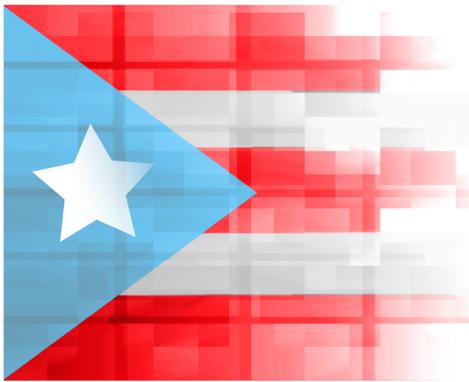


POPULATION DECLINE AND SCHOOL CLOSURE IN PUERTO RICO

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REBUILD PUERTO RICO

<https://centropr.hunter.cuny.edu/events-news/rebuild-puerto-rico>

Rebuild Puerto Rico

Hurricane Maria, a devastating Category 4 hurricane, caused billions of dollars in damages to Puerto Rico and left 3.4 million island residents without power, potable water, and telecommunications. Recovery is estimated to take years. Centro has launched Rebuild Puerto Rico, an online information clearinghouse for the stateside Puerto Rican community and other allies to support disaster relief and recovery efforts. A Puerto Rico Recovery & Reconstruction newsletter highlighting new content on the online platform will be issued weekly and as needed.

Hurricane Maria devastated Puerto Rico at a time of great financial difficulty for the island and its residents, leaving behind widespread destruction and a humanitarian crisis. Stay up to date with recent events related to recovery and reconstruction efforts in Puerto Rico.

News

You can help by donating directly to charities in Puerto Rico that are leading the effort to mitigate the humanitarian crisis. The website contains a list of charities and local initiatives with direct access to the victims of these hurricanes.

Donate

Browse current volunteer opportunities in support of disaster relief and recovery and reconstruction efforts.

Volunteer

Puerto Rican community leaders and elected officials in the diaspora are calling for a renewed effort to assist Puerto Rico with disaster relief and recovery. Many have responded to this call to action and have planned events in support of relief efforts.

Events

This natural disaster will undoubtedly dictate the upcoming policy agenda for the island. It is imperative that we maintain public awareness for disaster relief efforts and engagement, not just in the emergency phase but also during recovery and reconstruction.

Policy

Several federal, state, local, and private sector programs are available for those affected by a natural disaster. This page contains a collection of important resources and agencies that can help you during this difficult time.

Need Help?

Connect with people and organizations that provide a service or work with the Puerto Rican community stateside and in Puerto Rico.

New

Directory

Through two interactive maps find information related to pre and post-Maria conditions in Puerto Rico and the Puerto Rican solidarity movement in the United States.

New

Data Hub

Find information about collaboration opportunities or request for support from organizations that are working on the rebuilding of Puerto Rico.

New

Exchange

Introduction

According to the 2018 U.S. Census Bureau's Population Estimates, Puerto Rico's population is 3.1 million, having declined 4% since 2017 (3.2 million).¹ This is the first official estimate by the U.S. Census Bureau since Hurricane Maria struck Puerto Rico on September 20th, 2017. Since Hurricane Maria, migration has intensified, especially among adults and the children accompanying them (family units), and this pattern shifted the Island's demographic structure. This declining population has had a series of social and demographic impacts, such as increasing vacancy rates for housing units, lower growth rates in child population, and school closures throughout the Island. In a prior report, we documented the housing crisis² and in this study we examine school closures. A total of 265 public schools, or 24%, have closed, and 855 schools remained open in the 2018-2019 academic year. The total number of operational schools has declined from 1,515 at its peak in 2006 to 855 in 2018.³

Most school closures disproportionately occurred in the Island's rural areas (65%) relative to urban areas (35%). According to Puerto Rico's Department of Education, 306,652⁴ students matriculated in pre-kindergarten through 12th grade (preK-12) public schools in the 2018 academic school year, a percentage change of -11% compared to the 2017 academic school year, with a total matriculation of 346,096 students. However, between the 2006 and 2018 academic school years, student enrollment showed a percentage change of -44%, from 544,138 to 306,652 students. A combination of low fertility rates among women and migration has contributed to the declining number of children in Puerto Rico. However, the exodus of families increased post-Hurricane Maria and it is expected to be the main driver of population declines throughout the Island, especially among children under 18 years old. Nevertheless, it is important to note that recent 2017 U.S. Census Bureau data does not reflect true population figures, due to the interruption in data collection caused by both hurricanes Irma and Maria.⁵

It is noteworthy that the time frame of the 2018 estimate is between July 1st, 2017 and July 1st, 2018, and since Hurricane Maria took place on September 20, 2017, the 2018 population estimate includes both pre- and post-Hurricane Maria population. The absolute population change between the 2017 and 2018 estimate was -129,848. Moreover, this significant population drop reflects the impact of Hurricane Maria on the Island's population, which resulted an immediate outmigration, especially of families with children.

In this report, we examine Puerto Rico's child population trends from 2006 to 2017 and focuses on the impact of school closures not only on the child population, but also on the shrinking educational services and workforce and its impact on the countryside. Prior to Hurricane Maria, child migration was an existing trend during the 2006 economic crisis period, and we have seen the impact of child migration from Puerto Rico to the U.S. mainland as new communities in both new and traditional states of settlement emerged and contributed to the growth of stateside Puerto Ricans, immediately following the storm (Hinojosa, Román, and Meléndez 2018). We also take a closer look at the Island's demographic structure in 2006 and 2017, and compares population declines or growth at the municipal (or "municipio") level to understand the impacts of school closures in their respective communities. Lastly, we discuss policy recommendations to address what can be done to prevent school closings in vulnerable communities through the expansion of the public Montessori schools and similar community schools and repurpose the closed public school buildings, as such supply of vacant school buildings could serve as community centers and other social purposes to their corresponding communities.

This report is organized as follows: 1) an overview of the Island's demographic and migration trends in the child population, 2) student enrollment figures in both private and public schools between 2006 and 2018, 3) location of closed and open schools for the 2018-2019 academic year, and lastly, 4) policy recommendations.

¹Source: <https://www.census.gov/data/datasets/time-series/demo/popest/2010s-counties-total.html>.
<http://www.gdb-pur.com/documents/2017-SepOctNovDec-GDB-EAI.pdf>

²Jennifer Hinojosa and Edwin Meléndez, *The Housing Crisis in Puerto Rico and the Impact of Hurricane Maria*. New York, Center for Puerto Rican Studies, 2018 (RB2018-04). <https://centropr.hunter.cuny.edu/research/data-center/research-briefs/housing-crisis-puerto-rico-and-impact-hurricane-maria>.

