takes typically around 2 weeks post-disaster for reported damage data to get the levels of accuracy and completeness for this process. The differences and the issues associated with comparisons are discussed in detail in World Bank (2025). Overall, GRADE is a well-established, open method that delivers reliable results globally. Considering all these assumptions, the GRADE estimate lies between some of the other modeled estimates that range from US$6 billion to US$37 billion (H. Crowley and V. Silva, personal communication, July 2026; UNDRR, 2026).

4.3 Macroeconomic Impact

Macroeconomic modeling[25] shows that the pace of reconstruction will play a decisive role in shaping economic and social impact. If public and private investment remain at their current levels, recon-

[25] Results are based on the World Bank's standard MFMOD macro-structural forecasting model, as documented in Burns, Andrew; Campagne, Benoit; Jooste, Charl; Stephan, David; Bui, Thi Thanh. 2019. The World Bank Macro-Fiscal Model Technical Description. Policy Research Working Paper;No. 8965..

struction would need to be financed by diverting resources away from other productive investments. By scaling up public and private investment, reconstruction could be accelerated, mitigating the earthquakes' economic and social effects: If higher public investment front-loads reconstruction, transfers to affected households mitigate consumption losses, and complementary policy measures unlock higher private investment, productive capacity is restored more rapidly, and household losses are cushioned. Modeling results described in this chapter (Figure 8) highlight these dynamics by comparing macroeconomic outcomes under a scenario with no acceleration in public or private investment to a potential policy response scenario along the lines described above.

The damages documented by the GRADE reduce Venezuela's productive capital stock, which can have lasting effects on future economic activity. In accordance with GRADE results, the earthquakes' effect is modeled as a one-off destruction of US$19.6 billion in the country's capital stock, equivalent to approximately 1.7 percent of the total capital stock. In addition, direct economic losses, which are not part of the GRADE results, are approximated as a 1 percent reduction of labor supply in 2026[26]. The results compare the macroeconomic impact under two hypothetical reconstruction scenarios:

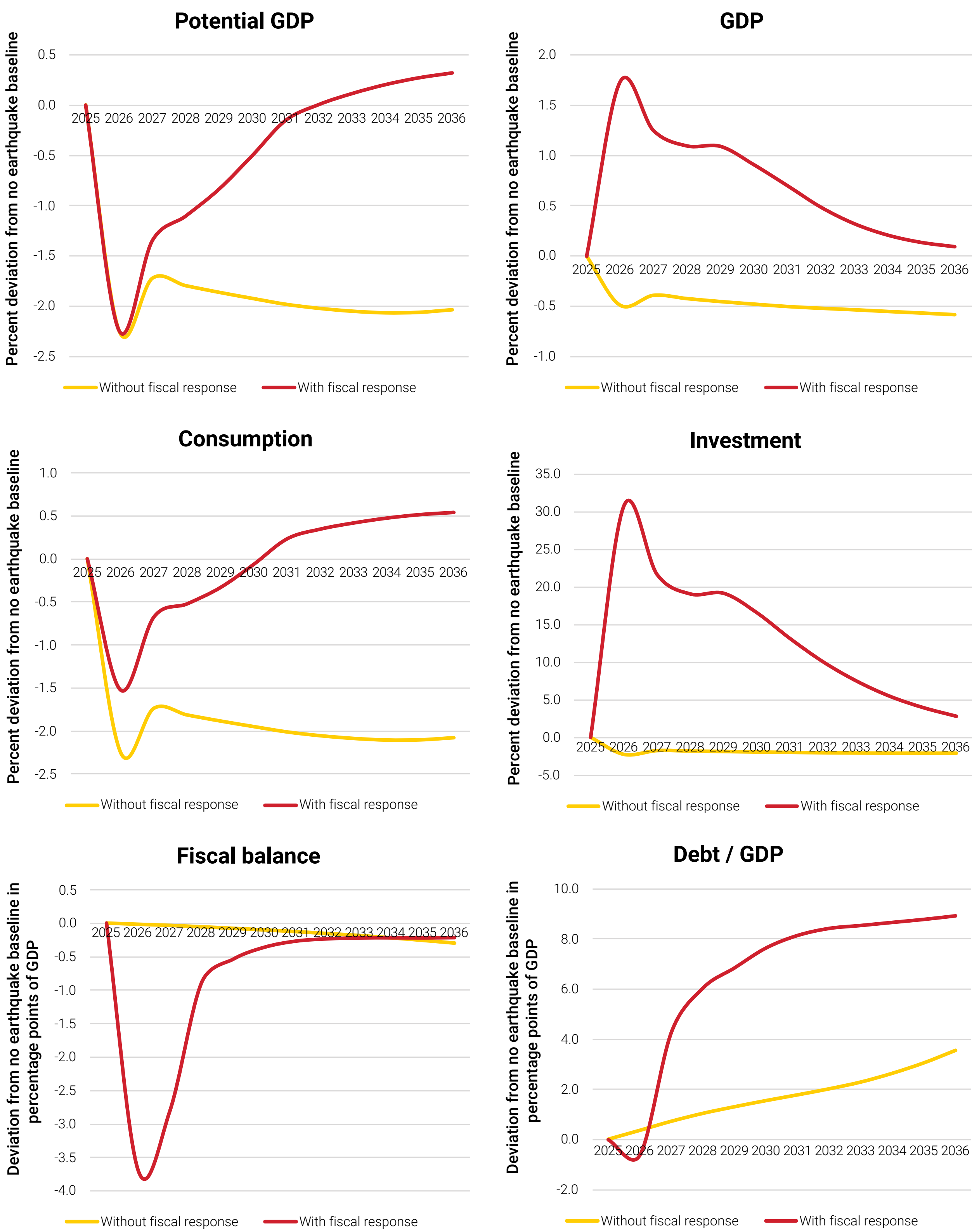
- In the first scenario, reconstruction is constrained to current public and private investment levels and can only be financed through the reallocation of resources from other investment projects. This scenario results in incomplete reconstruction over a 10-year forecast horizon while crowding out other priority investments due to reallocation to the reconstruction effort.
- The second scenario assumes reconstruction is supported initially by increased public investment, to be gradually complemented by improvements in the enabling environment for private investment. In addition, fiscal transfers of US$500 million are put in place to support affected households in 2026 and 2027. Under this scenario, Venezuela mobilizes US$9.8 billion in additional financing to support the fiscal response, alongside US$9.6 billion in additional private investment over a five-year reconstruction period.

The combination of increased public investment and a gradual increase in private investment restores productive capacity (potential GDP) to its pre-earthquake trajectory by 2032. Given the increase in investment during the first years of the reconstruction phase, real GDP rises above the baseline in 2026 before gradually returning to its pre-earthquake level over the 10-year forecast horizon. In the absence of a fiscal response, productive capacity and economic activity remain suppressed over the 10-year forecast horizon. With reconstruction constrained to current investment levels, 2036 productive capacity remains 2 percent below baseline due to the persistent reduction in the capital stock, and real GDP remains 0.6 percent below baseline.

Even with a fiscal compensation package, consumption losses amount to 1.5 percent in 2026 and return to baseline levels by 2031. These losses are significant given the country's already precarious humanitarian situation, and they would likely be concentrated on the most affected regions. Without a fiscal response, the effects of the earthquake weigh even more heavily on consumption. In the short term, the impact of the earthquake on consumption rises to 2.3 percent over the baseline in 2026 without a compensation package. More alarmingly, without swift reconstruction, the losses in productive

[26] Using earthquake effect intensity data from USGS shakemap and population data from 2026 WorldPop, the population in MMI shake intensity categories VI (felt by all), VII (very strong) and VII and above (severe, violent, or catastrophic) is 6.1, 3.5, and 0.7 million respectively. Applying state level employment rates from the ENCOVI survey and assuming average work disruption of 2 days, 2 weeks, and 8 weeks for inhabitants of MMI zones 6, 7 and 8+ respectively would yield a loss of approximately 5.3 million work weeks, or 1.0 percent of total estimated work weeks in 2026.

Figure 8. Model results on macroeconomic impact of earthquake with and without fiscal response



capacity and diversion of resources continue to weigh on consumption, which remains 2.1 percent below baseline by 2036.

The resources required for a fiscal response package would add to Venezuela's already large debt stock, but stronger growth would gradually strengthen the fiscal position compared to a no-response scenario. The response package would raise the fiscal deficit by 3.7 and 2.8 percent of GDP respectively in 2026 and 2027, before gradually returning to the pre-earthquake baseline. Assuming that the additional spending is fully financed through non-concessional external debt, it would add 8.1 percentage points to Venezuela's debt to GDP ratio by 2036. In the absence of an increase in investment, the fiscal balance would initially remain unchanged but deteriorate over the forecast horizon due to lower revenue as economic activity remains suppressed. The combination of higher deficits and lower GDP growth would continue to raise the debt to GDP ratio over the forecast horizon, leaving it 3.6 percentage points above baseline by 2036 with an increasing trend.

4.4 Social Vulnerability, Pre-Existing Vulnerabilities, Compounding Shocks, and the Context for Recovery

Social vulnerability to disasters cannot be understood through a single social characteristic such as age, income, or housing quality[27]. It emerges from the interaction of demographic, social, economic, health, housing, environmental, and institutional conditions. These conditions must be interpreted within their local context[28], while recognizing that any assessment is constrained by the coverage and quality of the available data[29].

This rapid analysis uses weighted household estimates from the National Survey of Living Conditions of Venezuela 2025 (*Encuesta Nacional de Condiciones de Vida* **(ENCOVI)**) **to examine a broad set of social attributes and explore the impacts of the June 24 earthquakes in Venezuela.** The analysis focuses on the seven most affected states: La Guaira, Distrito Capital, Miranda, Carabobo, Aragua, Yaracuy, and Falcón[30]. To place this analysis in national perspective, these seven states make up fewer than a third of Venezuela's 24 states; yet they are home to roughly 11.5 million people, about 40 percent of the country's estimated population of 28.5 million. These seven states also concentrate close to half (47 percent) of the nation's exposed building and infrastructure stock, worth about US$657 billion of a national total of US$1.4 trillion (Table 2). Social vulnerability profiles for the most affected states can be found in Figure 9.

All of the highest impacted states display pre-existing social vulnerabilities. These are discussed in detail in Annex G, but notably, La Guaira and Distrito Capital combine high physical impacts with several demographic and health-related vulnerabilities. The findings indicate that disaster recovery may benefit from restoring and maintaining access to basic services. Service interruptions are especially consequential for vulnerable households and can even generate impacts in places where physical building damage is comparatively low.

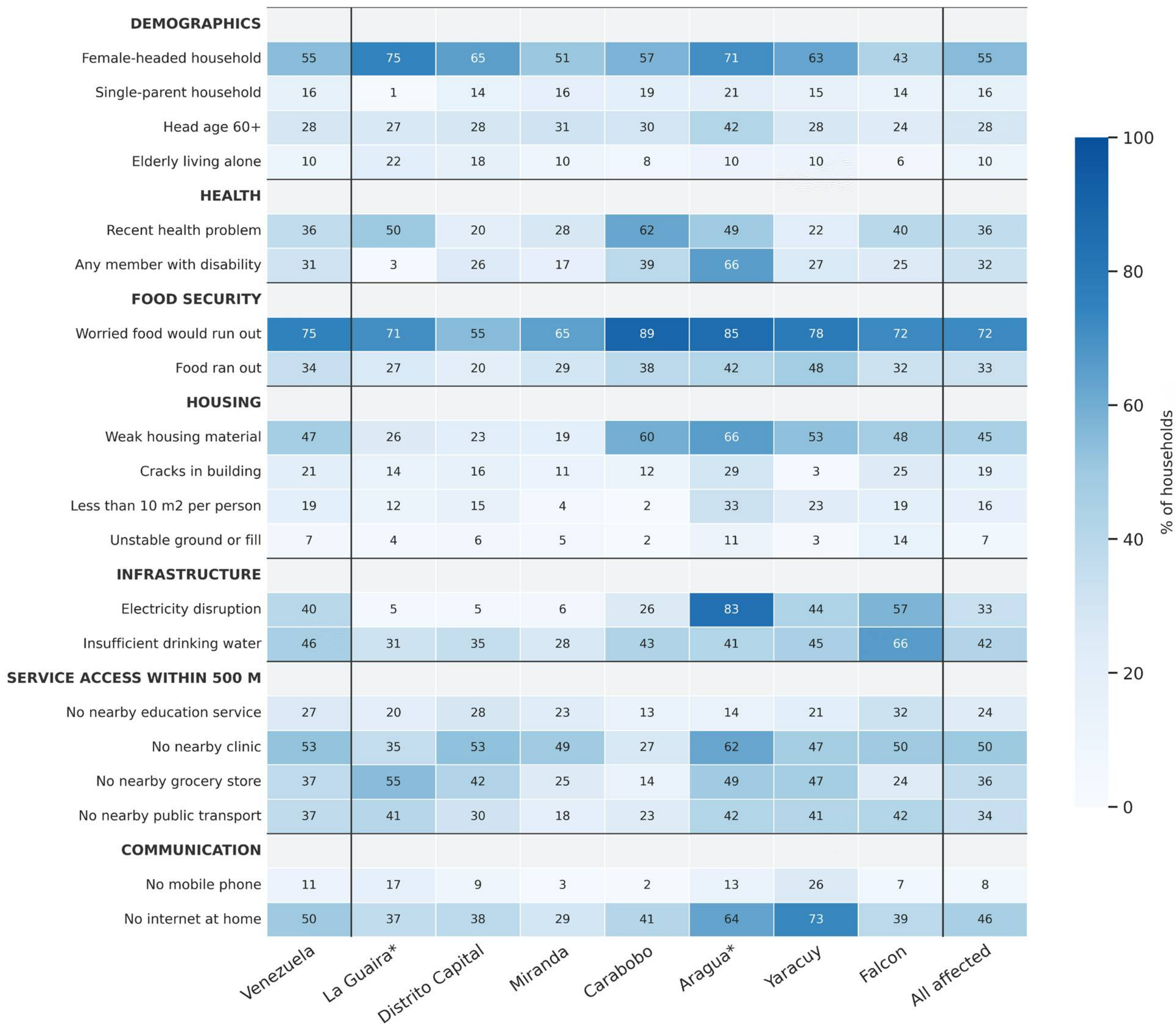
[27] Stolte, T. R., Koks, E. E., de Moel, H., Reimann, L., van Vliet, J., de Ruiter, M. C., & Ward, P. J. (2024). VulneraCity–drivers and dynamics of urban vulnerability based on a global systematic literature review. *International Journal of Disaster Risk Reduction, 108, 104535.*

[28] Kuhlicke, C., Scolobig, A., Tapsell, S., Steinführer, A., & De Marchi, B. (2011). Contextualizing social vulnerability: findings from case studies across Europe. *Natural hazards, 58(2), 789-810.*

[29] Burton, C. G., Toquica, M., Asad, K. M. B., & Musori, M. (2022). Validation and development of composite indices for measuring vulnerability to earthquakes using a socio-economic perspective. Natural Hazards, 111(2), 1301-1334.

