

# Estimates of Post-Hurricane Maria Exodus from Puerto Rico

## RESEARCH BRIEF

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Hurricane Maria's impact on Puerto Rico and its population is unprecedented. Though it is difficult to find comparable situations, we estimate that between 114,000 and 213,000 Puerto Rico residents will leave the island annually in the aftermath of Hurricane Maria. From 2017 to 2019, we estimate that Puerto Rico may lose up to 470,335 residents or 14% of the population. In other words, Puerto Rico will lose the same population in a span of a couple of years after Hurricane Maria as the island lost during a prior decade of economic stagnation. Our projections indicate that Florida is the state most likely to be affected by the exodus — with an estimated annual flow of between 40,000 and 82,000 people.



A breakdown of the migratory flow by age cohorts indicates that support for the relocation of the victims of Hurricane Maria would require a broad range of local public services across the country, especially in the states with the largest concentrations of the Puerto Rican population.

In the decade prior to Hurricane Maria, net migration from Puerto Rico to the United States amounted to approximately half a million, which represented a loss of ten percent of the island's population. The overwhelming reason alluded to by these migrants was the search for jobs or relocation for employment reasons. A large portion of those who left were unemployed or underemployed prior to migrating. The high number of unemployed on the island, more than double the national average, was induced by economic stagnation and the concomitant impact of the fiscal crisis on economic recovery.

After more than a decade of economic stagnation, the impact of Hurricane Maria on Puerto Rico's economy has been devastating and will push Puerto Rico further unto a

downward economic spiral. Researchers from the Climate Impact Lab estimated the impact of Hurricane Maria using an econometric model of the costs of cyclones over the past 60 years and applied it to the pre-storm economic conditions in Puerto Rico. They found that "Maria could lower Puerto Rican incomes by 21 percent over the next 15 years — a cumulative \$180 billion in lost economic output." They conclude that "Maria could be as economically costly as the 1997 Asian financial crisis was to Indonesia and Thailand and more than twice as damaging as the 1994 Peso Crisis was to Mexico — but this time on American soil."<sup>1</sup>

Given this grim economic scenario, the prospects for total employment to drop significantly in the months following Hurricane Maria are expected, given the collapse of the electrical system and the prognosis that it will take months to restore electricity to urban areas where jobs are concentrated, and even close to a year to restore electricity to more remote areas. The damage to the transportation and communications infrastructure will also take months to restore, directly affecting commerce and the service sector.

We will need to wait for the release of data on employment and net movement of passengers in the months after Hurricane Maria to fully assess the exodus of Puerto Rico residents to stateside communities. Yet the impact of Hurricane Katrina on the population exodus and ensuing unemployment in New Orleans offer an example of what lies ahead for Puerto Rico. A year after Hurricane Katrina devastated New Orleans, the city's population was just 56% of pre-Katrina levels.<sup>2</sup> In the 10 months (September 2005 to June 2006) following Katrina, New Orleans lost over 90,000 jobs or one-third of employment lost during the period.<sup>3</sup>

## ESTIMATES

To estimate the post-Maria exodus from Puerto Rico, we use the American Community Survey data for movers from the island to the United States. We assume a lower-bound estimate to be double the lowest number of migrants registered during the prior three years, and an upper-bound estimate of three times the highest number of

migrants registered during the prior three years. Implicitly, we assume that there will be no significant return migration this year. In addition, we assume that the distribution of movers from Puerto Rico will be distributed based on the destination preferences of recent migrants, not on the total population of the Puerto Rican population by states.

Table 1 depicts the estimates from the statistical simulations. We estimate that 114,396 to 212,607 persons will migrate to the United States over the next year as a result of Hurricane Maria. The largest impact of this exodus is likely to affect Florida, where an estimated flow of 40,998 to 82,707 people are expected. The post-Hurricane Maria migration upsurge will make Florida the state with the largest Puerto Rican population, surpassing New York State for the first time in history. New York, having the largest concentration of Puerto Ricans prior to Hurricane Maria, is expected to receive just a fraction of migrants, about 12,000.

