Overview

This repository includes instructions and code to replicate estimates of the paper "**Are the poor more exposed to Climate Hazards in Latin America?**" using R and Stata. There are three types of data used: (1) data from household surveys and related national/subnational data, (2) small area estimates from national statistics offices, and (3) spatial data.

Data Availability

Some data cannot be made publicly available.

Spatial data

Access to raw input spatial datasets is restricted and processing this data is very resource intensive (> 14 days, 1 TB storage recommended). Therefore, intermediate outputs from spatial analysis are provided for replication. Instructions to access raw hazard data files and code to calculate subnational exposure estimates were published in the Reproducibility package for Climate Risk Scorecard Vision Indicator 2021. Please refer to this package for more details (https://doi.org/10.60572/9j17-9n52).

Intermediate data included in the replication package

Data.Name	Location	Provided	Citation	Accessed
LAC subnational exposure estimates	02.input/	TRUE	World Bank (2025)	June 2025
LAC boundaries	03.intermediate/	TRUE	World Bank (2025)	June 2025

"LAC subnational exposure estimates" are derived from gridded hazard and population data and included for replication. This intermediate data includes two .dta format files (90 MB) here: **02.input/lac_5haz_exp100_any.dta**, **02.input/lac_5haz_exp100_mun.dta**

Citation: World Bank (2025)

"LAC boundaries" data were produced by the project team using an R script included in the package (01.code/R/lac_combined_shapefile.R). The dataset is produced from several administrative boundary data sources including World Bank Official Admin-0 Boundaries, Global Administrative Unit Layers (GAUL) 2015, United Nations Common Operational Datasets, and National Statistical Offices (NSOs).

The R script refers to list of boundaries included in this excel file produced by the project team: 02.input/LAC boundaries.xlsx. To run the R script, all input shapefiles should be saved here: **02.input/shapefiles/**. These inputs are not included in the package but are available from the following sources:

- World Bank Official Boundaries "World Country Polygons - Very High Definition" (*WB_countries_Admin0_10m*) available from: https://datacatalog.worldbank.org/search/dataset/0038272/World-Bank-Official-Administrative-Boundaries?version=3

- Global Administrative Unit Layers (GAUL) 2015 level 1 and level 2 produced by FAO and available from Google Earth Engine: https://developers.google.com/earth-engine/datasets/catalog/FAO_GAUL_2015_level1 https://developers.google.com/earth-engine/datasets/catalog/FAO_GAUL_2015_level2

- Planning region boundaries for Costa Rica produced by Instituto Nacional de Estadística y Censos (INEC) and available from: https://inec.cr/mapas-cartografia/unidad-geoestadistica-regional-2022

- Input shapefiles for seven countries (Brazil, Chile, Colombia, Honduras, Mexico, Panama, Peru) were provided by the same agency that produced the poverty map (listed below). The poverty maps and shapefiles will be published on Development Data Hub, with the exception of Honduras, which cannot be shared externally, and included in this collection: https://datacatalog.worldbank.org/int/search/collections/sae_poverty_mapping

The replication package includes the combined LAC shapefile (300MB) produced by the R script here: **03.intermediate/shapefiles/**

Citation: World Bank (2025)

Survey and other data

Data.Name	Location	Provided	Citation	Accessed
Global Monitoring Database (GMD)		FALSE	World Bank, GMD (2024)	June 2024

Intermediate data included in the replication package				
WDI Country name	02.input/ctrn_names.dta	TRUE	World Bank (2024)	June 2024

"Global Monitoring Database (GMD)" data is obtained from the World Bank Datalibweb platform using the Stata package *datalibweb*. Access to the Survey data in the Global Monitoring Database (GMD) is provided only for World Bank staff working with Bank managed computers, and the data is not available for external users. Most of the surveys in the GMD is available internally, however for some data users need to request access to the data in the Datalibweb platform. Users need to install the *datalibweb* ado package following the instructions in the About tab of the Datalibweb website.

License: Restricted access, exact license varies across surveys.

Citation: World Bank (2025).

"**WDI Country name**" data was obtained from the World Bank from World Development Indicators and DataBank (https://data.worldbank.org/country)

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Citation: World Bank (2024).

Poverty map

The poverty map collection process was led by the Statistical Team for Latin America and the Caribbean, along with Samuel Freije and Alejandro De La Fuente. The project began in early September 2024 and involved coordinating inputs with the Poverty Economists of the countries listed below. In some cases, the Poverty Economist responsible for the country acted as a liaison between the coordination team and the National Statistical Office to acquire the maps. The Poverty Economist also reviewed and approved the quality control process carried out by the Statistical Team and determined whether the data could be distributed.

Country	Agency that produced the data	Name of the Data Source for the Poverty Map	Boundaries Year	Survey Year	Reference Year	Administrative Unit	Map Classification
Brazil	Instituto Brasileiro de Geografía e Estadística (IBGE)	N/A	2019	2019	2019	Municipality	Vulnerability Map
Chile	Ministerio de Desarrollo	Encuesta de Caracterización	Unknown	2022	2022	Comunas	Poverty Map