[30] ENCOVI 2025 was not designed to be representative of the states of La Guaira (formerly Vargas), Aragua, and Carabobo. Additionally, Guárico and Cojedes have relatively small survey samples. Results for these states should be interpreted with caution. The reported percentages may therefore be sensitive to a small number of observations and should be treated as indicative patterns rather than precise population estimates.

Figure 9. Pre-earthquake social vulnerability profiles in the seven most affected states. Cells show the weighted percentage of households reporting each demographic, health, food-security, housing, infrastructure, service access within 500 meters of where the household lives, and communication conditions, based on ENCOVI 2025. Estimates marked with an asterisk are based on relatively small state samples or were not designed to be representative and should be interpreted cautiously.

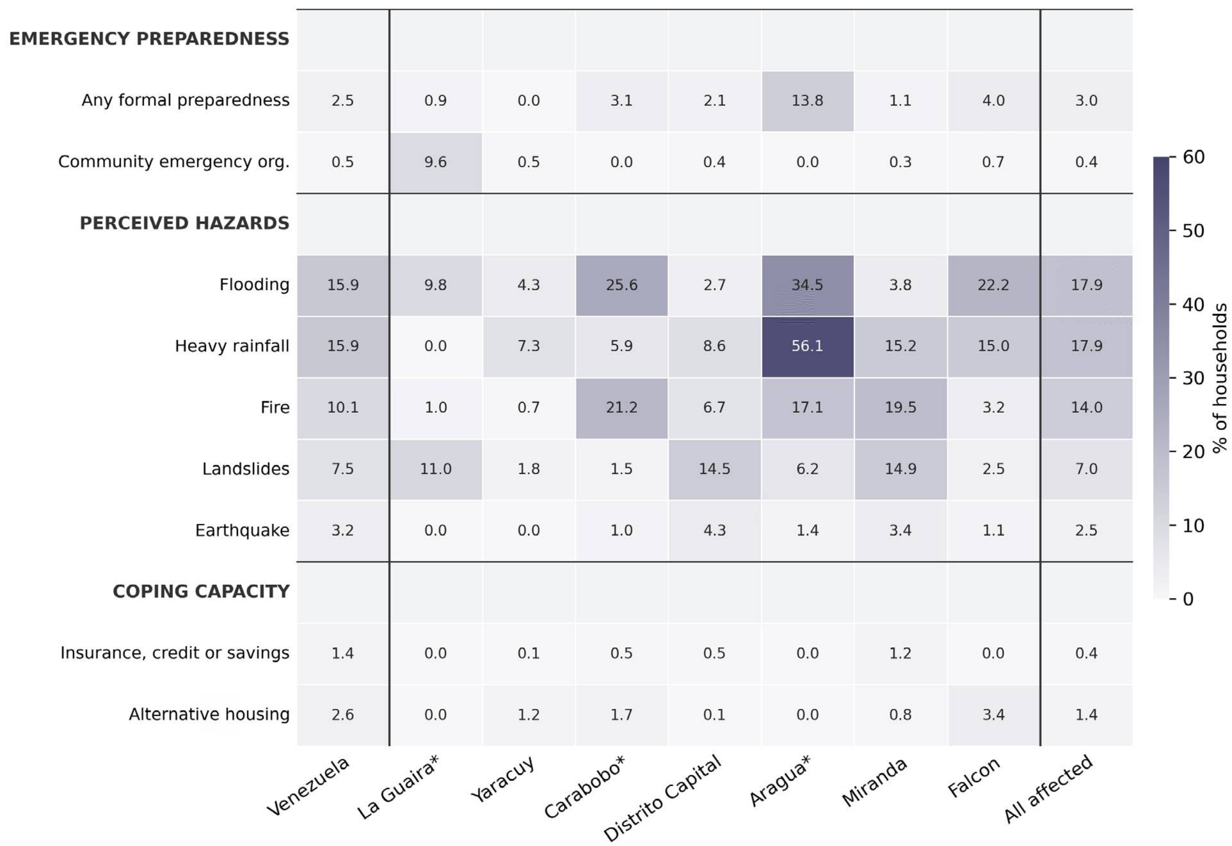


Household vulnerability must also be considered in relation to the broader environment in which households prepare for and respond to emergencies (Figure 10). The low level of preparedness observed represents an important gap, but it also identifies practical opportunities for risk reduction.

These findings should be interpreted cautiously. First, ENCOVI was not designed to be representative of La Guaira, Aragua, and Carabobo. The reported percentages may therefore be sensitive to a small number of observations and should be treated as indicative patterns rather than precise population estimates. Second, as the survey predates the earthquake, subsequent changes happening in the country may not be fully reflected in the resulting figures. Third, there might be significant within- and between-state variations, including urban-versus-rural differences. The least urbanized affected states and the ones containing rural communities may face comparatively high levels of multidimensional deprivation.

Recovery efforts concentrated primarily on highly urbanized areas may therefore overlook dispersed rural populations that face distinct barriers to accessing assistance and essential services.

Figure 10. Household preparedness, perceived hazards, and recovery capacity in the seven most affected states. Values show weighted percentages of households reporting formal preparedness, access to a community emergency organization, selected perceived hazards, insurance, credit or savings, and alternative housing. Estimates marked with an asterisk are based on relatively small state samples or were not designed to be representative and should be interpreted cautiously

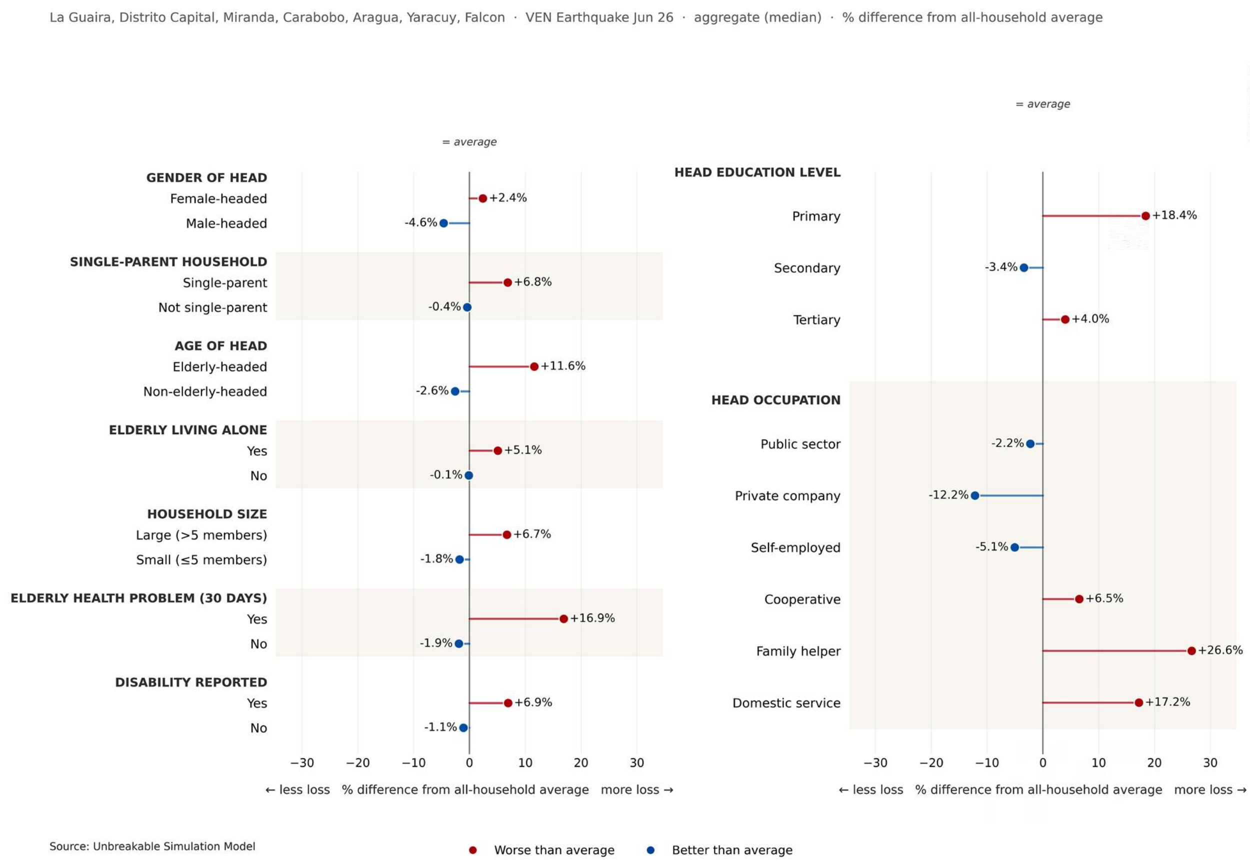


Modelled results suggest that vulnerable populations are likely to be affected disproportionately. To better understand the potential distributional impacts of the disaster on households of different social groups in Venezuela, the GRADE team utilized the "Unbreakable"[31] simulation model of household socio-economic resilience. The model integrates household-level data from ENCOVI 2025 with GRADE's exposure and damage data. The model estimates potential household-level consumption losses due to the disaster from: (i) households needing to spare some of their consumption budget to restore their damaged assets, and (ii) households losing some of their income due to damaged productive assets which generate that income. Figure 11 presents the estimated consumption loss of each household group relative to the average modelled loss among all households in the seven-state

[31] See the following publications for an elaborate explanation of the simulation model: https://openknowledge.worldbank.org/entities/publication/d361b0da-305d-5a94-8444-f99e4360cb67 or https://documents1.worldbank.org/curated/en/173611568643337991/pdf/Socioeconomic-Resilience-in-Sri-Lanka-Natural-Disaster-Poverty-and-Wellbeing-Impact-Assessment.pdf.

analytical sample. Positive values indicate losses above this average, while negative values indicate lower-than-average losses.

Figure 11. Estimated differences in household consumption losses among social groups in the seven most affected states. Values represent the percentage difference between each group's modelled consumption loss and the average loss among all households included in the seven-state analytical sample. Positive red values indicate above-average losses; negative blue values indicate below-average losses. Results are produced using the Unbreakable Simulation Model and should be interpreted as modelled group differences rather than as the independent causal effects of individual household characteristics.



The analysis finds that consumption losses may be concentrated among households with greater care needs, dependency, health constraints, or less secure forms of employment. Health-related characteristics are associated with some of the largest disparities. Education level is associated with differences in losses, although the relationship is not linear. Some of the largest differences appear across occupational groups.

Overall, the results suggest that the disaster may act to deepen pre-existing inequalities rather than affect households uniformly. Recovery support should therefore extend beyond compensation for physical damage.

The limited institutional capacity and human capital base are some of the constraints on the pace and quality of response and future recovery. Over 7.9 million Venezuelans have emigrated since 2015, disproportionately drawn from the professional and technical workforce whose expertise would be indispensable to reconstruction programming[32]. Public institutions had already lost between 30 and 50 percent of their personnel prior to the earthquake, with public hospitals reporting specialist vacancy rates of 50 to 70 percent[33]. In the immediate aftermath of the earthquakes, this deficit translated directly into an emergency response system operating well below minimum functional thresholds[34]: hospitals in the affected states, already running on lower staffing and facing chronic shortages of medicines and equipment, were overwhelmed within hours; and search and rescue capacity was insufficient to the scale of the collapse. Similarly, for infrastructure reconstruction at the scale needed, the professional construction corps will need to be reinforced. Rebuilding institutional capacity of this depth is typically a decade-long process, so recovery strategies will need to consider implementation capacity as a key constraint.

Annex G and H provide more detailed discussions of these results.

4.5 Gender Considerations

Pre-existing socioeconomic vulnerabilities and disparities in access to essential services may exacerbate the impacts of the disaster on women, girls, children, older persons, persons with disabilities, and other vulnerable groups. Sex-disaggregated data on affected populations are not yet available, but humanitarian organizations have emphasized that existing inequalities will shape disaster impacts and recovery needs. Disruptions to livelihoods, services and community support systems may further increase unpaid caregiving responsibilities and barriers to accessing health care, protection services, and economic opportunities, particularly for women and girls (UN Women, 2026; UNOCHA, 2026).

Initial humanitarian assessments highlight critical gaps in health, protection, and social services for populations with specific needs. The United Nations Population Fund (UNFPA) has prioritized sexual and reproductive health care, emergency obstetric care, family planning, and gender-based violence (GBV) prevention and response, while the United Nations Children's Fund (UNICEF) has underscored the need to protect children and adolescents through psychosocial support, education continuity, and child protection services. Displacement and temporary shelter conditions may also increase protection risks across these areas (PAHO, 2026; UNFPA, 2026; UNICEF, 2026; UNOCHA, 2026).

