

Appendix D: Data Sources

General Information and Disaster Overview Summary

88 FR 32046 located at: <https://www.hud.gov/sites/dfiles/CPD/documents/FR-6393-N-01-AAN.pdf> (English) and

<https://www.hud.gov/sites/dfiles/CPD/documents/6393-N-01-CDBG-DR-Allocations-Spanish-2023-09-06.pdf> (Spanish)

Climate Review for Puerto Rico and the U.S. Virgin Islands 2022.

https://www.weather.gov/media/sju/climo/monthly_reports/2022/2022.pdf

FEMA News and Media: Disaster 4649

https://www.fema.gov/sites/default/files/photos/fema_dr-4649-pdacatano-3.jpg

National Hurricane Center Tropical Cyclone Report: Hurricane Fiona.

https://www.nhc.noaa.gov/data/tcr/AL072022_Fiona.pdf

Preliminary Damage Assessment Report: Hurricane Fiona.

https://www.fema.gov/sites/default/files/documents/PDAReport_FEMA4671DRexpedited-PR.pdf

Preliminary Damage Assessment Report: Severe Storm, Flooding, and Landslides
FEMA-4649-DR.

https://www.fema.gov/sites/default/files/documents/PDAReport_FEMA464

[9DR-PR.pdf](#)

State Natural Hazard Mitigation Plan 2021 can be found at:

https://jp.pr.gov/wpcontent/uploads/2021/10/2021_PR_State_Hazard_Mitigation_Plan_Aug2021_1of2.pdf

U.S Global Change Research Program. Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II. U.S. Caribbean.

https://nca2018.globalchange.gov/downloads/NCA4_Ch20_US-Caribbean_ExecSum.pdf

Wiener, Sarah S.; Álvarez-Berrios, Nora L.; Lindsey, Angela B. 2020. Opportunities and challenges for hurricane resilience on agricultural and forest land in the US, Southeast and Caribbean. Sustainability, 12, 1364.

<https://www.fs.usda.gov/research/treesearch/59685>

Unmet Needs Assessment

Alford, Natasha S. Why Some Black Puerto Ricans Choose 'White' on the Census, The New York Times. February 2020. Accessed at:

<https://www.nytimes.com/2020/02/09/us/puerto-rico-census-blackrace.html>

Anderson, William A. *Bringing children into focus on the social science disaster research agenda*, International Journal of Mass Emergencies and Disasters. Accessed at: <http://ijmed.org/articles/376/download/>

Annual and Cumulative Estimates of Resident Population Change for Municipios in Puerto Rico and Municipio Rankings: April 1, 2020 to July 1, 2022 (PRM-EST2022-CHG) Source: U.S. Census Bureau, Population Division Release Date: March 2023

Annual Estimates of the Resident Population for Puerto Rico Municipios: April 1, 2020 to July 1, 2022 (PRM-EST2022-POP) Source: U.S. Census Bureau, Population Division Release Date: March 2023.

COR3 Road to Recovery hurricane Fiona Public Assistance Project Summary
Disadvantaged Communities – Justice40 data from USDOT's on Environmental Quality 2022

Drafts and approved MRP Plans can be found at:

<https://recuperacion.pr.gov/en/municipal-recovery-planning/>

Flash Flood Event – February 4-6, 2022

https://www.weather.gov/sju/flashflood_feb2022#:~:text=One%20of%20the%20most%20affected,major%20roads%20impassable%20and%20landslides.

<https://recuperacion.pr.gov/en/electrical-power-reliability-and-resilienceprogram/>

<https://recuperacion.pr.gov/en/energy-grid-rehabilitation-and-reconstructioncost-share-program/>

Hud datasets data from State 2022-2020 census

<https://www.huduser.gov/portal/datasets/assthsg.html>

Hurricane Fiona – September 17-19, 2022.

<https://www.weather.gov/sju/fiona2022>

Individual Assistance Daily Status Status Report from COR 3 of DR-4649 and 4671

Low Income Housing Tax Credits Program Projects

Municipal Recovery Plans

Municipalities of Ponce, Utuado and Cabo Rojo information

Oficina del Censo de los Estados Unidos. (sf). S1810: Disability Characteristics.

2022 American Community Survey 5-Year Estimates.

<https://data.census.gov/table/ACSST5Y2022.S1810?q=Population%20with%20disability%20in%20puerto%20rico>

OpenFEMA Data Sets – v2 <https://www.fema.gov/openfema-datapage/disaster-declarations-summaries-v2>

OpenFEMA Data Sets <https://www.fema.gov/about/openfema/data-sets>

Puerto Rico Racially and Ethnically Concentrated Areas of Poverty data from
HUD Office of Policy Development and Research 2022

Rodriguez, Donner & Trainor. *Handbook of Disaster Research*. 2018.