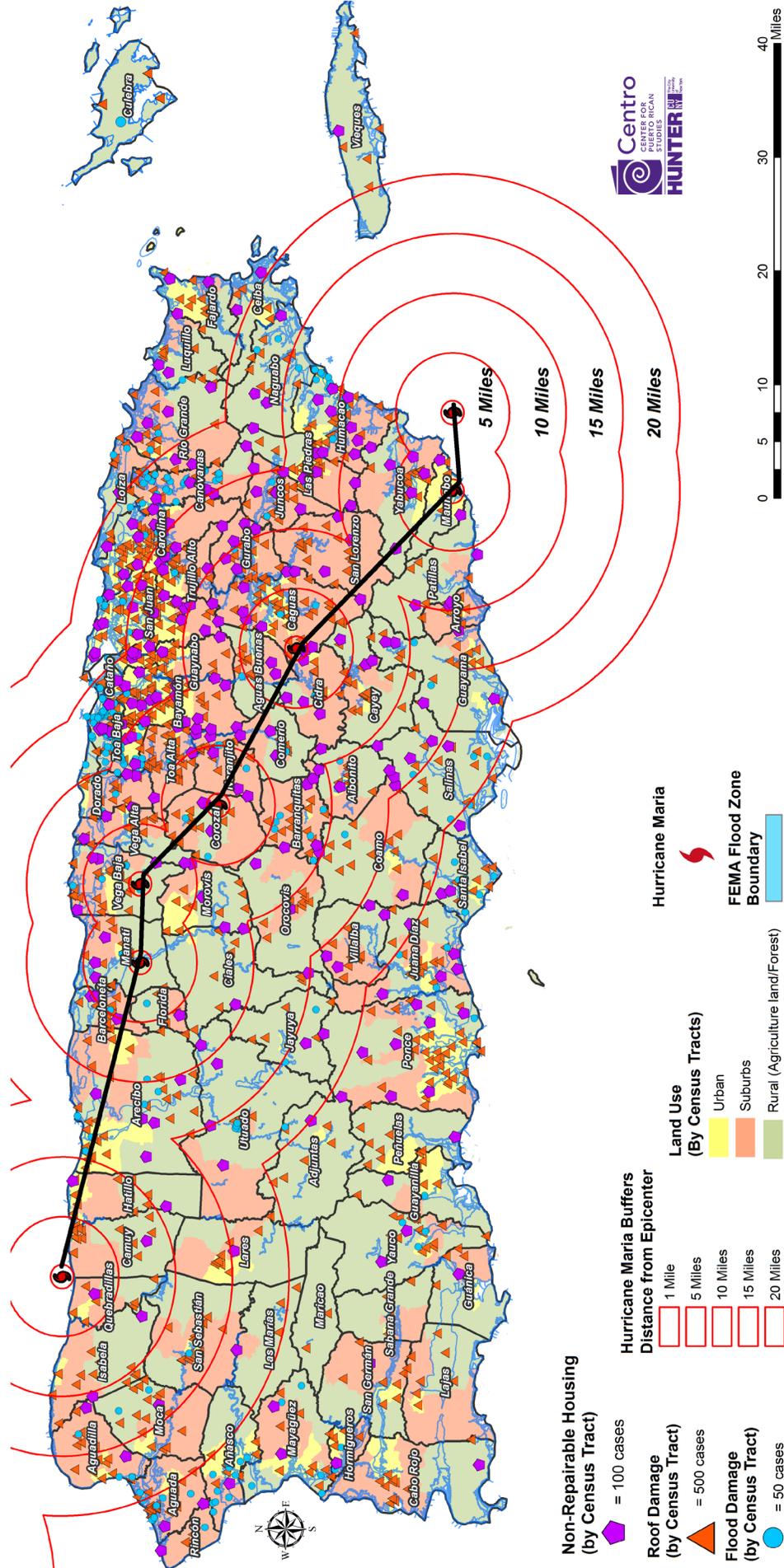
³Source: National Center for Education Statistics (NCES).

⁴As of September 13, 2018, data was provided by Puerto Rico's Department of Education.

⁵Refer to: <https://www.census.gov/programs-surveys/acs/technical-documentation/user-notes/2018-02.html>.

HURRICANE MARIA'S IMPACT

Hurricane Maria struck Puerto Rico as a category 4 storm. The island experienced widespread flooding (blue shades on map) with waist-deep water levels in some areas. Storm surge and flash flooding trapped thousands of residents. Despite evacuation of at-risk areas to shelters, 64 deaths were reported, but ongoing investigations suggest that over a thousand people may have died as a direct consequence of the storm. Strong winds destroyed homes and caused massive devastation and complete power grid destruction. FEMA claims illustrate in the map the extent and concentration of the damage caused by the storm.



Non-Repairable Housing (by Census Tract)

▲ = 100 cases

Roof Damage (by Census Tract)

▲ = 500 cases

Flood Damage (by Census Tract)

● = 50 cases

Hurricane Maria Buffers

- 1 Mile
- 5 Miles
- 10 Miles
- 15 Miles
- 20 Miles

Land Use (By Census Tracts)

- Urban
- Suburbs
- Rural (Agriculture land/Forest)

Hurricane Maria



FEMA Flood Zone



Boundary



Brief Overview of Puerto Rico's Population Trends

Demographically, Puerto Rico's population continues to decline, especially among children and working-age adults, and has a growing senior population. Prior to Hurricane Maria (September 2017), Puerto Rico's population decline was driven largely by migration coupled with low birth rates and high death rates. Such demographic change has implications to reassess social and economic needs to accommodate the Island's population age structure, especially within areas with closed school buildings. This includes redesigning policies related to educational services for the child population, job opportunities needed for the coming-of-age/working-age population cohort, or expanding social services for the senior population.

The consequences of this population decline and shifting demographic structure will entail an analysis of population change at the municipio level. However, instead of relying

on the Census Bureau's Population Estimates, it relies on 5-year estimates by the American Community Survey (ACS) for 2009-2017, due to availability of those data.