A gender-responsive and inclusive recovery is essential to ensure that assistance reaches those with the greatest needs and contributes to building resilience. UN Women has called for placing women and girls at the center of the humanitarian response and ensuring their meaningful participation in decision-making. Recovery planning should therefore incorporate sex-, age-, and disability-disaggregated data; restore resilient and accessible health systems, protection, education, and social services; and ensure that shelters, infrastructure, and livelihood support programs address the differentiated needs of all vulnerable groups (UN Women, 2026; PAHO, 2026; UNOCHA, 2026; UNFPA, 2026).

[32] https://respuestavenezolanos.iom.int/en/about-regional-venezuela-situation
[33] https://bti-project.org/en/reports/country-report/VEN
[34] https://news.un.org/en/story/2026/07/1167868


Photo credit: Valeria Alejandra Marchán Martínez.

5.0
Conclusions

The GRADE assessment of direct economic damage to physical assets from the June 24, 2026, M_w 7.2 and M_w 7.5 earthquakes in Venezuela determined that damage was most severe in the northern central coastal regions, particularly in La Guaira state and Distrito Capital. The GRADE best estimate of total direct economic damage is US$19.6 billion, expressed in replacement value terms. This figure does not include economic losses, indirect impacts, or reconstruction needs, which are expected to be substantially higher once comprehensive post-disaster needs assessments are completed. Buildings account for the largest share of damage, representing approximately 73 percent of the total estimate. Residential buildings suffered the greatest absolute damage at US$9.3 billion (approximately 47.5 percent of total damage), reflecting the high concentration of seismically vulnerable housing stock in the most severely affected states. Non-residential buildings and infrastructure account for the remaining damage, underscoring the breadth of the event's impact across productive and public assets alike.

The geographic concentration of damage in La Guaira and Distrito Capital — together accounting for approximately 47 percent of total estimated damage — reflects both the high levels of ground shaking and the vulnerability of the built environment in the urban coastal zones. Impacts were recorded across northwestern and north-central Venezuela, including in Miranda, Aragua, and Carabobo states, indicating that the event's footprint extends well beyond the most severely affected localities.

The pace of reconstruction will play a decisive role in shaping economic recovery and social impact. If Venezuela can increase public and private investment to support reconstruction financing and support affected households, the loss in economic activity and the social impact can be mitigated. This is illustrated by the World Bank's macroeconomic modelling results that compare a potential response package in the form of accelerated public investment, transfers to affected households, and measures to enable more private investment, to an outcome which restricts investment to current levels. In the response package scenario, productive capacity and household consumption are restored to their pre-earthquake path by 2031/32. Conversely, with no fiscal response, reconstruction would remain incomplete over a 10-year forecast horizon, with lasting negative effects on economic activity and household consumption.

Earthquake impacts may extend beyond physical damage and are influenced by households' pre-existing conditions and access to services and recovery resources. Although vulnerability profiles differ across affected states, demographic and health pressures, limited preparedness, constrained coping mechanisms, and potential service interruptions are recurring concerns. The microsimulation results suggest that some household groups may experience above-average consumption impacts, particularly those facing health constraints, care responsibilities, or less secure employment. Recovery planning should therefore combine reconstruction efforts with measures aimed at maintaining essential services continuity and targeted support.

Significant social, gender, and fragility challenges that pre-dated the earthquakes have been severely exacerbated by the disaster. Venezuela's protracted humanitarian crisis, which is characterized by economic contraction, reduced institutional capacity, limited fiscal space, and large-scale population displacement, constrains the country's ability to mount an adequate and equitable recovery response. The disaster is likely to deepen pre-existing inequalities, with disproportionate impacts expected for women, elderly populations, persons with disabilities, and those with care responsibilities. Recovery support will need to go beyond the physical replacement of damaged assets to address the specific vulnerabilities of affected populations and the structural conditions that amplify disaster risk.

This assessment is intended to serve as an initial evidence base to support emergency response, and prioritization of recovery and reconstruction interventions. It serves to inform a comprehensive reconstruction strategy that is responsive to the scale of destruction and the complexity of Venezuela's pre-existing development context.

6.0
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Photo credit: Valeria Alejandra Marchán Martínez.

Annex A.
Datasets Used

The main data-sources used in this GRADE Assessment are summarized below.

Hazard

- Parameterless Seismic Intensity methodology, Spence et al. (1991), European Macroseismic Scale, EMS-98, Grünthal (1998).
- USGS earthquake source parameters, focal mechanisms, finite-fault models, rupture geometries, slip distributions and ShakeMaps.
- GFZ earthquake source models, fault-slip products, ShakeMaps and ground-motion information.
- Directivity models based on Somerville relationships.
- NZSEE directivity and pulse-effect analysis and expert interpretation.
- USGS–GFZ fault-displacement and permanent-ground-deformation models.
- Sentinel-1 SAR and InSAR displacement products.
- Sentinel-2 optical imagery for surface rupture, landslides and ground deformation.
- EMSC felt reports and macroseismic-intensity observations.
- CATDAT historical Venezuelan and regional earthquake information.
- Published seismic hazard studies for Venezuela and neighboring countries.
- CAPRA and related regional seismic-hazard studies.
- Venezuelan university, engineering and seismological studies.

Population, Administrative and Census Data

- Venezuela 2011 Population and Housing Census.
- Instituto Nacional de Estadística de Venezuela data.
- REDATAM Venezuela census database.
- ENCOVI 2021, 2025
- WorldPop
- Official Venezuelan state, municipality and *parroquia* codes and boundaries.
- INE administrative selections and REDATAM administrative crosswalks.
- Alternative Venezuelan administrative-boundary datasets used for spatial checks.
- World Bank and UN administrative-boundary datasets used for cross-checking.

Exposure

- Capital Stock Modelling (Daniell; GAR 2015; IMF WEO (World Economic Outlook); World Bank)
- Global Program for Safer Schools study, Planopolis, Ministry data, Health statistics, other energy statistics from the government.
- Meta Relative Wealth Index, HRSL, WorldPop for population checks
- Humdata

- UN OCHA administrative boundaries and other World Bank boundaries
- SARA Venezuela Level 3 exposure data, GEM Level 1 enriched building-taxonomy datasets – different versions.
- Open Building Map Venezuela building exposure data, OBAT building footprints and building attributes.
- Overture Maps building footprints, places and land-use data.
- OpenStreetMap infrastructure and building footprints and attributes, HOTOSM building datasets, Open InfraMap
- Microsoft building footprints, Google building-footprint products, where available.
- Global Building Footprint and GloBFP products.
- GHSL built-up surface, volume, height, pop products.
- WSF3D building-height and built-volume products.
- GMVV (*Gran Misión Viviendas Venezuela*) building, housing, construction and valuation information.
- Venezuelan construction-cost publications and engineering cost guidelines, local housing-project and property-construction cost information, building vacancy-rate estimates.
- World Bank macro-economic and investment data, IMF World Economic Outlook and investment data.
- HEIGIT road-network and road-surface datasets.
- Gridfinder
- Venezuelan road and transport yearbooks.
- Government and utility asset inventories.
- Global infrastructure trackers, Global Energy Monitor datasets, Open GIS infrastructure layers.
- ArcGIS infrastructure and planning datasets published by Venezuelan organizations: Proyecto VE360 ArcGIS datasets, SIGMET2014 ArcGIS datasets, Gonzalez and related Venezuelan ArcGIS service datasets.

Vulnerability, Damage Data and Risk

- CATDAT historical earthquake damage and loss database.
- PSI methodology, Spence et al. (1991), EMS-98 building vulnerability classes and damage states.
- GEM Venezuelan building taxonomies and vulnerabilities.
- Previous Inter-American Development Bank (IDB) studies.
- Historical DaLA and PDNA earthquake assessments.
- Previous GRADE earthquake assessments.
- Venezuelan engineering surveys and construction-practice information.
- Global Seismic Code Index, building-practice and code-enforcement factors.

AI-Generated and Human-Validated Damage Data

- HOTOSM fAIr AI-derived building-damage products.
- Microsoft AI for Good Lab-derived building-damage products.
- International Charter Space and Major Disasters AI-derived and human-validated products.

Community and Geolocated Damage Data

- Yummy SOS and Yummy Rides geolocated damage reports.
- DanoVE community damage reports.

- SismoAyuda VE reports.
- TerremotoVE reports.
- terremotovenezuela reports.
- terremotovenezuelaapp reports.
- Ingenieros por Venezuela (habitable.lovable.app) reports.
- Geolocated community photographs and videos.
- Social-media building and infrastructure damage reports.
- Neighborhood and volunteer damage-mapping datasets.

SAR and InSAR Damage Data

- NASA–Oregon State University SAR-derived damage products.
- REACH SAR-derived damage products.
- Space Force SAR-derived damage products.
- Sentinel-1 coherence-change products.
- Sentinel-1 displacement and deformation products.
- InSAR-derived ground-displacement products.

Satellite and Expert-Interpreted Damage Data

- Copernicus Emergency Management Service EMSR884 products.
- UNOSAT satellite-derived building-damage products.
- UNOSAT damaged built-up-area products.
- SERTIT satellite-derived damage assessments.
- INSARAG damage observations.
- International Charter Space and Major Disasters products.
- Earth Observatory of Singapore - Remote Sensing (EOS-RS) damage proxy maps
- Pre- and post-event optical satellite imagery, i.e. Vantor, Planet
- Remote-sensing building-damage surveys.

Expert and Official Damage Data

- CHACAOSolidary building damage reports.
- Other municipal and state engineering inspections and expert reports.

Other Damage Data and Observation Sources

- Government reported damage data, updates and observations
- Ministry reported damage data, disaster incident data, updates and observations via official websites and social media channels including:
  - *Ministerio de Comunicación e Información (MIPPCI)*
  - *Ministerio del Poder Popular para el Transporte (MPPT)*
  - *Ministerio del Poder Popular para la Energía Eléctrica (MPPEE)*
  - *Ministerio del Poder Popular para la Educación (MPPE)*
  - *Ministerio del Poder Popular para la Salud (MPPS)*
  - *Ministerio del Poder Popular para Hábitat y Vivienda (MINHVI)*

  - *Ministerio del Poder Popular de Planificación (MPPP)*
  - *Ministerio del Poder Popular de Obras públicas (MPPOP)*
  - *Protección Civil y Administración de Desastres (PCivil)*
  - *Fundación Venezolana de Investigaciones Sismológicas (FUNVISIS)*
  - *Instituto Nacional de Estadística (INE)*
- State, Municipality and Parish (*estados, municipios, parroquias*) level data i.e. regional (state-level) civil protection websites and social media sites (Facebook/Instagram/X)
  - *Aggregated* building-damage counts by state, municipality and parish
- Mayor (Alcalde) updates and observations i.e. Gustavo Duque - Alcalde de Chacao (https://www.instagram.com/gustavoduquesaez; https://x.com/duquegustavoS)
- ReliefWeb: https://reliefweb.int/disaster/eq-2026-000093-ven
- Humanitarian Response Data: https://data.humdata.org/event/venezuela-earthquake
- LogCluster - Logistics/transport status reports/meetings: https://logcluster.org/en/activities/earthquake-2026; https://logie.logcluster.org/?op=ven
- Emergency Telecommunications Cluster (etc): https://www.etcluster.org/emergency/venezuela-earthquakes
- UN OCHA, PAHO/WHO/Health Cluster, IOM, DG ECHO, MapAction, IFRC, ACAPS, UNDRR, UNDP, UNICEF, UNFPA, WFP, CORE, IMC, AMDA, HOPE, PDC Situation Reports, Updates and Analyses
- Various satellite, aircraft and UAV-based post-event imagery data including geolocated field photographs and videos.
- News and media reports, including local radio and television reporting.
  - *El Universal - https://www.eluniversal.com/*
  - *El Nacional - https://www.elnacional.com/*
  - *El Diario - http://eldiario.com/*
  - *TalCual - https://talcualdigital.com/*
  - *2001Live - https://talcualdigital.com/*
  - *Últimas Noticias - https://ultimasnoticias.com.ve/*
  - *Globovision - https://www.globovision.com/*
  - *Agencia Venezolana de Noticias (AVN) - https://avn.info.ve/*
  - *El Carabobeño - https://www.el-carabobeno.com/*
  - *Yaracuy Al Día - https://yaracuyaldia.com/*
  - *El Impulso - https://www.elimpulso.com/*
  - *El Informador - https://elinformadorve.com/*
  - *NotiTarde - https://www.notitarde.com.ve/*
  - *El Periodiquito - https://elperiodiquito.com/*
  - *El Aragueño - https://elaragueno.com.ve/*
  - *Diario Avance - https://diarioavance.com/*
  - *LaiGUANAtv - https://www.laiguana.tv/*
  - *DIario de Los Andes - https://diariodelosandes.com/*
  - *etc.*
- Updates and data on estimated (insured) damage and payouts by various companies and research groups.
- X/Twitter, Telegram, Facebook and other social-media reporting.
- Reported felt intensities and eyewitness shaking descriptions.
- Historical building-condition and pre-existing damage information.