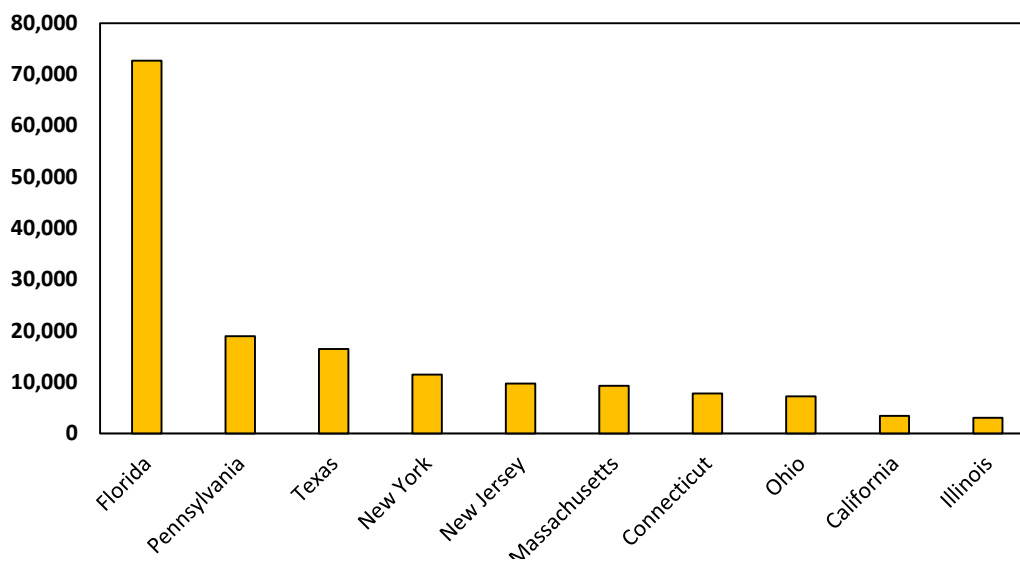
**Table 1. Post-Maria Exodus from Puerto Rico to the Top 10 States (one-year estimates)**

| Rank | State                | Puerto Rican<br>Population<br>2016 | Average<br>Migrants<br>2013-2016 | Migration Estimates |                |
|------|----------------------|------------------------------------|----------------------------------|---------------------|----------------|
|      |                      |                                    |                                  | Lower Bound         | Upper Bound    |
|      | <b>United States</b> | <b>5,450,472</b>                   | <b>64,933</b>                    | <b>114,396</b>      | <b>212,607</b> |
| 1    | Florida              | 1,067,747                          | 24,221                           | 40,998              | 82,707         |
| 2    | Pennsylvania         | 444,263                            | 6,333                            | 6,542               | 27,051         |
| 3    | Texas                | 196,460                            | 5,500                            | 5,276               | 27,153         |
| 4    | New York             | 1,081,110                          | 3,822                            | 7,350               | 11,877         |
| 5    | New Jersey           | 470,143                            | 3,251                            | 3,504               | 13,572         |
| 6    | Massachusetts        | 319,042                            | 3,109                            | 3,868               | 13,773         |
| 7    | Connecticut          | 298,245                            | 2,614                            | 3,676               | 11,334         |
| 8    | Ohio                 | 122,204                            | 2,420                            | 680                 | 13,107         |
| 9    | California           | 214,255                            | 1,145                            | 894                 | 6,741          |
| 10   | Illinois             | 209,638                            | 1,015                            | 1,918               | 3,285          |

Source: American Community Survey, various years.

Note: Lower bound estimates are double the lowest number of migrants registered during the prior three years. Upper bound estimates are three times the highest number of migrants registered during the prior three years. Since the ACS estimates are based on random sampling of the population, the smaller the numbers reported in this table the larger the margin of error for the estimates.

**Graphic 1. Post-Maria Exodus from Puerto Rico by States (one-year upper bound estimates)**



Source: American Community Survey, various years.

Note: Lower bound estimates are double the lowest number of migrants registered during the prior three years. Upper bound estimates are three times the highest number of migrants registered during the prior three years. Since the ACS estimates are based on random sampling of the population, the smaller the numbers reported in this table the larger the margin of error for the estimates.

As depicted in Graphic 1, other states where the estimated flows can exceed 25,000 people are Pennsylvania and Texas. Of the remaining top 10 states with the highest concentrations of Puerto Ricans, states expected to receive over 10,000 include New Jersey, Massachusetts, Connecticut, and Ohio.