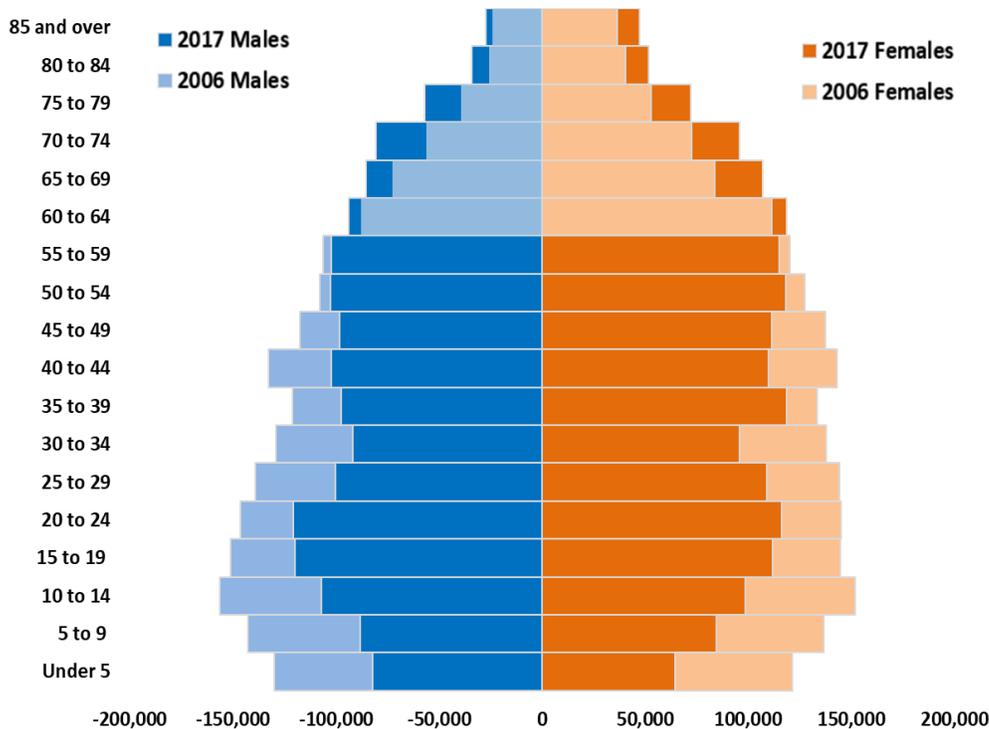
Population Declines by Municipios⁶

Puerto Rico's population declined by -12% between 2009 and 2017 (5-year estimates), from 3.9 million to 3.4 million.⁷ Geographically, population declines and age structures differ across the Island. Population data presented here analyze the percentage change between 2009 and 2017.

During this period, Ceiba (-22%), Culebra (-20%), Lares/Las Marías (-17%), Peñuelas (-16%), Guánica (-14%), Florida (-12%), Yauco/Fajardo/Villalba (-11%), Loíza/Trujillo Alto (-8%), and San Sebastián (-7%) experienced the highest population decline. These municipios are located on the Island's coastal and interior regions.

In terms of absolute change, municipios with the largest population density, such as San Juan, experienced a

Figure 1. Puerto Rico's Population Pyramids, 2006 and 2017



Source: U.S. Census Bureau, Puerto Rican Community Survey 2006 & 2017 (1-year estimate)

⁶ The 2009 and 2017 American Community Survey's 5-year estimates were used in this report to compare population change at the municipio level. It is noteworthy that the 5-year estimate is an annual average of data collected over a 60-month period. For example, the 2017 ACS population estimates discussed in this report is the population average that includes the years 2013, 2014, 2015, 2016, and 2017. More importantly, by using the 5-year estimates, ACS allows comparing population at the municipio level (and other smaller geographies with at least 65,000 people), and the primary advantage of analyzing 5-year-estimate data is the increased statistical reliability of the data. For more information, refer to: https://www.census.gov/content/dam/Census/library/publications/2018/acs/acs_general_handbook_2018_ch03.pdf.

⁷ The 2009 and 2017 5-year estimates were used to observe population changes at the municipio level.

percentage change of -5%, with a loss of -69,471 residents from 2009 to 2017, followed by Bayamón, with a -3% change—a loss of 31,992 residents—; Ponce, with a -6% change—a loss of 31,448 residents—; and Carolina, with a percentage change of -2%—a loss of 25,755 residents. Migration is the greatest driver of population loss in Puerto Rico’s largest urban municipios, while population loss in the rural areas is also caused by migration to the Island’s urban areas or out-migration from the Island, coupled with declining birth and increasing death rates.

Population Pyramids, 2006 & 2017

Figure 1 depicts the dramatic change in demographics in Puerto Rico over the past decade. The graph shows a comparison of Puerto Rico’s population pyramids, which is composed of age (at 5-year intervals) and sex in 2006 and 2017 (based on ACS’s 1-year estimates).⁸ The age structure for males is presented to the right of the pyramid (2017 is illustrated in a dark blue shade, while 2006 is light blue) and the age structure for females is to the left (2017 is illustrated in a dark orange shade, while 2006 is light orange). In the span of 11 years, the 60-and-under age groups declined, while the 60-and-over age groups increased.

Children Age (Under 18 years old)

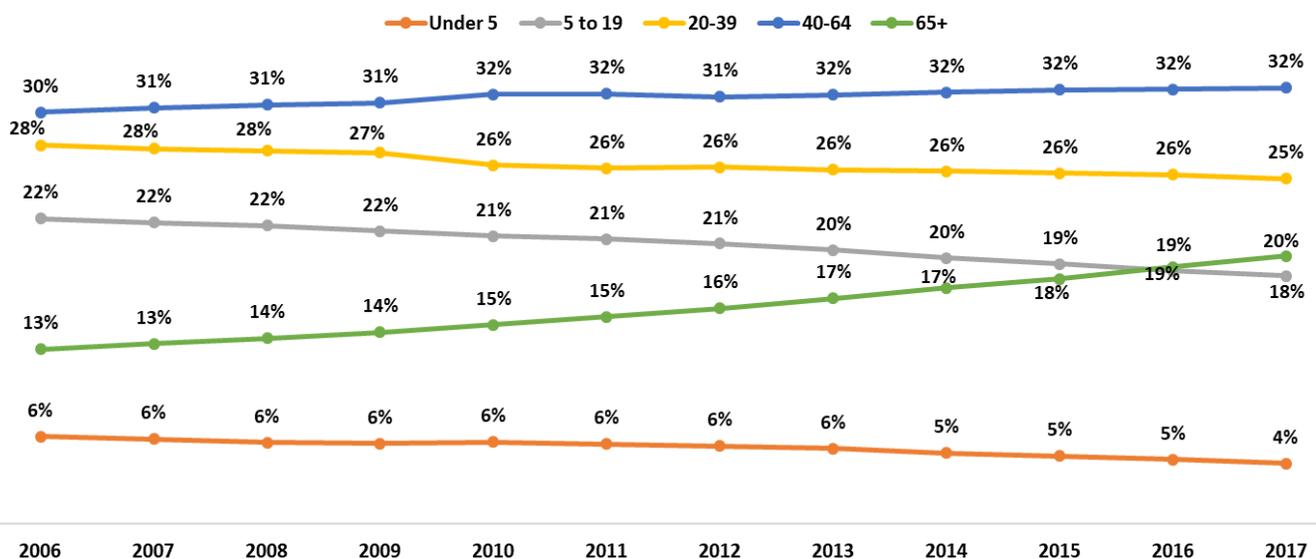
The population of children under 5 years of age in Puerto Rico was much larger in 2006, with a population size of

251,606; in 2017, this age cohort declined to 146,699 (based on ACS’s 1-year estimates). This represents a -42% change within this age group, the steepest decline relative to other age groups. This sizable decline is related to lower fertility rates, which in turn relates to smaller proportions of the total population in the youngest age groups. Since the population pyramids represent an 11-year span, children under the age of 5 in 2006 are assumed to be represented in the 10-to-14-years age cohort in 2017. As shown in figure 1, bars on both sexes within the 10-to-14 age group are smaller in 2017. In other words, a total of 251,606 children were under the age of 5 in 2006 and these same age cohorts were expected to be 10 to 14 years old in 2017, and within this age group only 205,425 were counted. A large proportion of such decline may be related to migration and, to a smaller extent, deaths. On the other hand, school-aged children (5-to-19 age groups) of both sexes also declined by -31%, from 883,481 in 2006 to 609,892 in 2017. As shown in figure 1, this age group showed a larger base size (see lighter shaded bars) in 2006 than in 2017.