Annex B.
Detailed Summary of Historical High Impact Earthquakes in Venezuela Over the Last Five Centuries

Date	Location	Magnitude[35]	MMI[36]	Reported Fatalities	Estimated Damage *(in 2026 dollar values)*	Description
Sep 1, 1530	Cumaná-Paria	7.3 M_s	X-XI	Many		Fort and many houses destroyed; ground cracking and probable tsunami effects.
Feb 3, 1610	Mérida-La Grita-Bailadores	7.6 M_w	X	60		Severe destruction across western Andean settlements.
Jun 11, 1641	Caracas-La Guaira		IX	200		Heavy damage in Caracas and La Guaira.
Mar 16, 1674	Trujillo region	7.4 M_w	VII	—		Damaging western Venezuelan earthquake; loss record is sparse.
Oct 21, 1766	Eastern Venezuela-Cumaná-Caracas	7.0 M_s	IX-X	0 recorded		Very widespread shaking and severe damage across eastern Venezuela and Trinidad.
Dec 14, 1797	Cumaná-Cariaco		IX	16-16,000		Severe destruction; duplicate workbook records contain irreconcilable fatality totals.
Mar 26, 1812	Caracas-La Guaira and Barquisimeto-San Felipe	7.7/ 7.4 / 7.1 M_w	IX-X	26,000 (10,000-40,000)		Catastrophic multi-fault event; widespread urban collapse and one of Venezuela's deadliest disasters.
Aug 12, 1834	Mérida		VII	55		Damaging Andean earthquake in the Mérida area.
Feb 26, 1849	Táchira	6.0 M_s	IX	40		Severe damage in western Venezuela.
Jul 15, 1853	Cumaná / Sucre	6.7/7.5 M_s	IX	800 (110-4,000)		Severe destruction in and around Cumaná. Tsunami event.
May 18, 1875	Cúcuta-San Cristóbal border region	7.41 M_w	X	16,461 (1,000-16,461)*		Catastrophic cross-border event; major impacts in Venezuela, but most fatalities were in Colombia.
Apr 14, 1878	Cúa	5.9 M_s	VIII	400 (300-400)		Severe destruction in Cúa and surrounding settlements.

[35] https://www.usgs.gov/faqs/moment-magnitude-richter-scale-what-are-different-magnitude-scales-and-why-are-there-so-many
[36] https://www.usgs.gov/programs/earthquake-hazards/modified-mercalli-intensity-scale

Date	Location	Magnitude[35]	MMI[36]	Reported Fatalities	Estimated Damage *(in 2026 dollar values)*	Description
Apr 28, 1894	Mérida and the Venezuelan Andes	7.56 M_w	IX	400 (115-400)		Major Andean earthquake with widespread structural damage.
Oct 29, 1900	Macuto-Guarenas-Caracas / Miranda	7.7 M_w	IX-X	53 (25-100)		Extensive damage across north-central Venezuela; landslides, liquefaction and a possible tsunami.
Jan 17, 1929	Cumaná	6.9 M_L	IX	50-200		Major damaging earthquake in Cumaná.
Mar 14, 1932	La Grita	6.5 M_s	VIII	6		Damaging earthquake in the La Grita area.
Jul 9, 1950	Arboledas-Cúcuta-San Cristóbal border region	7.0	IX	600	$450 million	Destructive Colombian-Venezuelan border sequence; extensive destruction and regional disruption.
Aug 3, 1950	El Tocuyo-Lara	6.8 M_L	VIII	100	$820 million	Building destruction, rockfalls, landslides, ground rupture and flooding from impounded water.
Oct 4, 1957	Carúpano-Río Caribe-San Juan	6.7 M_L	IX	5		Severe damage in northeastern coastal communities.
Jun 30, 1959	Aricagua	6.1 M_w	VIII	1		One death and several houses destroyed at Aricagua.
Jul 30, 1967	Caracas and the central coast	6.6 M_w	VIII	240 (up to 300)	$1.35-$2.1 billion	High-rise collapses in Caracas; 1,536 injured and major urban structural losses.
Sep 20, 1968	Sucre-Paria-Carúpano	6.2 M_b	IX	3		Damage and landslides in Sucre and Paria; impacts also reported in Trinidad.
Jun 12, 1974	Carúpano / Sucre	6.5 M_L	VII	3		Damaging earthquake in the Carúpano region.
Apr 5, 1975	Barquisimeto-Carora area	6.3 M_L	—	3		Damaging earthquake in the Lara region.
Jun 11, 1986	Cariaco-Carúpano-El Pilar-Río Caribe	6.2 M_w	VII	2		Forty-five injured, many homeless and substantial local building damage.
Jul 9, 1997	Cariaco-Cumaná / Sucre	6.9 M_w	VIII	81	$80 million	522 injured, 3,000 homeless, extensive landslides and disruption of power, water and communications.
Sep 12, 2009	Offshore Carabobo-Morón	6.4 M_w	VI (V in Caracas)	0		Eighteen injured and 17 buildings damaged; felt across northern and central Venezuela.

Date	Location	Magnitude[35]	MMI[36]	Reported Fatalities	Estimated Damage *(in 2026 dollar values)*	Description
Aug 21, 2018	Sucre, offshore east of Carúpano	7.3 M_w	VII	5 (indirect; reports vary)		At least 47 homes and two schools damaged in Sucre; escalator collapse and scattered wider damage.
Sep 24, 2025	Zulia-Mene Grande	6.2 / 6.3 M_w	VIII	1		Doublet earthquake. About 110 injured; more than 44 homes collapsed and wider damage to homes, public buildings and infrastructure.

Annex C.
Detailed Reported Damage Summary

Human impacts and humanitarian needs: According to the latest official reports on July 13, 2026, the number of deaths stood at 4,561, with a further 16,740 people injured. Official reports from the Venezuelan authorities indicate that emergency teams have managed to rescue 6,462 people. More than 128,000 families have received assistance from the authorities and agencies deployed on the ground[37]. With over 25,000 people reported to be affected, there will be significant response and recovery needs. The World Food Programme (WFP) reports that in La Guaira, the worst-hit state, thousands of people have lost their homes, livelihoods, or reliable access to food, while damage to roads, hospitals, and basic services continues to limit their immediate recovery[38]. UNICEF estimates that 1.8 million people and 680,000 children are in need of humanitarian assistance. The earthquake has compounded a situation where it was estimated that before the earthquake, 7.9 million people needed humanitarian support.[39]

Housing sector: The latest official assessments report 856 affected buildings, including 190 that have collapsed; however, other assessments estimate the number to be in the thousands[40]. Authorities reported that approximately 17,907 persons had been left homeless[41] and an estimated 25,000 homes are needed[42]. As of July 13, there were 107 transitional camps (40 in Caracas, 29 in Miranda, 28 in La Guaira, and 10 in Aragua) with a current occupancy of 20,231 people and a capacity of 25,604 people[43].

Education sector: Preliminary assessments confirm significant damage to education infrastructure. UNICEF reports indicate that 432 schools in the Capital District were damaged, representing approximately 34 percent of schools in the district[44]. In the state of Carabobo, at least 425 schools, about 30 percent of the educational infrastructure, suffered some type of damage as a result of the earthquakes[45],[46]. Overall, more than 900 schools across nine states of the country were reported to have been affected[47]. The Ministry of Education resumed classes in 18 states on July 6, 2026, but in-person learning continues to be suspended in Caracas (Distrito Capital), La Guaira, and affected municipalities in Aragua, Carabobo, Falcón and Miranda, pending structural safety assessments of school facilities[48].

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37 https://www.elnacional.com/2026/07/venezuela-eleva-a-4-561-la-cifra-de-fallecidos-por-los-terremotos/

38 World Food Programme (WFP). (2026). *WFP Venezuela Earthquakes Situation Report #04.* Available at: https://reliefweb.int/report/venezuela-bolivarian-republic/wfp-venezuela-earthquakes-response-situation-report-4-9-july-2026

39 UNICEF. (2026). *Venezuela Humanitarian Situation Report No. 2 (Earthquake).* Available at: https://reliefweb.int/report/venezuela-bolivarian-republic/unicef-venezuela-humanitarian-situation-report-no2-earthquake-27-june-2026

40 https://www.theguardian.com/world/2026/jun/30/tonnes-and-tonnes-of-rubble-more-than-58000-buildings-estimated-to-have-been-destroyed-in-venezuela-earthquakes

41 https://reliefweb.int/report/venezuela-bolivarian-republic/earthquakes-venezuela-situation-report-20-13-july-2026-time-0900-pm

42 https://www.cbc.ca/news/world/venezuela-earthquakes-death-toll-injured-july11-9.7267028

43 https://reliefweb.int/report/venezuela-bolivarian-republic/earthquakes-venezuela-situation-report-20-13-july-2026-time-0900-pm

44 UNICEF. (2026). *Venezuela Humanitarian Situation Report No.3 (Earthquake)* Available at: https://reliefweb.int/report/venezuela-bolivarian-republic/unicef-venezuela-humanitarian-situation-report-no3-earthquake-02-july-2026

45 https://www.el-carabobeno.com/cerca-del-30-de-las-escuelas-en-carabobo-sufrio-danos-tras-los-terremotos/

46 https://www.el-carabobeno.com/al-menos-425-escuelas-de-carabobo-registraron-afectaciones-tras-los-terremotos/

47 https://cecodap.org/almenos-de-900-escuelas-en-nueve-estados-de-venezuela-estan-afectadas-tras-los-terremotos/

48 El Heraldo. (2026). *Venezuela retoma clases en 18 estados tras los devastadores terremotos.* Available at: https://www.elheraldo.hn/mundo/venezuela-retoma-clases-18-estados-tras-devastadores-terremotos-ID31321933

Some schools are serving as emergency shelters and, if this is protracted, it will pose challenges for in-person learning going forward.

The earthquakes affected an education system already operating under severe infrastructure constraints. Prior to the disaster, 64.5 percent of schools reported major infrastructure deficiencies, 73.6 percent lacked reliable water supply, 75 percent had inadequate sanitation facilities, and 63.7 percent experienced unreliable electricity, limiting the sector's capacity to maintain education services during emergencies.[49]

Health sector: It has also been reported that health sector infrastructure has been significantly impacted. According to the latest Pan American Health Organization/World Health Organization (PAHO/WHO) situation report (July 12, 2026), official national reports indicate that 38 hospitals were affected. Health Cluster assessments of 73 health facilities in Distrito Capital, Miranda and La Guaira revealed that there are 27 facilities with earthquake-related damage, including 13 in Distrito Capital, nine in La Guaira and five in Miranda. In La Guaira, three health facilities remain non-operational or severely limited in function. PAHO/WHO also conducted technical post-disaster assessments of 12 priority hospitals across Distrito Capital, La Guaira and Miranda. Three hospitals remain fully operational, four partially operational, three functioning at basic or limited capacity, and one (*Maternidad Ana Teresa de Jesús Ponce* in Macuto) is non-operational and has been evacuated.[50]

The healthcare sector has been bolstered by international field hospitals deployed across Caracas, Miranda, and La Guaira. Medical teams and healthcare personnel sent by Barbados, Brazil, Colombia, the Dominican Republic, India, Japan and Spain, alongside NGOs such as Samaritan's Purse, are providing emergency treatment, surgical care, intensive care, and psychological support in affected communities[51]. The core focus is the restoring of essential health services and damaged key facilities in La Guaira, Caracas, and Miranda.[52]

There is rising concern of an increase in health issues as many families struggle to access basic services including safe water, sanitation, and hygiene services. Shortages of medicines and surgical supplies, failures in electricity and telecommunications, limited ambulance availability, and overcrowded services continue to constrain emergency response.

The earthquakes affected a health system already operating under severe infrastructure constraints. Prior to the disaster, 64.8 percent of households reported infrastructure deficiencies in the public health facilities they use, while 72.4 percent reported unreliable water supply, 61.9 percent unreliable electricity, 88.5 percent shortages of medical supplies, 89.8 percent shortages of medicines, and 87.7 percent deficiencies in medical equipment.[53]

Roads, bridges and tunnels: According to the Ministry of Transport (MPPT), damage to transport infrastructure was reported across seven states (La Guaira, Caracas, Miranda, Falcón, Aragua, Carabobo and

49 HumVenezuela. (2025). Community diagnostics – 2025. Available at: https://reliefweb.int/report/venezuela-bolivarian-republic/venezuela-community-diagnostics-2025
50 https://www.paho.org/sites/default/files/2026/07/ven-earthquakes-sitrep5-12july2026.pdf
51 https://www.telesurenglish.net/international-hospitals-venezuela-care/
52 https://news.un.org/es/story/2026/07/1541637
53 HumVenezuela. (2025). Community diagnostics – 2025. Available at: https://reliefweb.int/report/venezuela-bolivarian-republic/venezuela-community-diagnostics-2025

Yaracuy). The Caracas–La Guaira highway suffered significant damage and landslides. Tunnels between La Guaira and Caracas showed water seepage and some loss of material. The Valle–Coche highway in Caracas requires column reinforcements. The three bridges over the Río San Julián in Caraballeda were closed entirely, while the Caraballeda 2 and La Lucha bridges remained under partial restriction. In addition, edge failures were detected at four points along the Chuspa–Chirimena road[54]. In Aragua, two edge failures and a collapsed gabion wall occurred on the Local 4 road to Colonia Tovar, and a bridge at kilometer 117 of the *Autopista Regional del Centro* developed a crack. In Falcón, three bridges were damaged (Boca de Yaracuy, with traffic restrictions; Pajuí Norte and La Pava Norte, under rehabilitation), while in Carabobo a significant crack on the Morón–Coro road required traffic restrictions[55].

Airports and ports: The Simón Bolívar International Airport in Maiquetía, La Guaira, sustained damage and was closed in the initial days after the earthquake[56]. Although the airport has been partially open to humanitarian flights, commercial flights have not yet resumed[57]. According to LogCluster, partner assessments at the Puerto La Guaira (the Port of La Guaira) indicate that the northern piers 2 to 4 show no significant damage, although impact marks are visible at roughly 20 m intervals and a crack was observed at the western end of pier 2. Northern piers 6 to 8 are currently being used for victim identification, while the southern piers 15 to 20 are old and have protective barriers in poor condition, though the structures themselves appear to be mostly intact[58]. Severe structural damage has been reported in the vicinity of the port, including collapsed buildings, but reports did not confirm whether the affected structures included port terminals, warehouses or other maritime assets critical to operations. On July 7, MPPT announced that all cargo originally destined for La Guaira was being redirected to the ports of Puerto Cabello (Carabobo) and Guanta (Anzoátegui), which were operating at maximum capacity under a special contingency plan[59]. After an initial dip in cargo volumes immediately after the earthquakes, operations at Puerto Cabello (the Port of Cabello), Venezuela's most important port complex, have absorbed most of the volume of cargo that would usually arrive in Puerto La Guaira without any evidence of delays due to congestion or overcapacity operations[60].