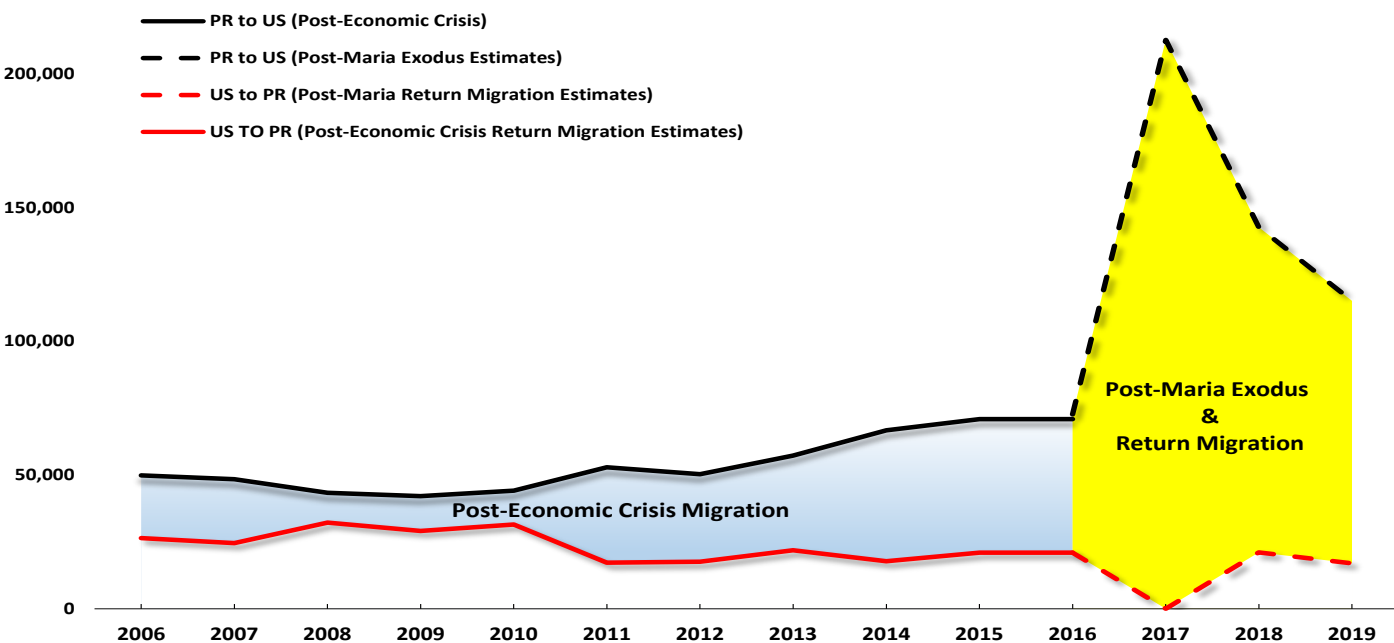
### DEPOPULATION OF PUERTO RICO

One of the most disturbing trends related to the prolonged economic crisis that began in 2006 has been the acceleration of migration from Puerto Rico to the United States. Hurricane Maria has accelerated this propensity to a point where we can refer to the depopulation of Puerto Rico as one of the most significant hurdles for future economic recovery.

Graphic 2 illustrates post-Maria Migration from Puerto Rico to the United States from 2006 to 2016 and then use those observations to estimate expected migration from 2017 to 2019. From 2006 to 2016, the island lost 525,769 net