Young and Middle Age Adults (20 to 59 years old)

Overall, the Island’s young and middle-aged adult population between 20 and 59 years old showed population declines from 2006 to 2017. This segment of the population may lead to economic and further demographic disadvantages for Puerto Rico. According to the 2017 U.S.

Figure 2. Population by Age and Year, 2006 to 2017



Source: U.S. Census Bureau, Puerto Rican Community Survey 2006-2017 (1-year estimate)

⁸The U.S. Census Bureau first published the American Community Survey in January of 2005 and the Puerto Rico Community Survey in 2006.

Census Bureau (based on ACS's 1-year estimates), the total number of women aged 15 to 50 declined to 794,095 from 1,013,624 in 2006; this was a -28% decline. Furthermore, the number of women in the same age group who birthed in the past 12 months declined by half, from 44,623 in 2006 to 22,160 in 2017.

Young adults aged 20 to 29 showed a decline between 2006 and 2017 (see figure 1). For example, males 20 to 29 years old in Puerto Rico declined by -23%, while females in the same age group declined by -22%. The 30-to-39 age group population showed slightly higher declines among males (-24%) than females (-21%) relative to the 20-to-29 age group. Among the 40-to-49 age group, males showed similar declines (-20%) compared to their female counterparts (-21%) and compared to the 20-to-29 and 30-to-39 age groups. Lastly, the 50-to-59 age group experienced lower percentage change compared to all age groups in the Island. For example, males declined by only -4%, while females declined by -6%.

Seniors (60 years and over)

Similar to other developed countries, lower fertility rates and increased life-spans have led Puerto Rico's older age population to grow rapidly. In 2017, Puerto Rico's senior age population (people 60 years and older, also known as "baby boomers") where the only demographic group with positive rates of growth. Specifically, the 60-to-64 age group grew slightly, followed by the 65-to-74 (9.6%) and the 74+ (2.9%) age groups.⁹ Relative to the senior population in the

U.S., Puerto Ricans in these cohorts showed higher rates of labor force participation.

In terms of population change, from 2006 to 2017, males in the 60-to-69 age group increased by 12%, while females increased by 16%. The highest increase occurred in the 70-to-79 age group: a 44% change among males and a 34% change among females. Lastly, the 80+ age group showed an increase of 24% for males and 29% for females. Such gains in the older age groups are to be expected due to increased longevity and lower fertility rates in Puerto Rico.

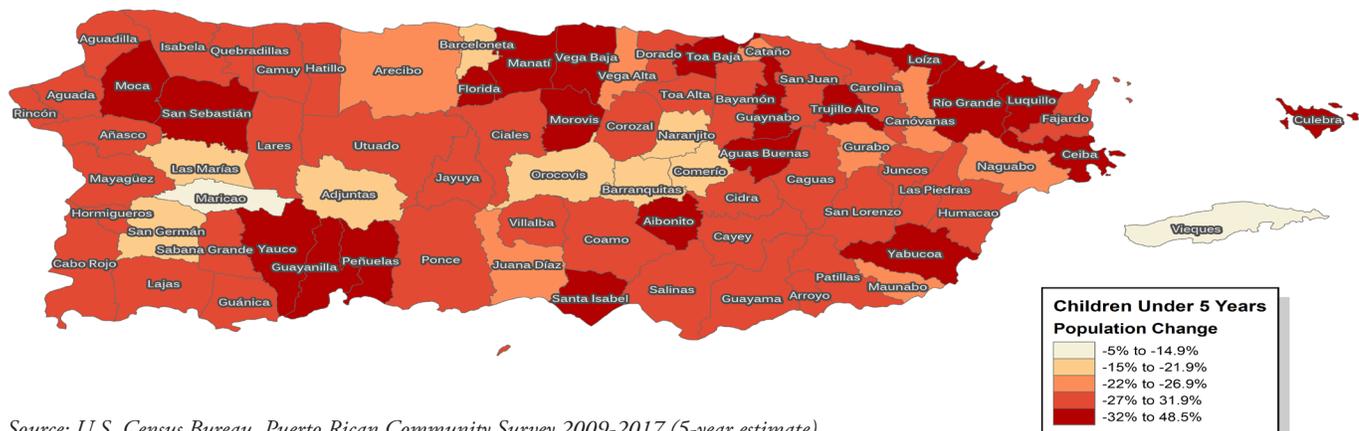
In sum, Puerto Rico's growing senior population is visible as the top of the 2017 pyramid, wider than in 2006. On the other hand, the number of people of childbearing age (15 to 49) has narrowed between 2006 and 2017. This is reflective of higher migration rates among the Island's youth and middle-aged adults, higher deaths, or low birth rates from a younger age population. Thus, this may lead to further population declines in the future, especially post-Hurricane Maria.

Children Population Trends

Children under 5

As shown in Figure 2, children under 5 made up the smallest share of Puerto Rico's population relative to other age groups. This sector of the population requires special attention as children will be impacted by the future decisions made around any further school closures, as they

Figure 3. Puerto Rico's Under 5 Years Old Percent Change, 2009 and 2017



Source: U.S. Census Bureau, Puerto Rican Community Survey 2009-2017 (5-year estimate)

⁹ Source: U.S. Census Bureau, 2017 American Community Survey (1-year estimates).

will soon enter elementary schools. Puerto Rico's children under the age of 5 declined from 251,606 in 2006 to 146,699 in 2017.¹¹ In all, the percentage change of children under the age of 5 is -42%, by far the highest percentage decline relative to other age groups in Puerto Rico.¹¹ In a 11-year span, the proportion of children under 5 fell from 6% in 2006 to 4% in 2017. Between 2006 and 2013, children under 5 steadily remained at 6% of the population, and between 2014 and 2016, this cohort declined to a 5% share of the population. Recent numbers show that in 2017 only 4% of Puerto Rico's population was under the age of 5. As shown in figure 3, the greatest declines for this age group occurred in the Island's coastal and interior municipios.¹²

Between 2009 and 2017, municipios with the greatest decline of children under the age of 5 included Culebra (-26%), Ceiba/Vega Baja/Yauco (-11%), Yabucoa (-10%), Peñuelas (-9%), Aguas Buenas (-8%), and Guayanilla (-7%). On the other hand, lower percentage declines were seen in Maricao (-10%), Vieques (-14%), Barranquitas (-16%), Las Marías (-19%), and Naranjito (-20%).