Water and sanitation networks were severely disrupted, with supply in La Guaira progressively restored. Authorities reported that around 68 percent was restored by June 28 and by July 9 around 86 percent was restored[61]. Authorities also claimed that at least 19 million liters of water were distributed to affected communities. UNICEF reported that the earthquakes severely disrupted water and sanitation services and that the water, sanitation, and hygiene (WASH) cluster was still mapping infrastructure damage and assessing the technical and operational capacity of affected systems.[62]

Power networks: Damage to substations and other critical network components caused power network supply outages. Among the major disruption was the damage to 10 towers along the Planta

54 https://www.elnacional.com/2026/07/siete-estados-de-venezuela-registran-danos-en-vialidades-puentes-y-tuneles-por-los-terremotos/
55 https://web.archive.org/web/20260702101755/https://www.mppt.gob.ve/2026/gobierno-nacional-continua-desplegado-para-atencion-de-vias-en-todo-el-territorio/
56 https://www.unicef.org/media/182066/file/UNICEF%20Venezuela%20Humanitarian%20Situation%20Report%20No.1%20%28Earthquake%29%2C%2025%20June%202026.pdf
57 https://www.france24.com/en/live-news/20260708-venezuela-says-caracas-airport-to-reopen-to-commercial-flights-soon-as-possible
58 https://logcluster.org/sites/default/files/public/2026-07/venezuelagtlsitrep1respuesta-terremotos_20260702.pdf
59 https://www.bolipuertos.gob.ve/?p=34320
60 Analysis using data extracted from the Port Watch platform: https://portwatch.imf.org/pages/076f32f7c4174f1da910d78fedce6623
61 http://eltiempo.com/mundo/venezuela/a-dos-semanas-del-doble-terremoto-en-venezuela-la-guaira-la-zona-mas-afectada-recupera-la-electricidad-en-un-96-y-el-agua-potable-en-un-3570313
62 https://reliefweb.int/report/venezuela-bolivarian-republic/unicef-venezuela-humanitarian-situation-report-no3-earthquake-02-july-2026

Centro-Yaracuy transmission line which resulted in the loss of 600 MW from the National Electrical System (SEN)[63]. The *Ministerio del Poder Popular para la Energía Eléctrica* (MPPEE) has been working hard to restore power supplies to the affected areas, and have reportedly reinstated five transmission lines, 20 substations, and 47 transformers[64]. As of July 14, these recovery efforts had successfully restored over 95 percent of the national electricity demand.[65]

Telecommunications: Initial reports stated the telecommunications in the affected areas were reduced to 65 percent, recovering to 77 percent within 48 hours[66]. La Guaira remains the hardest-hit area, where connectivity losses reached 90 percent and services operated at minimum capacity. According to *La Comisión Nacional de Telecomunicaciones (Conatel) or, in English, the National Telecommunications Commission, the disruptions were caused by the collapse of multiple land systems (including base stations, cell towers, and downed poles), alongside a physical rupture in the international submarine fiber optic cable located 1.8 km from the Puerto Viejo station in Catia La Mar, La Guaira, affecting at least four international providers*[67]. As of July 6, operators continued restoration efforts in the most severely impacted locations. Service availability and quality in key impacted areas remain dependent on repairs to damaged infrastructure, power restoration, and improvements to site access. Recovery of the telecommunications sector is anticipated to take several weeks. SpaceX is supporting temporary service restoration through humanitarian partners on the ground[68].

63 https://www.telesurtv.net/mas-del-95-por-ciento-de-la-demanda-electrica-ha-sido-recuperada-en-venezuela-tras-terremotos/
64 https://mppee.gob.ve/?p=109171
65 https://www.telesurtv.net/mas-del-95-por-ciento-de-la-demanda-electrica-ha-sido-recuperada-en-venezuela-tras-terremotos/. N.B. Reported values as of July 13, 2026 or before, were included in analysis.
66 https://www.etcluster.org/document/ltc-venezuela-telecoms-area-situation-report-1-24-30-june-2026
67 https://ecosistemag.com/como-el-terremoto-dejo-a-venezuela-con-la-mitad-de-su-capacidad-de-internet/
68 https://www.etcluster.org/emergency/venezuela-earthquakes

Annex D.
Detailed Hazard Analysis

The earthquake source characterization incorporated the available USGS, GFZ (Helmholtz Centre for Geosciences) and our own rupture geometries, focal mechanisms, hypocentral depths and fault-slip distributions. These were used to represent the spatial variation in energy release and the progression of rupture along the fault. The modelling also considered the combined contribution of the multiple earthquakes to the observed damage pattern, including areas where damage may reflect the cumulative effects of more than one strong shaking episode, with learnings from 2016 Kaikoura, 2023 Türkiye-Syria and other multi-fault or doublet or multiple events.

Ground motions were estimated using a combination of Ground Motion Prediction Equations (GMPE) and Intensity Prediction Equations (IPE) appropriate for the tectonic setting and available observations. The alternative GMPE and IPE results were compared with USGS and GFZ ShakeMaps, reported felt intensities, field observations, spot damage reports, and the geographical distribution of affected buildings and infrastructure. Damage information was also used to back-derive plausible shaking intensities, taking account of the vulnerability and expected response of the exposed building stock, and to constrain areas where the initial modelled shaking was inconsistent with the observed impacts.

Significant rupture-directivity and velocity-pulse effects were identified, particularly along, and close to, the principal rupture direction. These effects were represented using Somerville-type directivity relationships (Somerville, 2003), information developed through New Zealand Society for Earthquake Engineering (NZSEE)-related analysis, and additional expert interpretation as stated by Somerville. The directivity adjustment was combined with the fault-slip distributions to represent the higher demands expected near the principal rupture zones and the lower values in areas situated away from the dominant direction of rupture propagation.

Representative response spectra were used in addition to macroseismic intensity to examine the likely demand on structures with different heights, periods, and construction systems. While the underlying ground motion intensity is not determined by the building typology, buildings with different heights and stiffnesses respond differently to the frequency content and duration of the shaking. The hazard model therefore considered separate shaking surfaces or demand adjustments where directivity, long-period energy or local site effects were expected to affect taller or more ductile structures differently from predominantly low-rise construction.

Significant local ground effects were also observed and incorporated into the interpretation. These included soft-soil and basin amplification, topographic effects, areas of high permanent ground displacement and earthquake-triggered landslides.

The final hazard maps were developed through calibration of alternative sources, GMPE, IPE, directivity and site-response models, and the available damage and observational evidence. Greater weight was assigned to model combinations that reproduced the broad spatial pattern of observed impacts, while retaining uncertainty in areas with limited reporting or sparse exposure. The combination of the modelled ground motions, rupture and slip information, directivity effects, representative spectra, local ground conditions, landslide observations and damage-derived intensity constraints resulted in the final GRADE hazard mapping.

Annex E.
Exposure Model Development

The exposure model is built on GMVV housing and construction data, engineering and construction reports produced in Venezuela over approximately the last 15 years, the 2011 Population and Housing Census at *parroquia* level, Global Earthquake Model (GEM) Level 3 exposure information, and detailed building datasets from Open Building Map (OBM), Open Buildings Attribute Table (OBAT), Overture, OpenStreetMap (OSM), World Settlement Footprint (WSF), Global Human Settlement Layer (GHSL) and three-dimensional Global Building Footprints (3D-GloBFP), as well as other local and global datasets. These sources were checked, merged and reconciled to create a consistent bottom-up representation of the national built capital stock.

The model distributes the building stock across 53 principal typologies, comprising 18 residential and 35 non-residential typologies, with additional differentiation by urban and rural setting, building height and number of stories. The non-residential stock includes commercial, industrial, public, institutional and other forms of fixed capital. Building footprints, floor areas and stories were derived from the available building datasets and checked against census information, GHSL, GloBFP, WSF and other remotely sensed indicators of settlement density, building height and built-up area. Where detailed building attributes were unavailable, values were inferred using the census characteristics, settlement type, mapped footprint size, expected stories and the distribution of comparable building typologies within the same *parroquia* or municipality.

UCCs were developed for the different structural typologies, occupancies, locations, quality levels and building finishes. These UCCs range from below US$100 per square meter for some basic and low-cost construction to over $900 per square meter for specialized, high-quality commercial, industrial and public assets. The values were informed by Venezuelan engineering reports, published construction costs, GMVV information, recent projects, local cost estimates and international benchmarks adjusted to the Venezuelan context. Residential and non-residential contents were added using occupancy-specific contents and fixed-asset assumptions. Vacant buildings were retained within the building replacement-cost stock, while their content values were adjusted through estimated occupancy and vacancy percentages.

In building the exposure model, the value of each mapped building was estimated from its footprint, number of stories, expected total floor area, occupancy, structural typology, and location-specific unit costs. Census households and housing characteristics were used to constrain the residential stock at *parroquia* level, while mapped commercial, industrial, public, and institutional facilities were used to distribute the non-residential stock. For areas with incomplete building mapping, the bottom-up results were supplemented and controlled using settlement area, population, and capital-stock relationships. This provided a means of maintaining the correct aggregate exposure while preserving as much spatial and structural detail as possible.

For non-residential assets, databases of schools, health facilities, government buildings, industrial sites, commercial establishments, and other fixed assets were examined together with mapped points of interest, land use, and establishment information. Capital stock checks were undertaken using national and sectoral investment information, gross and net capital stock estimates, construction activity, fixed capital formation, and asset-to-output relationships. These top-down estimates were compared with the bottom-up building and infrastructure calculations to identify omissions, duplication, or implausible/outlier unit values.

For infrastructure, the databases of OpenStreetMap, Venezuelan statistical yearbooks, engineering and construction guidelines, government and utility information, sector trackers, global infrastructure datasets and open geographical information system (GIS) layers were combined to develop a spatially distributed asset inventory. The model includes transport infrastructure such as roads, bridges, railways, airports, runways, terminals, ports and ferry facilities; power infrastructure including generation plants, substations, transmission lines, towers and distribution assets; oil and gas infrastructure including refineries, processing plants, terminals, platforms, wells, pipelines and storage facilities; water infrastructure including networks, pumping assets and non-hydroelectric dams; and ICT infrastructure. Replacement values were assigned using asset-specific unit costs, lengths, areas, capacities and engineering characteristics, with checks against sectoral capital stock and reported project costs and overall capital.

The estimated national replacement value shown in the table amounts to approximately US$1.41 trillion, including building contents. Residential building and contents exposure is estimated at approximately US$667.3 billion, while non-residential building and contents exposure is approximately US$264.7 billion. The combined building stock therefore accounts for approximately US$932.0 billion, or around 66 percent of the modelled built capital stock. Infrastructure exposure is estimated at approximately US$474.0 billion, representing the remaining 34 percent.

The values in the table are presented in US$ millions and show the substantial variation between states arising from differences in population, urbanization, industrial concentration, construction quality and the location of major infrastructure networks. State totals range from approximately US$2.7 billion to more than US$217 billion.

Exposure data were initially controlled at *parroquia* level and subsequently allocated to individual buildings and infrastructure assets using mapped footprints, lines, points, settlement distributions, and administrative boundaries. Also, it is worth noting that, due to the nature of the capital stock estimation process, neighboring districts may inherently have some exposure (and damage) that could be attributed to one district but actually occurred in the adjacent district.

It is important to note that the GRADE analysis focuses on the costs of direct physical damage rather than the wider economic losses arising from disruption, reduced production, displacement or interruption of services. Damage estimates are produced for the repair or replacement of affected assets based on their pre-event, or "as was", capital replacement values.

This GRADE assessment thus uses capital replacement costs, which is the estimated cost to bring back an asset to its pre-damage condition without rebuilding to a different typology. Reconstruction costs, especially with 'build back better' considerations, exceed direct replacement costs due to a number of factors, including the use of superior, more resilient materials, advanced design and engineering through updated building codes, heightened post-disaster demand causing supply constraints, the necessity for interim infrastructure like temporary housing, and other factors enhancing the earthquake resilience of the building stock. It should also be differentiated from the actual cash value of the property, which is either defined as the book value, or net capital stock, which includes depreciation of the asset. Generally, replacement costs are more than book value, and less than reconstruction costs.

Where vulnerable buildings and infrastructure are upgraded to more resilient standards, the additional build-back-better cost will depend on the original typology, location, accessibility, construction practice and the required level of seismic improvement. These ratios can change according to updated local engineering information, applicable building regulations and seismic design standards, socio-economic conditions, availability of skilled labor and materials, and post-event demand cost-surge effects. Appropriate and cost-efficient build-back-better measures should therefore be assessed separately from the direct replacement cost estimates and applied according to the characteristics of the affected Venezuelan building and infrastructure stock; however, these could be in the order of 1.5–3 times given experience from past earthquakes. Appropriate and cost-efficient build back better guidelines exist in the literature (Coburn et al. 1995).

In terms of the baseline exposure values, the total built capital stock in buildings, contents and infrastructure is summarized in Table 2.

There is a higher degree of uncertainty than usual in the GRADE exposure estimates due to:

- Volatile construction cost indices resulting from high inflation (in the order of 60 percent annually), as well as fluctuations in the exchange rate.
- Material costs that are currently highly volatile — these costs are typically higher and more volatile after major disasters. While this primarily impacts reconstruction and recovery costs rather than damage estimates, this is still a major source of uncertainty.

These uncertainties have been dealt with rigorously through assessments of datasets for accuracy and completeness, calibration and validation, and cross-checking and triangulation of sources and data.

