Appendix A: Quantitative Methodology and Equations for Aims 1-3

Aim 1
Panel regressions will be estimated with robust standard errors with the following model:

$$PPBPL = tdamages_{mm} + pop_{miles} + pu18 + Hmrip + collegeplus + qawage + UR + ppop65 + u_i$$

Where:
- *PPBPL* = Percentage of the Population below poverty level by municipality for years 2015-2019

List of independent variables:
- *tdamages* = total damages as informed by SHELDUS (units of measurement: US$ millions)
- *pop_miles* = municipality population in thousands for years 2015-2019
- p*u18* = percentage of the population below 18 years
- *Hmrip* = deaths reported by municipality caused by Hurricane María
- *Collegeplus* = percentage of the population with a college degree earned or higher educational attainment
- UR = unemployment rate
- *qawage* = quarterly average wage
- pop65 = percentage of the population 65 years and older

This model will be estimated in different ways: 1) Ordinary Least Squares (OLS) with robust standard errors, 2) Generalized Least Squares (GLS) with random effects (re), 3) Generalized Least Squares (GLS) with fixed effects for municipalities. A Hausman test will be performed to measure the best model between the GLS with random effects and fixed effects.

Aim 2
2.a   Panel regressions will be estimated with robust standard errors with the following model:

$$PPBPL = tdisbursed\ mm + pop_{miles} + pu18collegeplus + qawage + ppop65 + UR + u_i$$

and
$$crogppbpl = tdisbursed\ d_{mm} + pop_{miles} + ur + pu18 + Hmrip + collegeplus + qawage + ppop65plus + UR + u_i$$

Where:
For the dependent variables:
- *PPBPL* = Percentage of the Population below poverty level by municipality for years 20152019
- crogppbpl = Change in the rate of growth (whether positive or negative) of the percentage of the population below the poverty level by municipality for the years 2015-2019

List of independent variables:

- *tdisbursed* = total amount of CDBG-DR and FEMA aid disbursed by the government of the Commonwealth to municipalities (units of measurement: US$ millions)
- *pop_miles* = municipality population in thousands for years 2015-2019
- UR = unemployment rate
- p*u18* = percentage of the population below 18 years
- *Collegeplus* = percentage of the population with a college degree earned or higher educational attainment
- *qawage* = quarterly average wage
- ppop65 = percentage of the population 65 years and older

This model will be estimated in different ways: 1) Ordinary Least Squares (OLS) with robust standard errors, 2) Generalized Least Squares (GLS) with random effects (re), 3) Generalized Least Squares (GLS) with fixed effects for municipalities. A Hausman test was performed to measure the best model between the GLS with random effects and fixed effects.

Aim 3

Cross-section regressions will be estimated with robust standard errors with the following model:

$$ac19$$
$$= appop65 + apopden + acancer + adiabetes + aheart + aocuuprate + apemp$$
$$+ tncorp + healthaccess + u_i$$

Where: dependent variable

- *ac19* = average COVID-19 deaths years 2015-2019

List of independent variables (all variables for years 2015-2019):

- *appop65* = average percentage of the population over age 65
- a*popden* = average percentage of population density
- acancer = average number of deaths caused by cancer
- adiabetes = average number of deaths caused by diabetes
- aheart = average number of deaths caused by heart conditions
- aoccuprate = average occupancy rate of arriving guests
- *apemp* = average percentage of population employed
- tncorp = total number of corporations by municipality
- *healthaccess* = total number of health professionals by municipality

This model will be estimated in different ways: 1) Ordinary Least Squares (OLS) without and with robust standard errors, 2) OLS with and without robust standard errors and fixed effects by municipality and 3) OLS with and without robust standard errors and fixed effects by regions (regions as determined by the PR Department of Health)