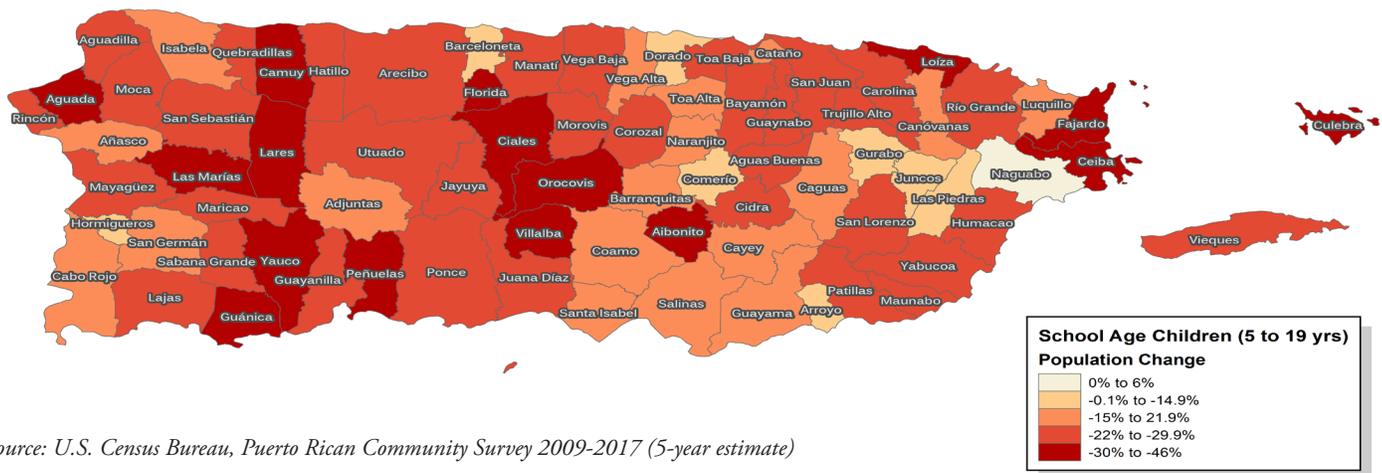
School Age Children (5 to 19 years old)

According to the U.S. Census Bureau's American Community Survey (based on the 1-year estimates), the number of school-aged children (5 to 19 years old) declined from 883,481 (22%) to 609,892 (18%), a -30%

change overall. This age group showed the second highest percentage declines on the Island, after children under 5 years (-31%). Relative to other age groups,¹³ school-aged children (5 to 19 years old) composed 22% of Puerto Rico's population, the second largest group between 2006 and 2015. As shown in figure 1, the proportion of school-aged children steadily declined and remained at 21% between 2010 and 2012. In 2013 and 2014, the share of school-aged child population continued to decline to 20%, and between 2015 and 2016, school-aged children further declined to 19% and then to 18% in 2017. As shown in figure 1, school-aged children are the fourth largest age group after Puerto Rico's senior population (65+), young adult population (20-39 years), and middle-aged adults (40-64 years). In 2016, the proportion of school-aged child and senior populations was the same, and in 2017 the proportion of 65+ population (20%) outpaced the school-aged child population (18%) by 2 percentage points.

Overall, the steepest declines, in terms of percentage change among school age children (5 to 19 year olds), was seen in the Island's coastal and interior municipios¹⁴ (see Figure 4). Figure 4 shows the percentage change in school-aged child population at the municipio level between 2009 and 2017. The highest declines were observed in Culebra (-55%), Ceiba (-54%), Lares and Peñuelas (-50%), Guánica and Las Marías (-48%), and Loíza and Ciales (-47%). On the

Figure 4. Puerto Rico's School Age Children (5 to 19 years old) Percent Change, 2009 and 2017



Source: U.S. Census Bureau, Puerto Rican Community Survey 2009-2017 (5-year estimate)

¹⁰ 2006 and 2017 U.S. Census Bureau's American Community Survey (1-year estimate).

¹¹ Percentage change between 2006 and 2017 for (1) 5-19 years = -30%, (2) 20-39 years = -9%, (3) 40-64 years = 6%, and (4) 65+ = 54%.

¹² The 2009 and 2017 American Community Survey's 5-year estimates was used for percentage change among children under 5 years for comparative analysis across all municipios.

¹³ This research brief divides age by the following groups: (1) under 5 years, (2) 5-19 years, (3) 20-39 years, (4) 40-64 years, and (5) 65+ years.

¹⁴ The 2009 and 2016 American Community Survey 5-year estimates were used for percentage change among children under 5 years for comparative analysis across all municipios.

other hand, moderate percentage change declines were observed in Naguabo (-16%), Gurabo (-21%), Dorado (-23%), Comerío (-28%), and Hormigueros (-29%) in this population sector (see Figure 4).

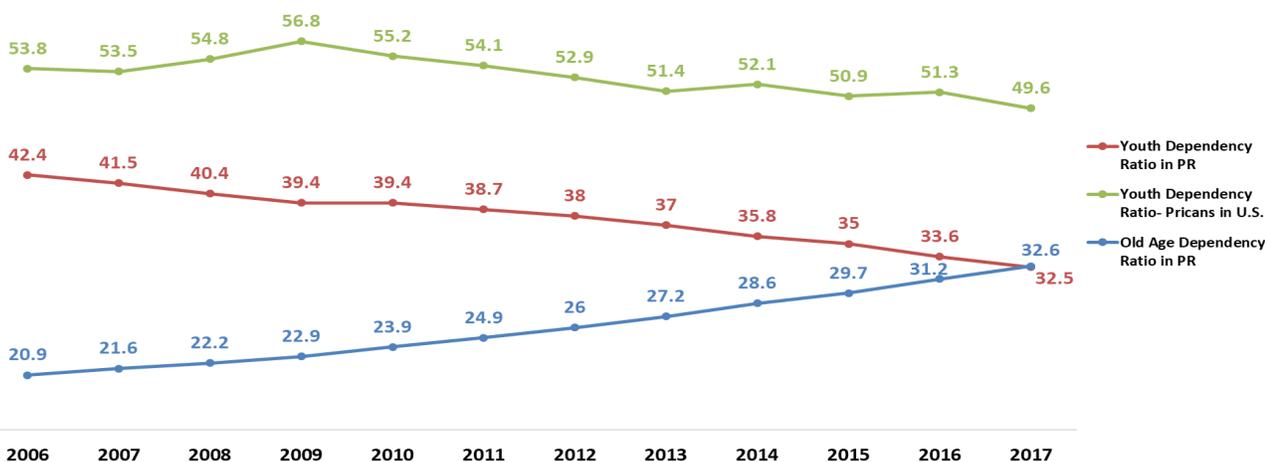
Dependency Ratios

Dependency ratios are measurements of the potential burden of the youth population (0-18 years) and the elderly population (65+ years) (who are not in the labor force) on the working-age population cohort (18-64 years). Thus, a dependency ratio is defined as the number of dependents (youth or elderly population) in a given population divided by the working-age population (18-64 years).¹⁵ Developing countries tend to have higher youth dependency ratios due to higher birth rates and a larger child population (0-18 years), while developed countries show the opposite, whereby youth dependency ratios are lower and elderly dependency ratios are higher (Rowland, 2003). Similarly, the old age dependency ratio depicts the potential burden of the older age population (65+ years) on the working age population (18-64 years). In the case of Puerto Rico, having a lower youth dependency ratio could impact economic growth through the decline of the labor force, lower government revenues, and, by implication, less spending on schools and other programs for children. According to Alejandro Macarrón, Puerto Rico is undergoing a “demographic winter,” whereby fertility levels are very low (currently below the 2-children-per-woman threshold), as migration continues to increase from the Island to the U.S. mainland, and deaths began to exceed births (Macarrón, 2014).