Annex F.
Sectoral Damage Maps

Figure 12. Spatial distribution of the estimated residential damage at state level (in US$ million).

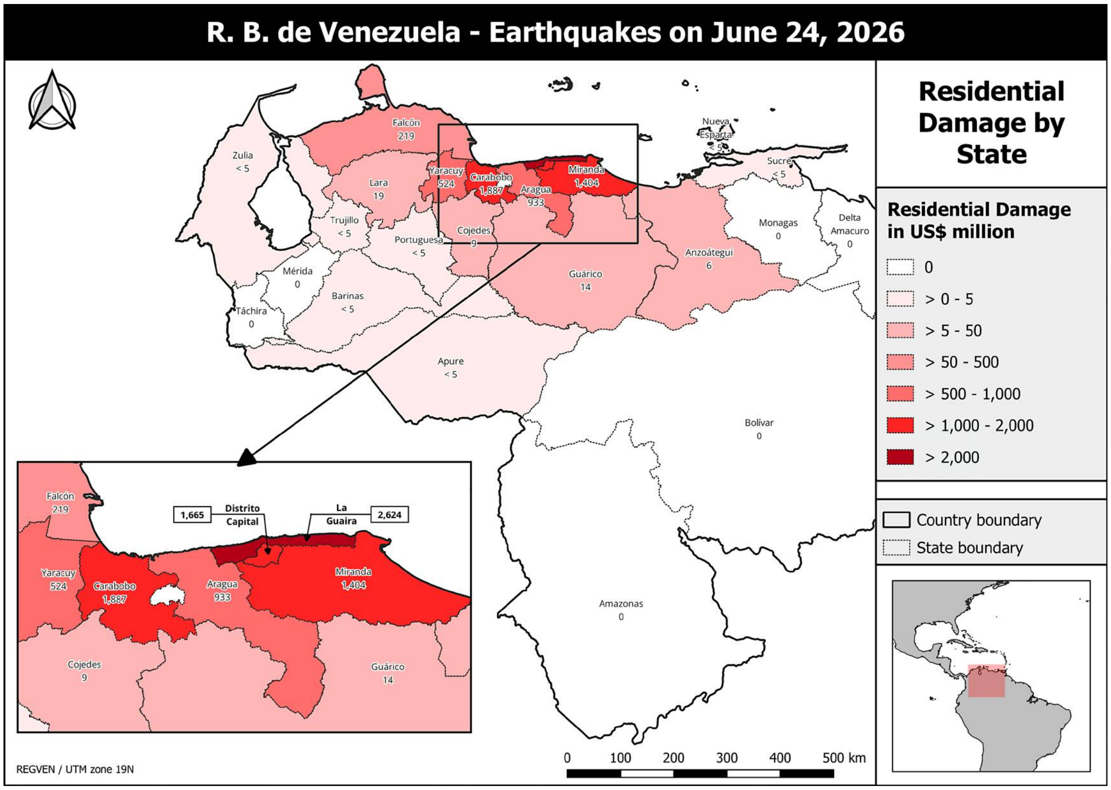


Figure 13. Spatial distribution of the estimated residential damage at state level (displayed as a percentage of residential exposed value).

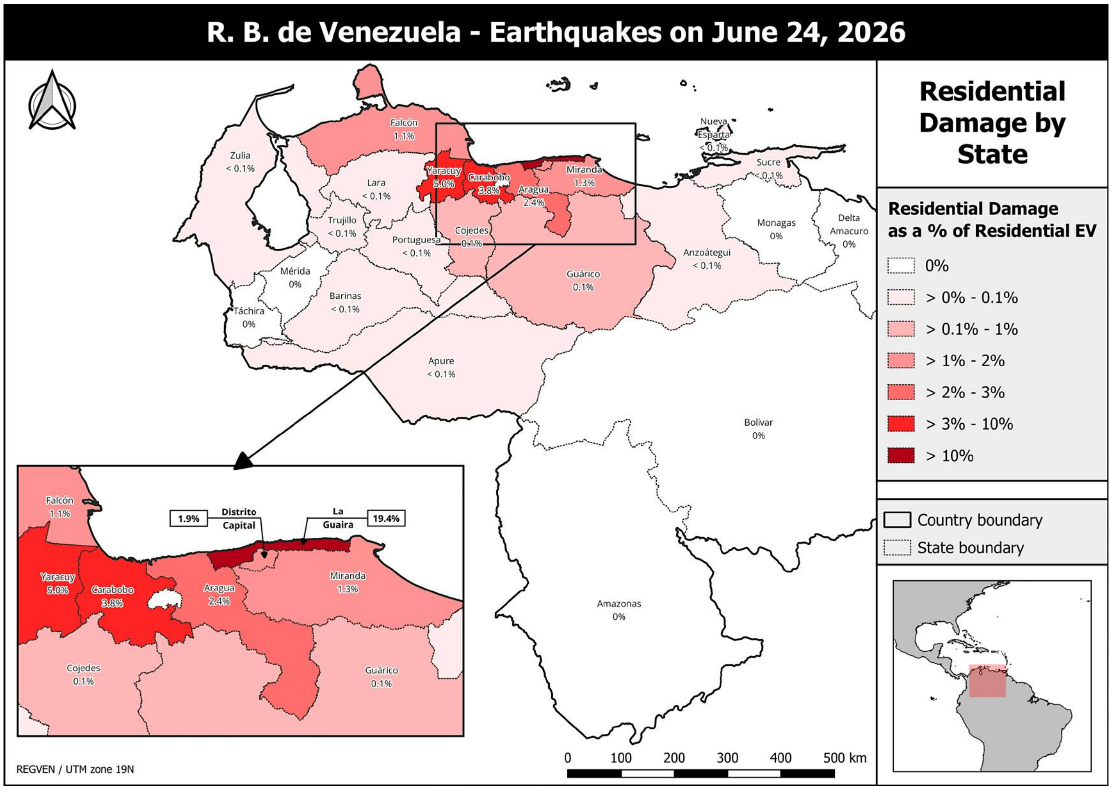


Figure 14. Spatial distribution of the estimated non-residential damage at state level (in US$ million).

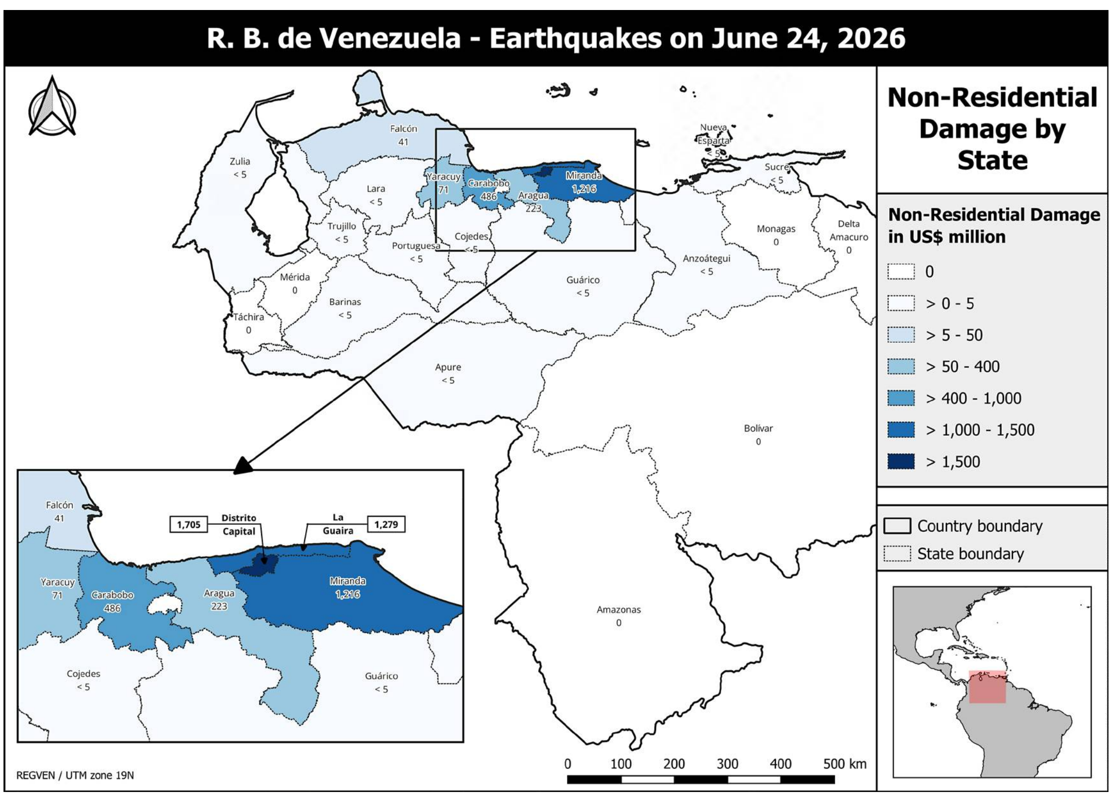


Figure 15. Spatial distribution of the estimated non-residential damage at state level (displayed as a percentage of non-residential exposed value).

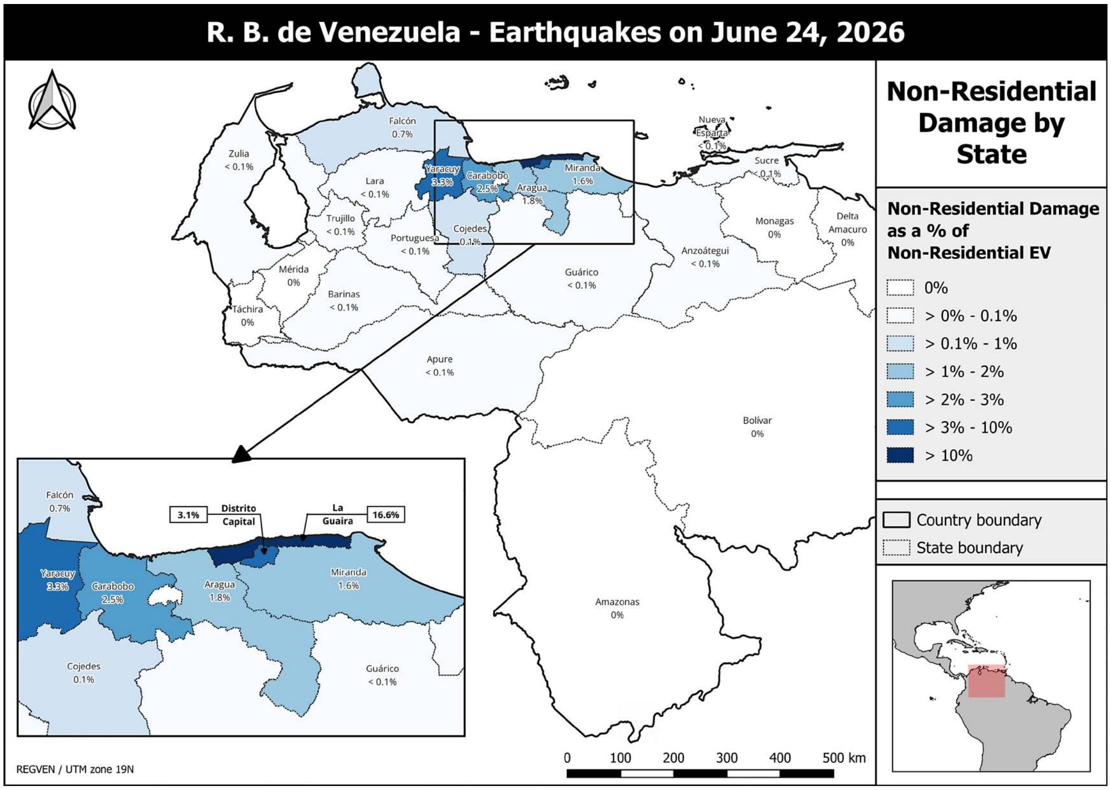


Figure 16. Spatial distribution of the estimated infrastructure damage at state level (in US$ million).