SBA Disaster Loan FY22. https://data.sba.gov/dataset/e243640a-ed1c-4941-850e-b2c6aa15cad3/resource/dfca7ddd-348c-43a1-bb89-98fae0e6ff3a/download/sba_disaster_loan_data_fy22.xlsx

See Puerto Rico's CDBG-MIT Action Plan Section "Additional Analysis of
Demographics and Protected Classes" for detailed assessment on socially
vulnerable populations and protected classes. Accessed at:

<https://cdbgdr.pr.gov/en/cdbg-mit/>(English) and <https://cdbgdr.pr.gov/cdbgmmit/>(Spanish)

Single Family Housing Mitigation

Smith, Susan M. *Disaster planning and response: considering the needs of the frail
elderly*, International Journal of Emergency Management. Accessed
at:

https://www.researchgate.net/publication/244924906_Disaster_planning_and_response_Considering_the_needs_of_the_frail_elderly

Social Interest Housing Program

This data is based in HUD 2022 Continuum of Care Homeless Assistance Program
Housing Inventory Count Report

https://files.hudexchange.info/reports/published/CoC_HIC_State_MS_2022.pdf . Inventory documents prepared by PRDOH.

Trieb, Carolin-Anna. Vulnerability to Natural Hazards: A Gender Perspective in Disasters, Management Center Innsbruck. Accessed at:

http://www.ibgeographypods.org/uploads/7/6/2/2/7622863/university_dissertation_ib_dp_geography.pdf

U.S. Census Bureau. Glossary. Accessed at:

<https://www.census.gov/programssurveys/geography/about/glossary.html#:~:text=Census%20Tracts%20are%20small%2C%20relatively,Bureau's%20Participant%20Statistical%20Areas%20Program.>

United States Census Bureau. (sf). B16002: Detailed Household Language by Household Limited by Household Limited English Speaking Status. 2022 American Community Survey 5-Year Estimates.

[https://data.census.gov/table/ACSDT5Y2022.B16002?g=040XX00US72,72\\$0500000&d=ACS%205-Year%20Estimates%20Detailed%20Tables](https://data.census.gov/table/ACSDT5Y2022.B16002?g=040XX00US72,72$0500000&d=ACS%205-Year%20Estimates%20Detailed%20Tables)

United States Census Bureau. (sf). B19301: Per capita in the past 12 months (in 2022 inflation- adjusted dollars)

<https://data.census.gov/table/ACSDT5Y2022.B19301?q=per%20capita%20income%20puerto%20rico&tid=ACSDT1Y2022.B19301>

United States Census Bureau. (sf). DP05: Demographic and Housing Estimates.
2022 American Community Survey 5-Year Estimates.

https://data.census.gov/table/ACSDP5Y2022.DP05?q=DP05:%20ACS%20Demographic%20and%20Housing%20Estimates&g=040XX00US72_050XX00US72001,72003,72005,72009,72011,72013,72017,72019,72021,72023,72025,72029,72031,72033,72041,72043,72045,72051,72057,72059,72067,72069,72071,72073,72075,72077,72079,72085,72097,72099,72105,72107,72109,72111,72113,72117,72123,72125,72127,72129,72131,72133,72135,72137,72141,72143,72145,72151,72153&moe=false&tid=ACSDP1Y2022.DP05

United States Census Bureau. (sf). S1701: Poverty Status in the past 12 months
2022 American Community Survey 5-Year Estimates.

[https://data.census.gov/table?q=S1701&g=040XX00US72,72\\$0500000](https://data.census.gov/table?q=S1701&g=040XX00US72,72$0500000)

United States Census Bureau. (sf). S1810: Disability Characteristics. 2022
American Community Survey 5-Year Estimates.

<https://data.census.gov/table/ACSST5Y2022.S1810?q=Population%20with%20disability%20in%20puerto%20rico>

United States Census Bureau. (Sf). Total Low Income Persons- HUD estimate using
ACS 2012-2016 Standar Tabulation data.

United States Census Bureau. (Sf). Total Population estimate using ACS 2012-
2016.