This section analyzes Puerto Rico’s dependency ratios. Figure 5 depicts the youth dependency ratio (red line) for Puerto Rico in comparison to the Puerto Rican population in the U.S. (green line). In addition, we include in the graph Puerto Rico’s old age dependency ratio (blue line). In general, Puerto Rico’s youth dependency ratio is lower relative to stateside Puerto Ricans (see Figure 5). In other words, there are fewer child dependents in Puerto Rico to be supported for every 100 working-age adults. This is a result of heightened children migration to the U.S. mainland and a lower number of births (Macarrón, 2014; Hinojosa, Román, and Meléndez, 2018). On the other hand, the relatively higher youth dependency ratios among stateside Puerto Ricans is the result of migration of children from Puerto Rico—especially during the economic crisis period and heightened by Hurricane Maria—, and stateside Puerto Ricans have a much younger age structure relative to Puerto Rico’s overall population. It is noteworthy that the recent 2017 American Community Survey (ACS) and Puerto Rican Community (PRCS) data do not reflect post-Hurricane Maria population impacts due to data collection suspension immediately after the storm; therefore, Puerto Rico’s youth dependency ratio might be even lower than the reported ratio of 32.5 for 2017.

Puerto Rico’s youth dependency ratio declined from 42.4 in 2006 to 32.5 in 2017; in other words, for every 100 working-age adults (18-64 years) only 32.5 children under 18 years are expected to be supported. This is reflected in the age composition of the overall population, as the

Figure 5. Puerto Rico’s Under 5 Years Old Percent Change, 2009 and 2017

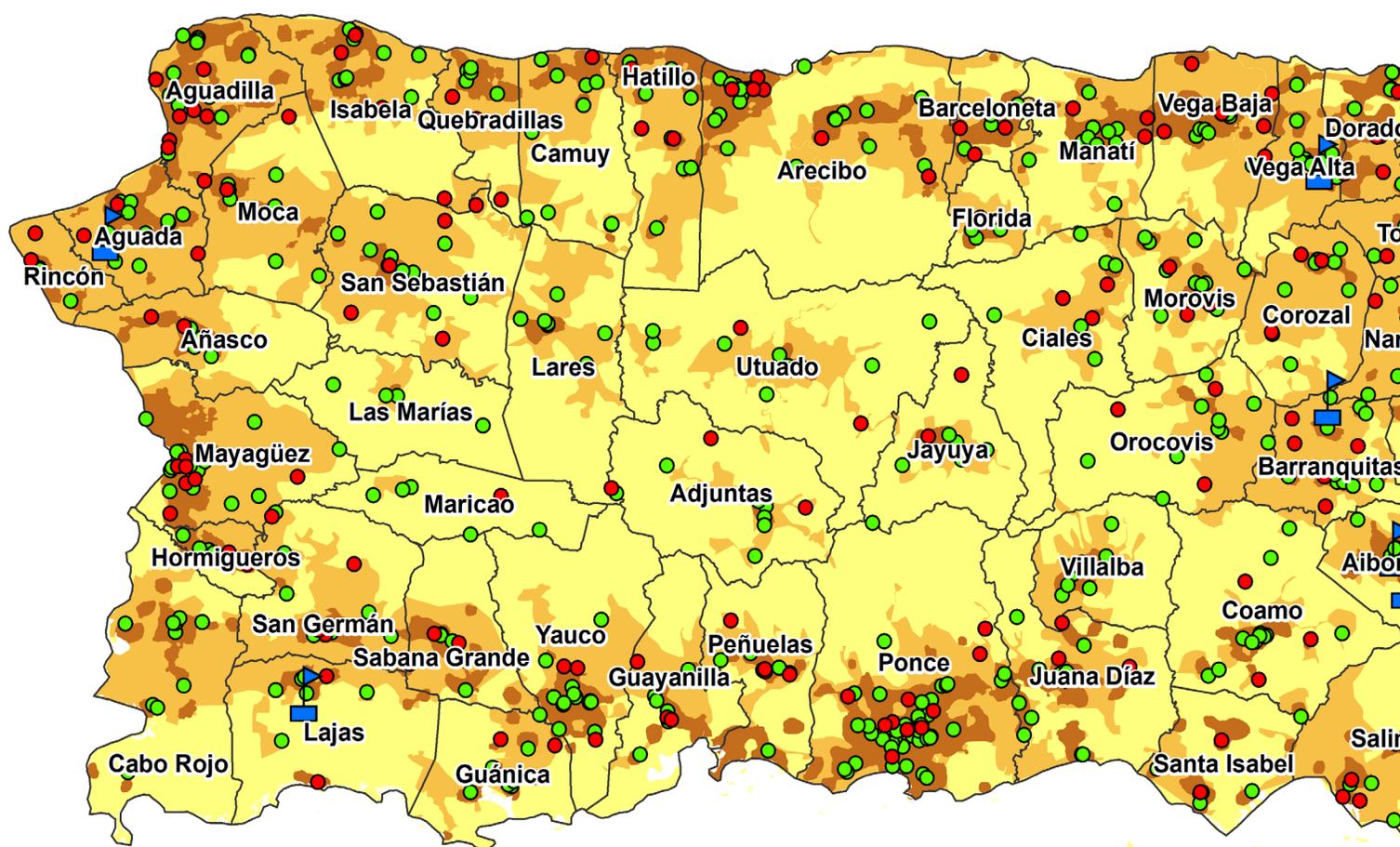


Source: U.S. Census Bureau, Puerto Rican Community Survey 2006-2017 (1-year estimate).

¹⁵ This research brief follows the U.S. Census Bureau’s dependency ratio calculation. See page 6: https://www.census.gov/content/dam/Census/library/publications/2018/demo/P25_1144.pdf

School Openings and Closings in Rural/Urban

The U.S. Census Bureau estimates that Puerto Rico lost 4% of its population after Hurricane Maria. Population losses have led to school closures across the island. Overall, the total number of schools declined from 1,515 at its peak in 2016 to 855 in 2018. However, most school closures disproportionately occurred in the Island's rural areas (65%) relative to urban areas (35%). Partly in response to the impact that school closing is having in disadvantaged communities, public Montessori schools have emerged as viable bottom-up policy to prevent school closings or reopen those that have been closed. Public Montessori and other similar community schools provide quality education to disadvantaged communities in higher-risk rural areas and contribute to the population and economic stabilization of these communities.