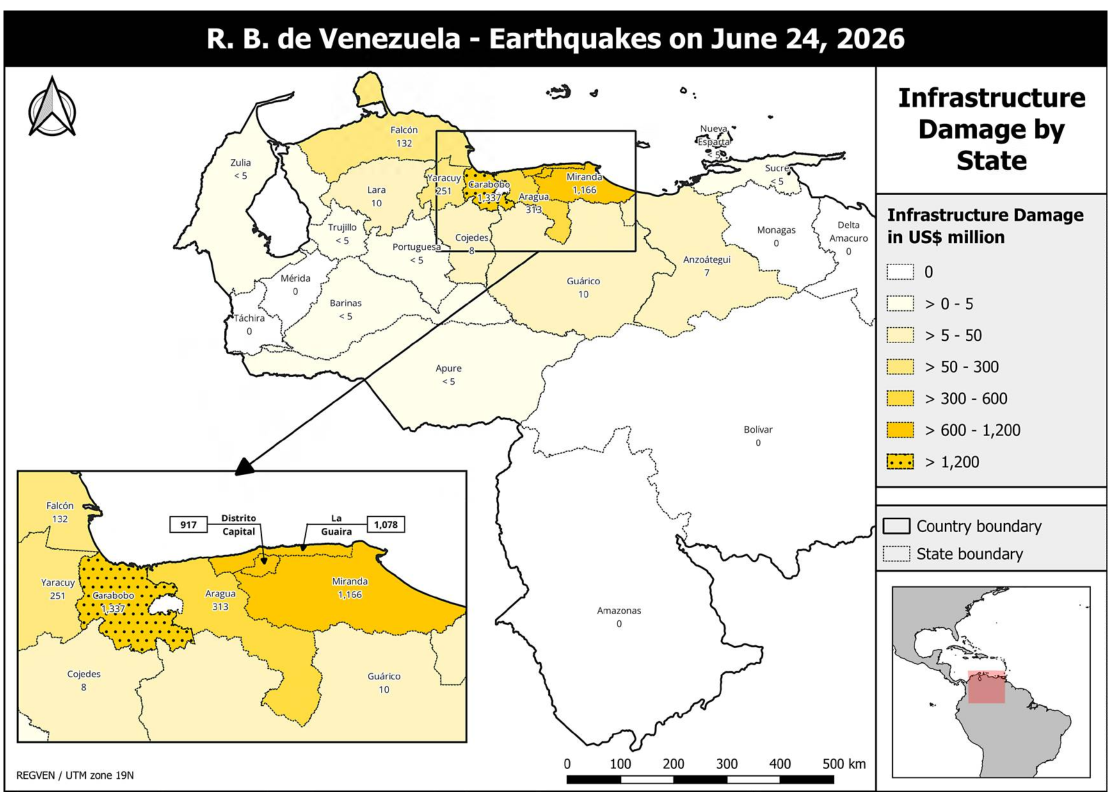
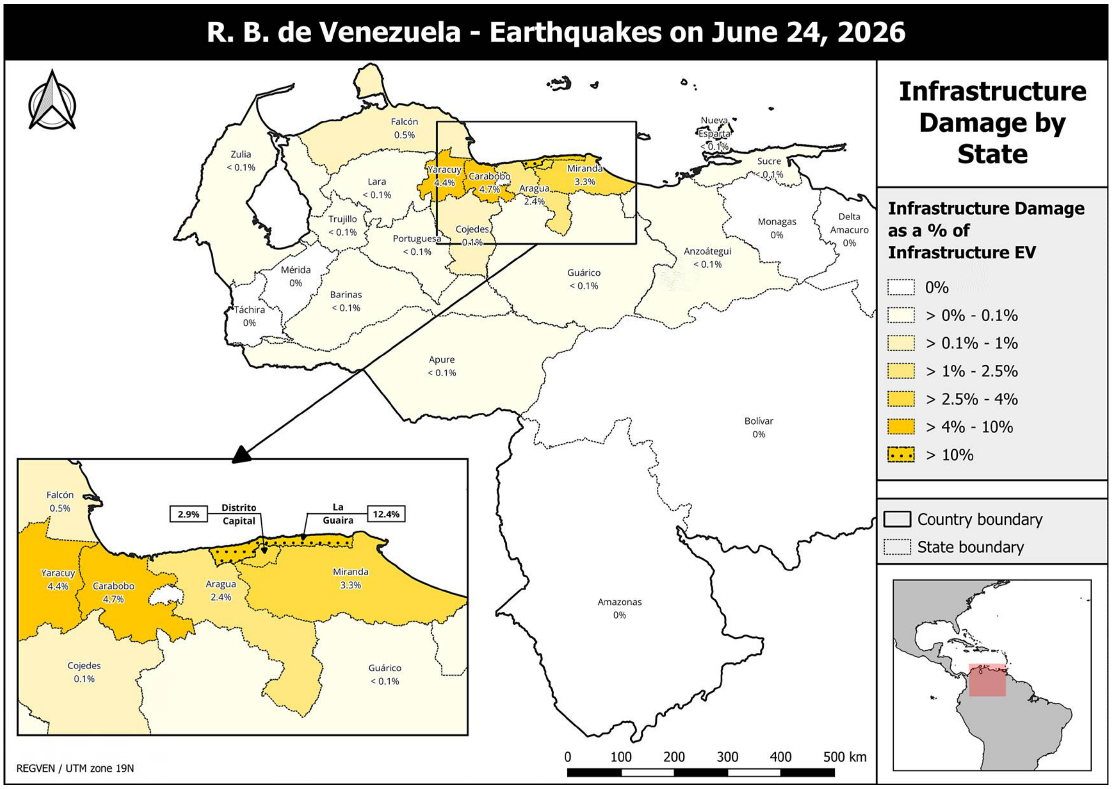


Figure 17. Spatial distribution of the estimated infrastructure damage at state level (displayed as a percentage of infrastructure exposed value).



Annex G.
Social Vulnerability Analysis Details

Vulnerability to disasters is multidimensional: it cannot be understood through a single characteristic such as age, income, or housing quality. It emerges from the interaction of demographic, social, economic, health, housing, environmental, and institutional conditions[69]. These conditions must be interpreted within their local context[70], while recognizing that any assessment is constrained by the coverage and quality of the available data[71].

This rapid screening uses weighted household estimates from ENCOVI 2025 to examine a broad set of attributes related to demographics, health, food security, housing, infrastructure, service access within 500 meters of where households reside, communication, emergency preparedness, and recovery capacity. Examining a relatively large set of indicators is necessary because vulnerability and the ensuing recovery are complex processes[72]: no single measure can adequately represent the different constraints households may face before, during, and after a disaster. Each indicator should therefore be understood as a potential source of vulnerability rather than independently determining whether a household is vulnerable.

The analysis focuses on the seven most affected states: La Guaira, Distrito Capital, Miranda, Carabobo, Aragua, Yaracuy, and Falcón; while at the national level, most pre-existing pressures persist. The figures for all affected states can be found at the end of this Annex G.

The analysis uses household-level indicators. Each value represents the weighted share of households in which the relevant condition is present, for example, at least one household member reports a disability or the dwelling lacks an internet connection. These measures are appropriate for assessing household vulnerability and recovery capacity, but they should not be interpreted as the prevalence of the condition among individuals. Person-level estimates would use a different denominator and may therefore produce different national and state-level values.

La Guaira[73] combines high physical impacts with several demographic and health-related vulnerabilities. Approximately 75 percent of its households were female-headed, 22 percent included an older person living alone, and 50 percent reported a recent health problem Figure 8. Communication constraints

[69] Stolte, T. R., Koks, E. E., de Moel, H., Reimann, L., van Vliet, J., de Ruiter, M. C., & Ward, P. J. (2024). VulneraCity–drivers and dynamics of urban vulnerability based on a global systematic literature review. *International Journal of Disaster Risk Reduction, 108, 104535.*

[70] Kuhlicke, C., Scolobig, A., Tapsell, S., Steinführer, A., & De Marchi, B. (2011). Contextualizing social vulnerability: findings from case studies across Europe. *Natural hazards, 58(2), 789-810.*

[71] Burton, C. G., Toquica, M., Asad, K. M. B., & Musori, M. (2022). Validation and development of composite indices for measuring vulnerability to earthquakes using a socio-economic perspective. Natural Hazards, 111(2), 1301-1334.

[72] Cutter, S. L. (2024). The origin and diffusion of the social vulnerability index (SoVI). *International journal of disaster risk reduction, 109, 104576.*

[73] Results for La Guaira, Aragua, Guárico, and Cojedes should be interpreted with caution because they are based on relatively small survey samples. The reported percentages may therefore be sensitive to a small number of observations and should be treated as indicative patterns rather than precise population estimates.

were also evident: 17 percent lacked a mobile phone and 37 percent lacked internet access[74]. More than half reported no grocery store within 500 meters. This result may partly reflect La Guaria's spatial diversity. While some residents live in dense, centrally located neighborhoods with nearby services, others live in peripheral communities where access to grocery stores may be more limited. These conditions could complicate emergency communication, assistance to isolated residents, temporary relocation, and access to food and healthcare.

Distrito Capital also had a high proportion of female-headed households (64 percent), while 17.7 percent included an older person living alone. Approximately 53 percent reported no nearby clinic, and more than one-third lacked internet access. Although several housing indicators were less than the national average, the concentration of people, services, and economic activity means that disruptions in the capital can affect a large population and generate consequences beyond directly damaged households.

Miranda presented a different combination of vulnerabilities. Approximately 16 percent of households were single-parent households, and 31 percent had a household head aged 60 years or older. Almost half reported no nearby clinic, while 42 percent had no nearby grocery store, and 30 percent lacked nearby public transport. These accessibility constraints can increase the time and cost of obtaining assistance after an earthquake, particularly when roads, public transport, or local services are disrupted.

Several of the other heavily affected states displayed particularly significant pre-existing pressures. In Carabobo, 62 percent of households reported a recent health problem, 89 percent worried that food would run out, and 60 percent lived in housing containing weak construction materials. In Aragua, 66 percent reported a household member with a disability[75], 85 percent worried about food running out, 66 percent lived in weak housing, and 83 percent reported electricity disruptions. In Yaracuy, food had run out in 48 percent of households, 53 percent lived in weak housing, 73 percent lacked internet access, and 26 percent lacked a mobile phone. Falcón was characterized by substantial infrastructure constraints: 66 percent reported insufficient drinking water and 57 percent reported electricity disruptions. Falcón and Yaracuy are also among the least urbanized affected states and contain rural communities facing comparatively high levels of multidimensional deprivation. Recovery efforts concentrated primarily on Distrito Capital and La Guaira may therefore overlook dispersed rural populations that face distinct barriers to accessing assistance and essential services.

Household vulnerability must also be considered in relation to the broader environment in which households prepare for and respond to emergencies The share of households reporting any form of formal preparedness ranged from approximately zero in Yaracuy to 3.1 percent in Carabobo and 4.0 percent in Falcón (Figure 9). Aragua recorded a higher estimate of 13.8 percent, although its relatively small survey sample means that this value should be treated as indicative rather than definitive. La Guaira stood out for the reported presence of community emergency organizations, at 9.6 percent, but formal household preparedness remained below 1 percent. The near-zero levels observed in 2025 are consistent with a decline documented in earlier ENCOVI surveys: between 2015 and 2023, reported access to

[74] Internet access is measured here as the presence of internet service in the dwelling; "no internet" therefore denotes households without a home connection. This differs from person-level measures that also count individuals who have used the internet outside the home, which produce a substantially higher estimate of approximately 84%. State-level values would likewise differ under this broader person-based definition.

[75] Disability is measured as the share of households in which at least one member reported a difficulty in any assessed domain, excluding "don't know" and refusal responses. This household-level measure differs from the approximately 13% person-level prevalence. State-level estimates would consequently differ if calculated as the share of individuals with disabilities rather than the share of households containing at least one affected member.

early-warning systems fell from 10 to 2 percent, the presence of local emergency organizations from 5 to 2 percent, and household evacuation plans from 3 to 1 percent. This suggests that limited preparedness is not a recent development but a persistent and, by several measures, worsening constraint.

The low level of preparedness represents an important gap, but it also identifies practical opportunities for risk reduction. Government leadership is essential, while neighborhood organizations and trusted community leaders can complement formal systems by disseminating warnings, identifying residents who require assistance, supporting evacuation, and facilitating access to emergency aid, as they have been demonstrated to play an important role in early response[76].

Risk perception can influence whether households seek information, prepare emergency supplies, strengthen their homes, participate in drills, or respond to warnings[77]. Flooding and heavy rainfall were prominent in Aragua, while flooding was also frequently identified in Carabobo and Falcón. Fire was relatively prominent in Carabobo, Aragua, and Miranda, and landslides were more frequently reported in Distrito Capital and Miranda. In contrast, earthquakes were among the least frequently identified threats in every state: the estimated share ranged from approximately zero in La Guaira and Yaracuy to 4.3 percent in Distrito Capital. Earlier ENCOVI analyses conducted in 2015 and 2023 also indicated a decline in the proportion of people identifying earthquakes as an important threat.

Financial and alternative housing coping mechanisms are scarce. No more than 1.2 percent of households in any of the seven states reported insurance, credit, or savings as a potential recovery mechanism. Access to alternative housing ranged from approximately zero in La Guaira and Aragua to 3.4 percent in Falcón. Some less or non-affected states reported greater potential capacity; for example, in Cojedes, 13.6 percent of households indicated access to alternative housing. This could provide an opportunity to support temporary relocation from more heavily affected areas, but the availability, accessibility, and safety of such housing would need to be verified, particularly because 34 percent of households in Cojedes also reported cracks in buildings. Temporary displacement could therefore create demand for shelters, rental assistance, host family support, and other forms of emergency accommodation.

These findings should be interpreted cautiously. First, ENCOVI was not designed to be representative of La Guaira, Aragua, and Carabobo. The reported percentages may therefore be sensitive to a small number of observations and should be treated as indicative patterns rather than precise population estimates. Second, as the survey predates the earthquake, subsequent changes happening in the country may not be fully reflected in the resulting figures. Third, there might be significant within- and between state variations, including urban-versus-rural differences. The least urbanized affected states and the ones containing rural communities may face comparatively high levels of multidimensional deprivation. Recovery efforts concentrated primarily on highly urbanized areas may therefore overlook dispersed rural populations that face distinct barriers to accessing assistance and essential services.

Vulnerable populations in the affected states have suffered disproportionately. To better understand the potential distributional impacts of the disaster on households of different social groups in Venezuela, the microsimulation model "Unbreakable" was utilized[78]. The model integrates household-level data

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[76] Panday, S., Rushton, S., Karki, J., Balen, J., & Barnes, A. *(2021). The role of social capital in disaster resilience in remote communities after the 2015 Nepal earthquake. International Journal of Disaster Risk Reduction, 55, 102-112.*

[77] https://onlinelibrary.wiley.com/doi/abs/10.1111/risa.14151

[78] See the following publications for an elaborate explanation of the simulation model: https://openknowledge.worldbank.org/entities/publication/d361b0da-305d-5a94-8444-f99e4360cb67 or https://documents1.worldbank.org/curated/en/173611568643337991/pdf/

from the ENCOVI 2025 with exposure and disaster damage data. The model estimates potential household-level consumption losses, due to the disaster, from: (i) households needing to spare some of their consumption budget to restore their damaged assets, and (ii) households losing some of their income due to damaged productive assets which generate that income.

The distributional analysis uses a smaller subset of household characteristics than the broader vulnerability screening. These characteristics were selected because they may help explain differences in household-level consumption losses, for example through care responsibilities, dependency, health-related expenditure, earning capacity, or employment security. They do not capture the full consequences of the disaster. Actual impacts also depend on the severity and location of damage, access to services and assistance, displacement, housing safety, health consequences, social networks, environmental conditions, and the duration of infrastructure and livelihood disruption.