United States Census Bureau. Annual Estimates of the Resident Population for

Puerto Rico Municipios: April 1, 2020 to July 1, 2022 (PRM-EST2022-POP)

WCRP mapping tools, Interactive Social Capital Maps and the Interactive

Vulnerability and Risk Maps can be found at:

<https://recuperacion.pr.gov/wcrp/tools.html>

WCRP program education modules can be found at:

<https://recuperacion.pr.gov/wcrp/education-module1.html>

General Requirements

42 U.S.C § 5301 et seq.

Birkmann, Jörn. Measuring Vulnerability to Natural Hazards: Towards Disaster

Resilient Societies Second Edition. United National University Press.

December 2013.

https://collections.unu.edu/eserv/UNU:2880/n9789280812022_text.pdf

Code of Federal Regulations: 49 C.F.R § Part 24

Cutter, Susan L., Emrich, Christopher T. Moral Hazard, Social Catastrophe: The

Changing Face of Vulnerability along the Hurricane Coasts. The ANNALS of
the American Academy of Political and Social Science. March 1, 2006.

Accessed at:

<https://journals.sagepub.com/doi/10.1177/0002716205285515>

Permits Management Office (OGPe, by its Spanish Acronym), Puerto Rico Codes

2018, Regulation No. 9049 (November 15, 2018)

Puerto Rico Hazard and Risk Dashboard PRDOH, 2023

The URA and ADP Guide has been developed for CDBG-DR programs and will

carry through into implementation of the CDBG-MIT Program

Grantee Proposed Use of Funds

City Revitalization Program "Re-Green" initiatives

Low Impact Development and Green Infrastructure EPA program.

Methodologies

Through written correspondence attached in exhibit B, PRDOH developed an assessment to estimate MID Areas impacted by Hurricane Fiona based on the summary of impacts to homeowners (without insurance) classified as major-low or greater damage, low-income renters, small business, and public infrastructure using the methods provided in the FR. The FR identified the majority of municipalities in the HUD-identified MID Area as zip code areas, with the exception of Salinas, which was identified as a MID area by HUD. The remaining municipalities in the MID Area were identified through a zip code level assessment of the data noting that the available FEMA Individual Assistance (IA), SBA, and FEMA Public Assistance (PA) data does not support a zip code level assessment. However, it is relevant to note that when replicating the FR method for identifying MID areas, Salinas did not pass the \$10 million threshold. Moreover, Toa Baja exceeded HUD's \$10 million threshold at the county level to be included in the MID area, with more than \$14 million in estimated unmet needs. Thus, by using this approach, recognizing that Salinas was designated, among others, as a MID area by HUD, and highlighting other municipalities with losses greater than current MID municipalities is useful for identifying additional areas that, due to incomplete, inconsistent and/or inaccurate data, were excluded from the MID area. The "Total FR Determined Unmet Needs" (\$1,039,337) across all municipalities identified in the FR was used to appraise all other municipalities in terms of their total loss. This approach produced a twenty-five (25) additional municipalities with greater unmet needs than those identified as MID areas. By using this approach and comparing current MID areas, a total of forty-eight (48) municipalities would be classified as MID.

Furthermore, ArcGIS Pro was used to analyze the information provided by the municipalities and determine the landslide type and flooding risk of the damage produced by Hurricane Fiona. This software provided an analysis of Puerto Rico Racially and Ethnically Concentrated Areas of Poverty (R/ECAPs) and Justice 40 (Disadvantaged Communities). Moreover, U.S. Census information allowed for the creation of maps and tables that provide an assessment of socially vulnerable and protected class populations.

This Action Plan incorporates prior research conducted by PRDOH as part of HUD's 2019 CDBG-MIT Action Plan. In the CDBG-MIT Action Plan, the evaluation of risk is based on the Department of Homeland Security (**DHS**) extended risk definition³⁶. By referencing this definition, PRDOH determines measurable risk in as universal a language as possible, making the results accessible for planning across federal funding sources and allocations. Here, risk is the potential for an adverse outcome assessed as a function of threats, vulnerabilities, and consequences associated with an incident, event, or occurrence. A complete risk assessment has four (4)

basic components, including: hazard identification; profiling of hazard events; inventory of assets; and an estimate of potential human and economic losses based on exposure and vulnerability of people, buildings, and infrastructure³⁵. The equation in **Figure 4** illustrates this concept showing that Vulnerability times Hazard times Consequence equals Risk.

$$RISK_{HAZ_n} = (VUL)(HAZ_n)(CON_{HAZ_n})$$

↓




RISK =  x  x 

Figure 4: Risk Assessment Equation