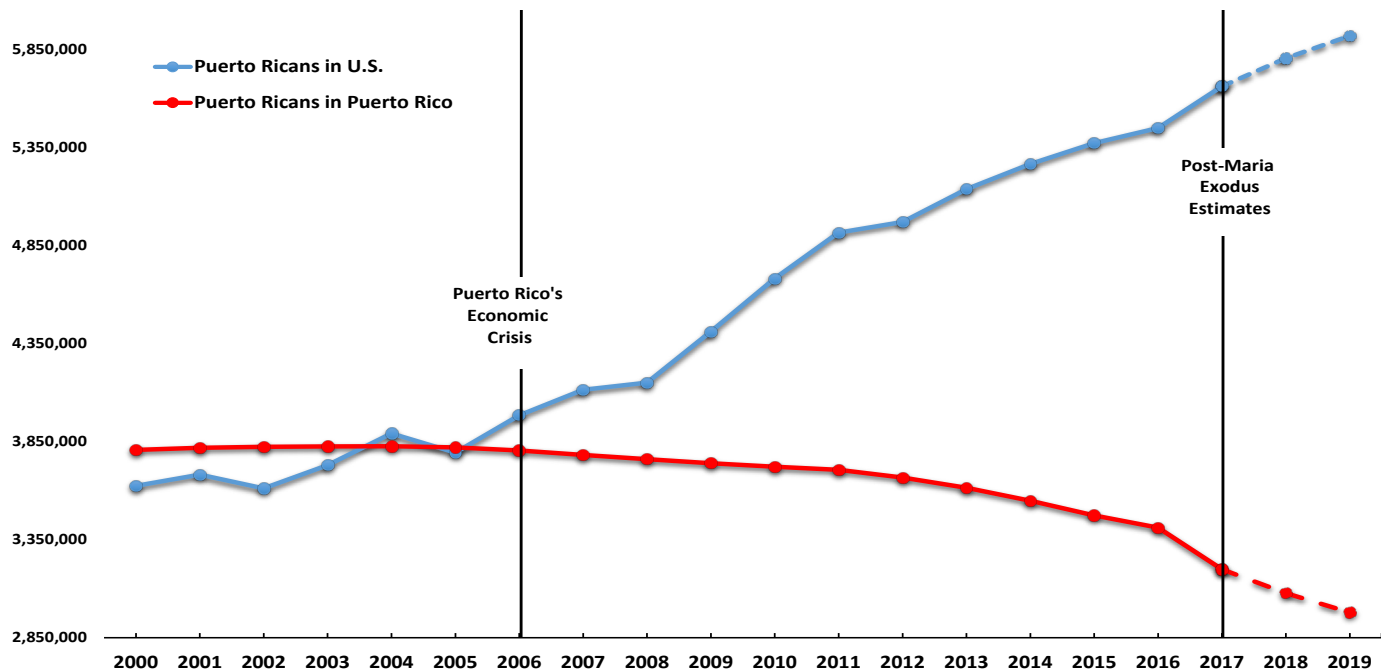
migrants, equivalent to 14% of the total population of the island since the economic crisis started. The aforementioned migration patterns have resulted in a significant shift of the Puerto Rican population from the island to stateside. As illustrated by Graphic 3, at the beginning of the economic crisis, there were about equal number of Puerto Ricans in Puerto Rico and the United States. With the crisis, the outflow of Puerto Ricans from the island, especially of young people in reproductive ages, resulted in a population explosion of stateside Puerto Ricans. By 2016, there were 5.5 million stateside Puerto Ricans while the island's population has dwindle to about 3.4 million residents.

Graphic 2. Post-Maria Migration from Puerto Rico to the United States 2006 to 2016 and 2017 to 2019 Estimates