Figure 10 presents the estimated consumption loss of each household group relative to the average modelled loss among all households in the seven-state analytical sample. Positive values indicate losses above this average, while negative values indicate lower-than-average losses.

Consumption losses may be concentrated among households with greater care needs, dependency, health constraints, or less secure forms of employment. Single-parent households experience losses that are 6.8 percent above average. Losses are also higher among elderly-headed households, at 11.6 percent above average; households in which an older person lives alone, at 5.1 percent; and large households, at 6.7 percent.

Health-related characteristics are associated with some of the largest disparities. Households reporting a recent health problem among an older member experience estimated losses 16.9 percent above average, while households including a person with a disability experience losses 6.9 percent above average. Such households may face simultaneous pressures from reduced earning capacity, additional care requirements, medical expenditure, and interruptions to healthcare or support services.

Education is associated with differences in losses, although the relationship is not linear. Households whose head has primary education experience losses 18.4 percent above average. Households headed by someone with secondary education record below-average losses, while those with tertiary education remain slightly above average. The results therefore point to a pronounced disadvantage among primary-educated household heads rather than a consistent decline in losses with increasing education.

The largest differences appear across occupational groups. Households headed by family helpers experience estimated losses 26.6 percent above average, while domestic-service households experience losses 17.2 percent above average. Cooperative-member households also record above-average losses. By contrast, households headed by private-company employees, self-employed workers, or public-sector employees record below-average losses.

Overall, the results suggest that the disaster may reinforce pre-existing inequalities rather than affect households uniformly. Recovery support should therefore extend beyond compensation for physical damage. Priority measures may include temporary income assistance, continuity of healthcare

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and care services, support for single-parent and elderly-headed households, and targeted protection for workers in family work, domestic service, and other potentially insecure occupations.

These results represent modeled differences between household groups and the seven-state average, rather than observed causal effects of individual characteristics. Household characteristics frequently overlap. For example, an elderly-headed household may also include a person with a disability, have limited savings, and depend on insecure employment. The estimates should therefore be interpreted as signals of potentially concentrated disadvantage rather than as the independent effect of any single characteristic.

Figure 18. Pre-earthquake social vulnerability profiles in all affected states. Cells show the weighted percentage of households reporting each demographic, health, food-security, housing, infrastructure, service access within 500 meters of where the household lives, and communication conditions, based on ENCOVI 2025. Estimates marked with an asterisk are based on relatively small state samples or were not designed to be representative and should be interpreted cautiously.

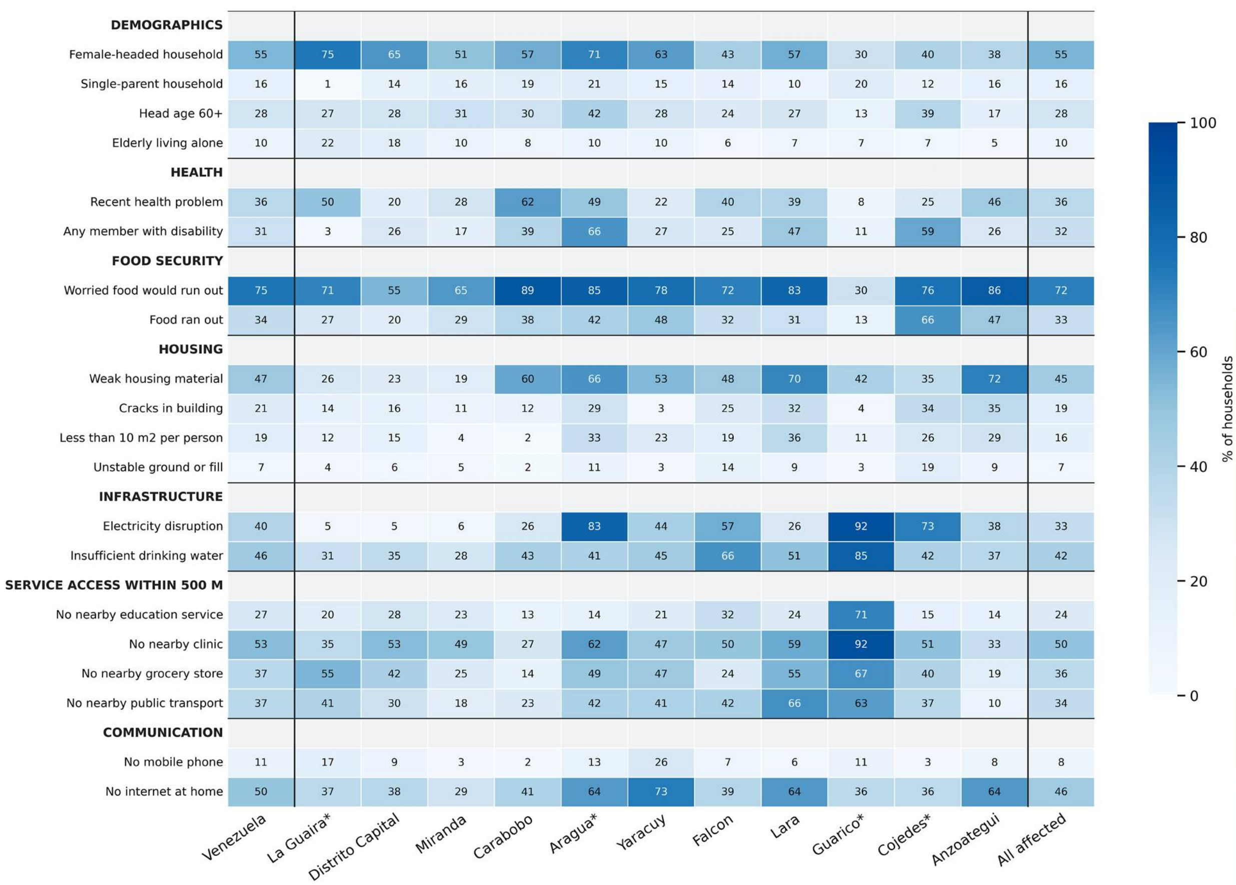
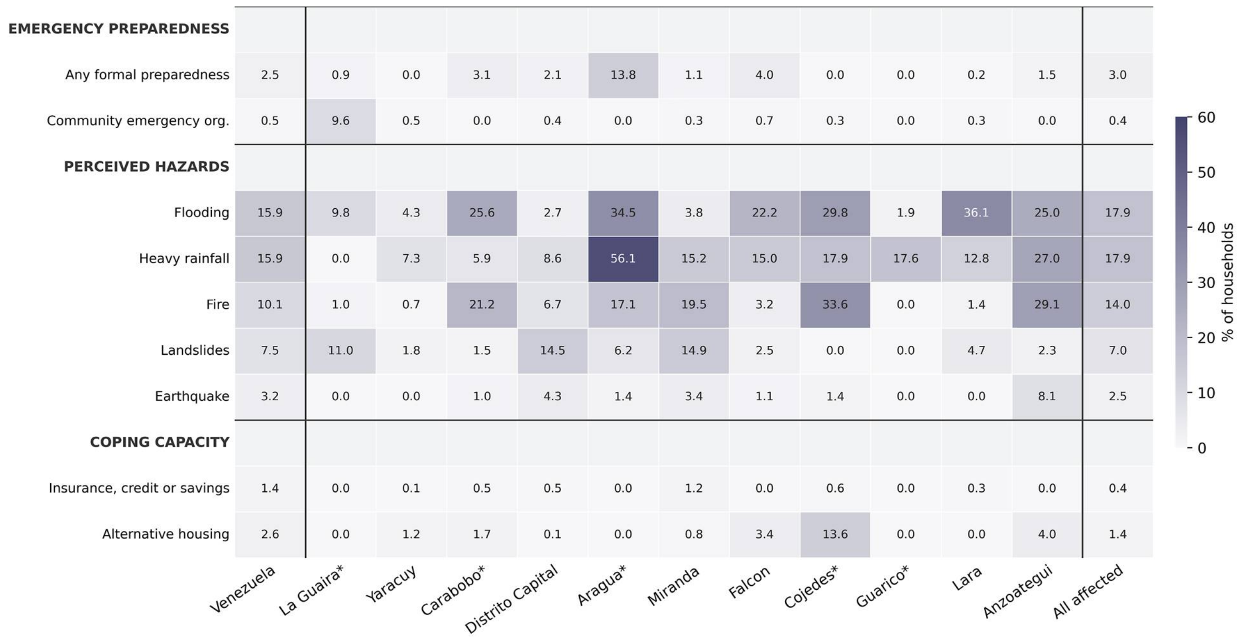


Figure 19. Household preparedness, perceived hazards, and recovery capacity in all affected states. Values show weighted percentages of households reporting formal preparedness, access to a community emergency organization, selected perceived hazards, insurance, credit or savings, and alternative housing. Estimates marked with an asterisk are based on relatively small state samples or were not designed to be representative and should be interpreted cautiously.



Annex H.
Pre-Existing Vulnerabilities, Compounding Shocks, and the Context for Recovery

The human and physical toll of the June 24, 2026, earthquakes must be understood against the backdrop of a decade of successive shocks that had progressively strained households' coping capacity and the resilience of the built environment. The twin event, measuring 7.2 and 7.5 in magnitude and striking approximately thirty-nine seconds apart, were the strongest recorded in Venezuela in more than a century, and they affected some of the country's most densely populated urban corridors, including metropolitan Caracas and the coastal state of La Guaira. As of early July, national authorities had confirmed more than 3,600 deaths and over 16,700 injuries, with United Nations agencies estimating that as many as 6.8 million people, including approximately 680,000 children, may require assistance.

The earthquakes struck an economy and a built environment shaped by an exceptionally difficult period: output contracted by an estimated three-quarters between 2013 and 2021, among the deepest peacetime contractions recorded in the region, before returning to growth in recent years. This prolonged contraction, compounded by constrained access to international capital markets and external financing, sharply limited public and private investment in housing, infrastructure maintenance, and risk reduction over an extended period. As in many rapidly urbanized and seismically exposed settings worldwide, vulnerability became concentrated in informal and self-built neighborhoods, including on the hillsides surrounding Caracas and La Guaira, where structures were seldom engineered to seismic standards[79],[80]. The experience of comparable events, including the 2023 earthquakes in Türkiye and Syria and the 2010 earthquake in Haiti, demonstrates that where natural hazard exposure intersects with accumulated socioeconomic vulnerability, human and material losses are magnified well beyond what ground motion alone would predict.

A second defining feature of the context is the pressure that a decade of economic hardship has placed on Venezuela's human capital and institutional capacity. Approximately 7.9 million Venezuelans are estimated to be living abroad, one of the largest external displacement situations in the world, including a substantial share of the country's professional and technical workforce in fields directly relevant to reconstruction, such as engineering, construction, and health[81],[82]. The health system, which humanitarian partners had documented as operating under significant resource constraints prior to the disaster, faced extraordinary surge demands in the earthquakes' immediate aftermath[83]. These constraints are by no means unique to Venezuela: no national system, however well resourced, absorbs a disaster of this magnitude unaided, as the experiences of Türkiye in 2023 and Pakistan in 2022 make clear. They do, however, carry three implications for recovery design. First, reconstruction planning should incorporate a realistic assessment of implementation capacity from the outset, pairing national leadership with sustained technical and operational support, and drawing where useful on third-party implementation

[79] https://bti-project.org/en/reports/country-report/VEN
[80] Fair Planet (2026). Venezuela's Deadliest Earthquake in a Century Exposes Failures in Emergency Response. https://www.fairplanet.org/story/venezuelas-deadliest-earthquake-in-a-century-exposes-failures-in-emergency-response/
[81] https://respuestavenezolanos.iom.int/en/about-regional-venezuela-situation
[82] https://bti-project.org/en/reports/country-report/VEN
[83] https://news.un.org/en/story/2026/07/1167868

arrangements that have proven effective in comparable settings. Second, phased and progressively scaled approaches, beginning with assessments, planning, and quick-impact restoration of essential services before advancing to large-scale reconstruction, are more likely to succeed than front-loaded programs that outpace absorptive capacity. Third, the Venezuelan diaspora represents a significant potential asset for recovery, as a source of skills, professional networks, and resources that well-designed programs can help mobilize in support of national efforts.

Recovery programming will also need to be attentive to the complex social and territorial dynamics that characterize some affected areas, as is standard practice in dense urban environments following major disasters. International experience from post-disaster operations in urban settings across multiple regions indicates that recovery programs perform best when they incorporate systematic context-sensitivity analysis, transparent and verifiable beneficiary targeting, community-level engagement in prioritization, robust grievance redress mechanisms, and due diligence screening of implementing partners and contractors. These measures are standard components of World Bank operations in complex environments and serve the interests of all stakeholders: they protect affected households, safeguard the credibility of implementing institutions, and provide the fiduciary assurance that international partners and financiers require in order to commit resources at scale.

The government's response provides an important foundation on which recovery efforts can build. Within two weeks of the earthquakes, the authorities launched the Gran Misión Venezuela Renace, mobilizing more than 2,500 structural engineering specialists who have assessed close to 5,000 buildings in Caracas and La Guaira using a transparent, traffic-light habitability classification, alongside economic support to the most affected families. At the same time, the scale of reconstruction needs will exceed the fiscal resources realistically available to any single government confronting a disaster of this magnitude. This is not a Venezuelan particularity: Türkiye in 2023 and Pakistan in 2022 both combined strong national reconstruction programs with substantial international financing and technical partnership. Approached in this spirit, the earthquakes present an opportunity for the international community to accompany Venezuela in protecting affected populations, restoring essential services, and rebuilding safer and more resilient communities, objectives around which there is a broad convergence of interest among the government, its citizens, and international partners.

Photo credit: Valeria Alejandra Marchán Martínez.

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