	Social y Familia (MDSF)	Socioeconómica Nacional (CASEN)					
Colombia	Departamento Administrativo Nacional de Estadística (DANE)	Gran Encuesta Integrada de Hogares (GEIH)	2020	2019	2019	Municipality	Poverty Map
Ecuador	Instituto Nacional de Estadística y Censos (INEC)	Encuesta Nacional de Empleo, Desempleo y Subempleo (ENEMDU)	2012	2022	2022	Provinces	Poverty Map
Honduras *	Instituto Nacional de Estadística (INE)	Encuesta Permanente de Hogares de Propósitos Múltiples (EPHPM)	Unknown	2019	2019	Municipality	Poverty Map
Mexico	Instituto Nacional de Estadística y Geografía (INEGI)	Encuesta Nacional de Ingresos y Gastos de los Hogares (ENIGH)	2020	2020	2020	Municipality and States	Poverty Map
Panama	Instituto Nacional de Estadística y Censo (INEC)	Encuesta de Hogares de Propósitos Múltiples (EHPM)	2010	2015	2015	Provinces, Districts, Corregimiento	Poverty Map
Peru	Instituto Nacional de Estadística e Informática (INEI)	Encuesta Nacional de Hogares (ENAHO)	2018	2017	2018	District, Province	Poverty Map

*Honduras is not allowed for external distribution.

Instructions for Replicators

Replication from intermediate spatial data

Follow these steps to reproduce results from the intermediate spatial data:

1. Clone the reproducibility package (see folder structure below)
2. Open the Stata master do-file "01.code/dofile/MASTER dofile.do"
3. File "LAC subnational survey estimates 685.xlsx" contains data for countries without small area estimates. The file is created manually based on getting the poverty rates at $6.85 (2017 PPP) from the SPID data (for ARG, BOL, CRI, GTM, HTI, NIC, PRY, SLV, URY using the AM24 version), and running Datalibweb (for DOM in the GMD collection), and getting national poverty rates from PIP (for BLZ, GRD, GUY, JAM, LCA, SUR, TTO, and VEN, using the AM24 version). Details are described in code "01-combine poverty estimates.do"

4. Change the current directory on line 2 to the reproducibility package path
5. Run the master Stata do-file following the sequence described in the code

List of Exhibits

The provided code reproduces: all tables and maps. All codes are in the 01.code/dofile folder. A modified bimap.ado is stored in 01.code/ado folder. Map outputs are verified and edited by the World Bank's Maps Department for publication.

Exhibit name	Output filename	Script	Note
Map 7	Map 7 - LAC_685_povrate2.png	01-combine poverty estimates.do	
Table 6	Tables.xlsx	02-Table 6.do	All tables are in the Excel file.
Table 7	Tables.xlsx	03-Table 7.do	
Table 8	Tables.xlsx	03-Table 8.do	
Table 9	Tables.xlsx	03-Table 9.do	
Tables 3, 10, 12, 14, 16, 18, 20, 22, 24	Tables.xlsx	02-Type of hazard.do	
Tables 4, 5, 11, 13, 15, 17, 19, 21, 23, 25	Tables.xlsx	03-Number of hazard.do	
Maps 8, 10, 12, 14, 16, 18, 20, 22, 24	Map #	04-Bivariate maps.do	# notes map numbers
Maps 1-6	Map #	04-Exposure maps.do	
Maps 9, 11, 13, 15, 17, 19, 21, 23	Map #	04-Exposure maps.do	Panel map, with 6 sub-panels per country

Requirements

Computational requirements

The Stata master script was run on a Windows (Windows 11 version 24H2, Intel(R) Core(TM) Ultra 7 165U 2.10 GHz, and RAM 32.0 GB RAM). The run time was 16 minutes for Stata.

Software requirements

Stata version 18

Packages

- Datalibweb package version 2 (July 2024), see the "About" tab for more instructions of Datalibweb, installation of Stata package, token is needed to run DLW in Stata. It is available at https://datalibweb2.worldbank.org/home
- PIP Stata wrapper – instruction to install with more details available here
  net install github, from("https://haghish.github.io/github/")

github install worldbank/pip

Memory, Runtime and Storage Requirements

From intermediate spatial data:

Memory: at least 16 GB

Storage: at least 20 GB available

Run time: 16 minutes (Stata master do-file)

Code Description

Stata

Dofile	Description
Master.do	Master dofile
PER2018 subnat pline.do	Converting poverty LCU - PPP for PER
PAN2015 subnat pline.do	Converting poverty LCU - PPP for PAN
MEX2020 subnat pline.do	Converting poverty LCU - PPP for MEX
HND2019 subnat pline.do	Converting poverty LCU - PPP for HND
ECU2022 subnat pline.do	Converting poverty LCU - PPP for ECU
COL2019 subnat pline.do	Converting poverty LCU - PPP for COL
CHL2022 subnat pline.do	Converting poverty LCU - PPP for CHL
BRA2022 subnat pline.do	Converting poverty LCU - PPP for BRA
00-LAC subnat manual.do	Get survey estimates from SPID, PIP, DLW
01-combine poverty estimates.do	Combine sae and survey estimates
02-Type of hazard.do	Create tables for different types of hazards and poverty
02-Table 6.do	Prepare Table 6
03-Table 7.do	Prepare Table 7
03-Table 8.do	Prepare Table 8
03-Table 9.do	Prepare Table 9
03-Number of hazard.do	Create tables for numbers of hazards and poverty
04-Exposure maps.do	Create exposure maps (region, country)
04-Bivariate maps.do	Create bivariate maps (region, country)

Folder structure

```
├── 01.code
│   ├── ado
│   └── dofile
├── 02.input
│   ├── BRA
```

```
│   ├── CHL
│   ├── COL
│   ├── ECU
│   ├── HND
│   ├── MEX
│   ├── PAN
│   └── PER
├── 03.intermediate
│   └── shapefiles
├── 04.output
└── 05.figures
```

References

World Bank. (2025). Global Monitoring Database [Dataset]. World Bank.