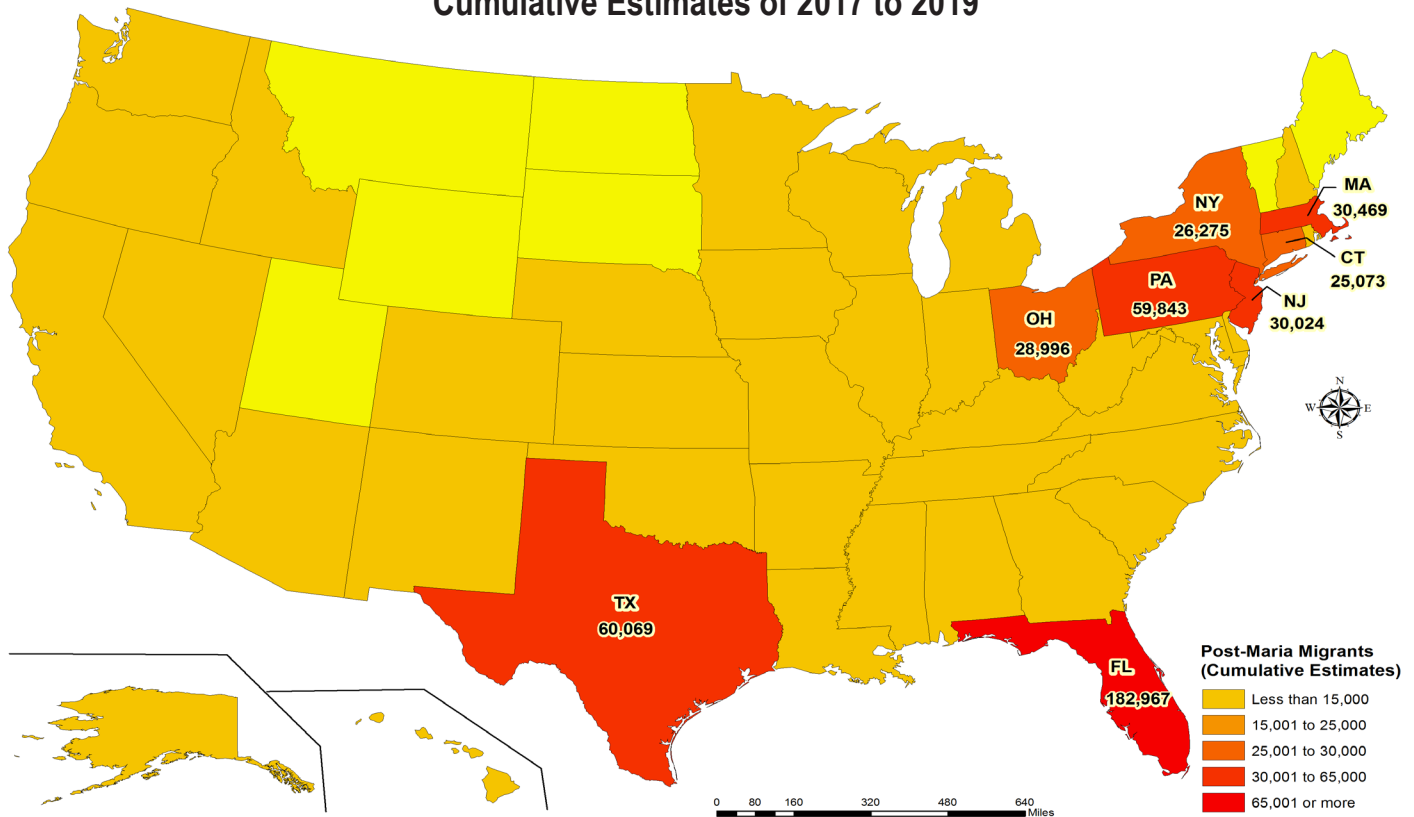
Source: American Community Survey, various years.  
Note: Lower bound estimates are double the lowest number of migrants registered during the prior three years. Upper bound estimates are three times the highest number of migrants registered during the prior three years. Since the ACS estimates are based on random sampling of the population, the smaller the numbers reported in this table the larger the margin of error for the estimates.

Graphic 3. Post-Maria Puerto Rico and Puerto Ricans in the United States Population 2006 to 2016 and 2017 to 2019 Estimates



Source: American Community Survey, various years.  
Note: Lower bound estimates are double the lowest number of migrants registered during the prior three years. Upper bound estimates are three times the highest number of migrants registered during the prior three years. Since the ACS estimates are based on random sampling of the population, the smaller the numbers reported in this table the larger the margin of error for the estimates.

**Graphic 4. Post-Maria Exodus from Puerto Rico:  
Cumulative Estimates of 2017 to 2019**



Source: American Community Survey, various years.

Note: Lower bound estimates are double the lowest number of migrants registered during the prior three years. Upper bound estimates are three times the highest number of migrants registered during the prior three years. Since the ACS estimates are based on random sampling of the population, the smaller the numbers reported in this table the larger the margin of error for the estimates.