Landuse

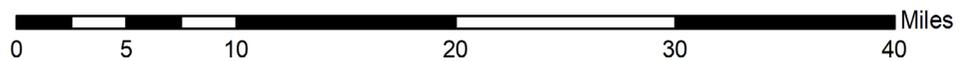
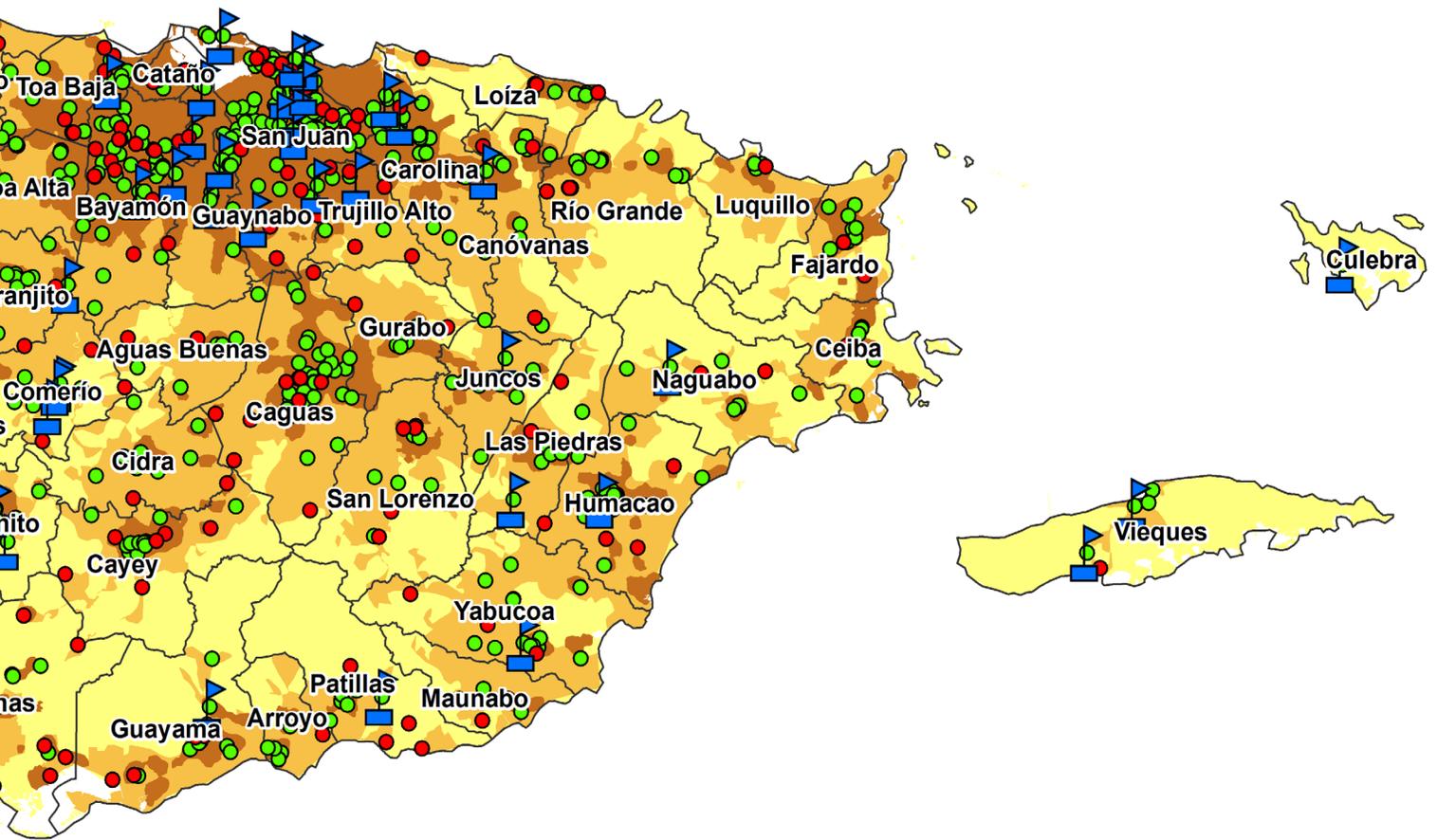
- Urban
- Rural high-density populated
- Rural low-density populated

School Status

(2018-2019 School Year)

- Currently Open
- Montessori Schools
- Currently Closed
- Currently Open

Communities, 2018-2019



Island's children age population has been shrinking since 2006 (Figure 1). On the other hand, 49.6 children under 18 years are to be supported for every 100 working-age stateside Puerto Rican adults in 2017, a ratio that is at least 17.1 percentage points higher than Puerto Rico's youth dependency ratio. Stateside Puerto Rican children show a relatively higher youth dependency ratio compared to those in Puerto Rico, but showed slight declines from 53.8 in 2006 to 49.6 in 2017. These trends are two sides of the same coin (Hinojosa, 2018). As shown in figure 5, as Puerto Rico's youth dependency ratio further declines, stateside Puerto Rican youth dependency shows a slight spike. This is especially evident in 2008, 2013, and 2016.

In contrast, Puerto Rico's old dependency ratio steadily increased between 2006 and 2017, from 20.9 to 32.6. This follows a similar global trend whereby old age dependency ratio is expected to rise, especially among developed countries and, to some extent, developing countries, due to the expected baby boomers (those born between 1946 and 1964) and longer life expectancy. However, in Puerto Rico's case, the high proportion of the senior age population is also a result of the disproportional share of working-age adults and child migration. As shown in figure 5, Puerto Rico's older age dependency ratio is similar to the youth dependency ratio in 2017, but it is expected to outpace the latter group in the coming years. This also indicates a higher demand for elderly care on the Island as its old dependency ratio continues to rise and outpace its youth dependency ratio.