## DEMOGRAPHIC BREAKDOWN

To ascertain the question of what are the potential impacts of the depopulation of Puerto Rico on stateside communities, we disaggregated the data by demographic groups. In addition to lower and upper bounds for expected Puerto Rican migrants by states, we estimated various age cohorts in order to provide some indicators of the impact of relocation of the victims of Hurricane Maria on local public services. Table 2 depicts the cross tabulations for the top five states for which there was sufficient observations for disaggregation of the data. For analytical purposes, we divided the population as follows:

**-School Age (5 to 17 years old)**

**-College Age (18 to 24 years old)**

**-Middle Age adults (25 to 64 years old)**

**-Seniors (65+)**

We estimate that 22,710 to 42,771 school-age children will migrate from Puerto Rico to the United States with their families. These children will be enrolled in public and private schools across the country requiring enrollment and transfer services, English as a second language or bilingual education, afterschool programs, and counseling. An additional number of babies and toddlers 4 years old or younger (estimated to be over 13,000) will most likely full-time or part-time daycare and babysitting. These children will also need pediatric care, and many of their parents will need access to translation and culturally sensitive health care services.

The estimate for college-age youth (18 to 24 years old) to leave the island in the aftermath of Hurricane Maria is from 17,250 to 32,721. In the short term many of these students may see their college studies interrupted. However, there are Puerto Rico-based universities that operate in Florida and other states that may facilitate the transfer of credits

**Table 2. Overall Post-Maria Exodus from Puerto Rico by Demographic Breakdown (one-year estimates)**

|                                    | Puerto Rican Population | Average Migrants | Migration Estimates |                |
|------------------------------------|-------------------------|------------------|---------------------|----------------|
|                                    |                         |                  | Lower Bound         | Upper Bound    |
| <b>United States</b>               | <b>5,450,472</b>        | <b>64,933</b>    | <b>114,396</b>      | <b>212,607</b> |
| Under 5 years                      | 474,191                 | 4,600            | 8,068               | 16,443         |
| School Age (5 to 17 years)         | 1,220,906               | 13,050           | 22,710              | 42,771         |
| College Age (18 to 24 years)       | 621,354                 | 9,726            | 17,250              | 32,721         |
| Middle Age adults (25 to 64 years) | 2,676,182               | 32,527           | 50,458              | 104,091        |

Source: American Community Survey, various years.

Note: Lower bound estimates are double the lowest number of migrants registered during the prior three years. Upper bound estimates are three times the highest number of migrants registered during the prior three years. Since the ACS estimates are based on random sampling of the population, the smaller the numbers reported in this table the larger the margin of error for the estimates.

**Table 3. Post-Maria Exodus from Puerto Rico to the Top 5 States by Demographic Breakdown (one-year estimates)**

| Rank     | State                              | Puerto Rican Population 2016 | Average Migrants 2013-2016 | Migration Estimates |               |
|----------|------------------------------------|------------------------------|----------------------------|---------------------|---------------|
|          |                                    |                              |                            | Lower Bound         | Upper Bound   |
| <b>1</b> | <b>Florida</b>                     | <b>1,067,747</b>             | <b>24,221</b>              | <b>40,998</b>       | <b>82,707</b> |
|          | School Age (5 to 17 years)         | 227,430                      | 4,955                      | 9,666               | 15,408        |
|          | College Age (18 to 24 years)       | 111,046                      | 2,497                      | 3,634               | 8,847         |
|          | Middle Age adults (25 to 64 years) | 547,754                      | 13,029                     | 20,280              | 47,175        |
|          | Seniors (65 years and over)        | 108,910                      | 1,802                      | 3,026               | 6,321         |
| <b>2</b> | <b>Pennsylvania</b>                | <b>444,263</b>               | <b>6,333</b>               | <b>6,542</b>        | <b>27,051</b> |
|          | School Age (5 to 17 years)         | 114,620                      | 1,652                      | 880                 | 9,840         |
|          | College Age (18 to 24 years)       | 54,200                       | 1,069                      | 1,466               | 4,473         |
|          | Middle Age adults (25 to 64 years) | 206,582                      | 2,576                      | 2,222               | 10,185        |
|          | Seniors (65 years and over)        | 23,102                       | 542                        | 1,083               | 3,285         |
| <b>3</b> | <b>Texas</b>                       | <b>196,460</b>               | <b>5,500</b>               | <b>5,276</b>        | <b>27,153</b> |
|          | School Age (5 to 17 years)         | 44,204                       | 1,227                      | 866                 | 5,988         |
|          | College Age (18 to 24 years)       | 22,396                       | 724                        | 554                 | 3,843         |
|          | Middle Age adults (25 to 64 years) | 100,980                      | 3,175                      | 2,806               | 15,255        |
|          | Seniors (65 years and over)        | 11,591                       | 107                        | 213                 | 561           |
| <b>4</b> | <b>New York</b>                    | <b>1,081,110</b>             | <b>3,822</b>               | <b>7,350</b>        | <b>11,877</b> |
|          | School Age (5 to 17 years)         | 215,141                      | 756                        | 1,102               | 3,087         |
|          | College Age (18 to 24 years)       | 121,084                      | 539                        | 670                 | 2,373         |
|          | Middle Age adults (25 to 64 years) | 534,068                      | 1,558                      | 2,548               | 5,142         |
|          | Seniors (65 years and over)        | 126,490                      | 810                        | 676                 | 3,216         |
| <b>5</b> | <b>New Jersey</b>                  | <b>470,143</b>               | <b>3,251</b>               | <b>3,504</b>        | <b>13,572</b> |
|          | School Age (5 to 17 years)         | 102,021                      | 548                        | 882                 | 1,833         |
|          | College Age (18 to 24 years)       | 48,895                       | 325                        | 650                 | 2,502         |
|          | Middle Age adults (25 to 64 years) | 232,721                      | 2,008                      | 1,772               | 8,136         |
|          | Seniors (65 years and over)        | 40,432                       | 204                        | 78                  | 1,317         |

Source: American Community Survey, various years.

Note: Lower bound estimates are double the lowest number of migrants registered during the prior three years. Upper bound estimates are three times the highest number of migrants registered during the prior three years. Since the ACS estimates are based on random sampling of the population, the smaller the numbers reported in this table the larger the margin of error for the estimates.



and assist with relocation. In addition, there are many universities in Florida, New York, and other states that are coordinating efforts to provide alternative programs, such as online courses or exchanges that will allow students to keep their affiliation to Puerto Rico universities while continuing their education with stateside institutions. More than anything, college students need information on the plethora of academic programs that may support their preferences for institutional affiliation and career preparation.

The estimate for working-age adults (25 to 64 years old) migrating from the island is from 50,458 to 104,091. The main consideration for this group in terms of local support services will be access to employment and housing, and relocation assistance especially if they have families and children. Florida and New York have been exemplary in their outreach to the Puerto Rican community and policy and programmatic initiatives to assist Puerto Ricans both in the island as they relocate stateside. Even in Florida, the state with the largest share of potential migrants from Puerto Rico, the number of workers relocating from Puerto Rico is not large enough to affect the state job market in any significant way.

The last demographic group, seniors (65+) migrating from the island, represents 8,572 to 16,464 persons, the smallest fraction when compared to other demographic groups. Seniors are the demographic group that traditionally is less likely to become inter-state movers. However, many seniors require specialized medical care that might be lacking on the island, and their families may encourage and facilitate their move to where they can receive appropriate treatment and care.

Table 3 shows a demographic breakdown for the five states with the largest expected migratory flows from Puerto Rico in the aftermath of Katrina. Florida with 39% of the expected largest share of migrants from Puerto Rico stands out. Florida may also account for a disproportionate share among emigrants of school-age children (36%), college-age youth (27%), working-age adults (45%), and seniors (38%).

## NOTES

1. [https://www.nytimes.com/2017/09/29/opinion/puerto-rico-hurricane-maria.html?action=click&pgtype=Homepage&clickSource=story-heading&module=opinion-c-col-left-region&region=opinion-c-col-left-region&WT.nav=opinion-c-col-left-region&\\_r=0](https://www.nytimes.com/2017/09/29/opinion/puerto-rico-hurricane-maria.html?action=click&pgtype=Homepage&clickSource=story-heading&module=opinion-c-col-left-region&region=opinion-c-col-left-region&WT.nav=opinion-c-col-left-region&_r=0)

2. New Orleans Population 2017, World Population Review. Retrieved October 12, 2017 from: <http://worldpopulationreview.com/us-cities/new-orleans-population/>

3. Michael L. Dolfman, Solidelle Fortier Wasser, and Bruce Bergman, "The effects of Hurricane Katrina on the New Orleans economy." U.S. Bureau of Labor Statistics, Monthly Labor Review, June 2007.

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