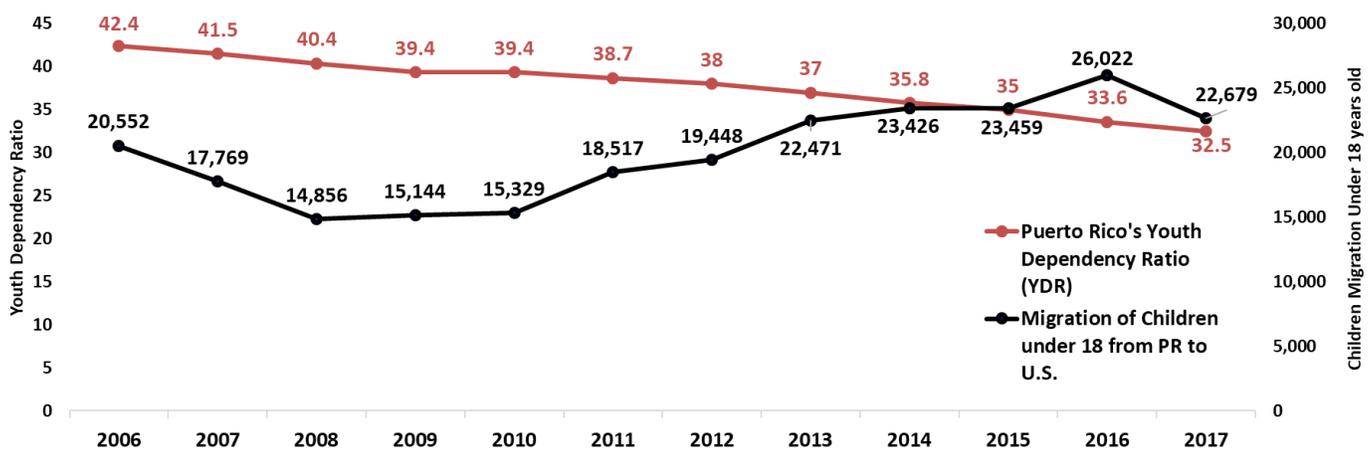
Migration

Migration played an important role in the declining child population in Puerto Rico at the start of the 2006 economic crisis period, and hurricanes Irma and Maria have heightened migration among households with children. Figure 6 illustrates Puerto Rico's youth dependency ratio (red line) and migration trends from Puerto Rico to the U.S. among children under 18 years (black line). It is clear the out-migration of children from Puerto Rico to the U.S. mainland has an effect on the Island's declining youth dependency ratio. In 2006, a total of 20,552 children under 18 migrated to the mainland and the youth dependency ratio was 42.4. As migration decreased and stabilized between 2007 and 2010 from 17,769 to 15,329, youth dependency also declined and remained stable from 41.5 in 2007 to 39.4 in the same years. However, between 2011 and 2015 migration steadily increased from 18,517 to 23,459, and Puerto Rico's youth dependency ratio steadily declined from 38.7 to 35. In 2016 alone, 26,022 children under 18 left the Island, which further affected its youth dependency ratio at 33.6. Finally, one year prior to both hurricanes Irma and Maria, at least 22,679 children migrated, and the Island's youth dependency ratio was at its lowest: 32.5 (see figure 6).

Student Enrollment

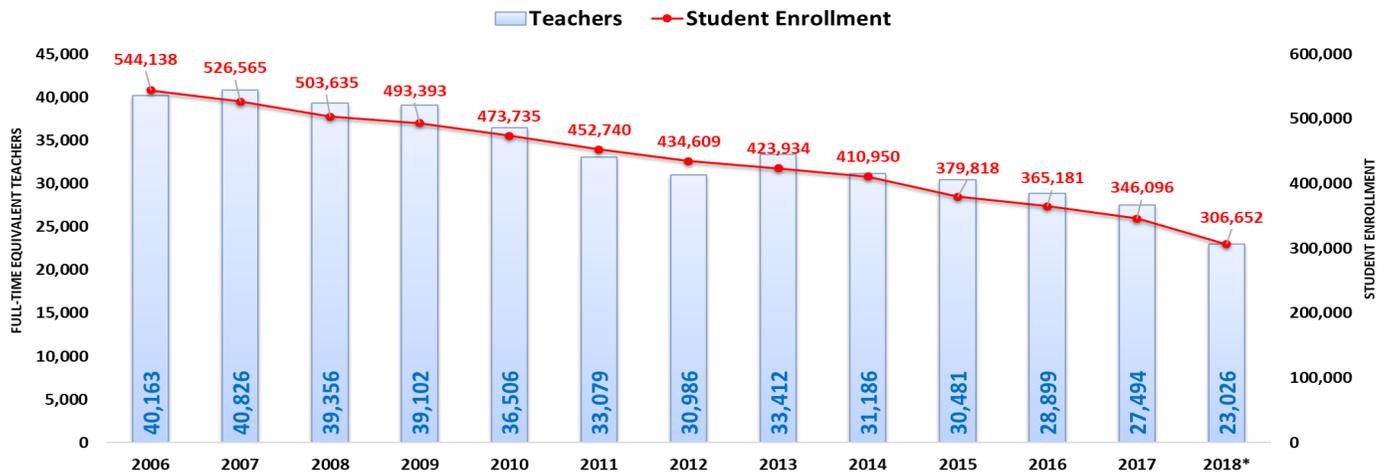
This section analyzes the Island's declining student enrollment in both public and private schools pre- and post-Hurricane Maria. All in all, since Hurricane Maria, public school enrollment showed a percentage decline of -44%, from 544,138 in 2006 to 306,652 in 2018 (one year post-

Figure 6. Puerto Rico's Under 5 Years Old Percent Change, 2009 and 2017



Source: U.S. Census Bureau, Puerto Rican Community Survey 2006-2017 (1-year estimate).

Figure 7. Puerto Rico's Under 5 Years Old Percent Change, 2009 and 2017



Sources: Puerto Rico's Department of Education & Instituto de Estadísticas & U.S. Department of Education, National Center for Education Statistics, Common Core of Data (CCD); *2018-Full time-teachers who were evaluated for 2017-2018 school year.

Hurricane Maria). Similarly, Puerto Rico's private school enrollment declined by -21%, from 2155,050 students in 2009 to 122,924 students in 2017.¹⁶

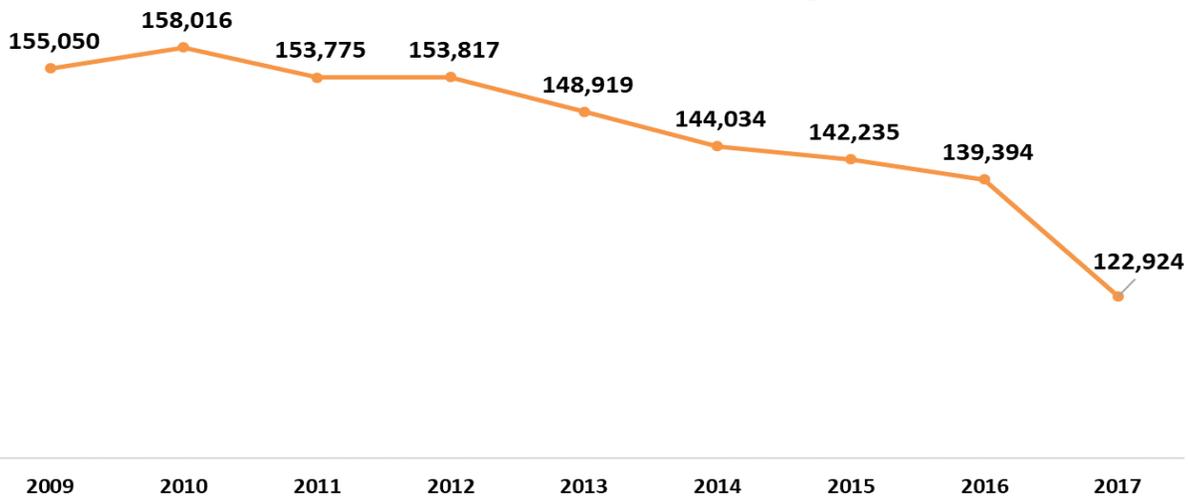
Public Schools

Puerto Rico's long economic crisis and the migration of families with children to the U.S. mainland after Hurricane Maria has resulted in a sharp decline in pre-K-12 student enrollment. According to Puerto Rico's Department of Education, approximately one year post-Hurricane Maria (October 2018), only 306,652 students matriculated in public schools. This was approximately 5,000 students more than the projected estimate by Puerto Rico Department of Education of 311,835.¹⁷ On the onset of the Island's economic crisis, student enrollment was at its peak with

544,138 students in 2006, and steadily declined to 346,096 in 2017, with a percentage change of -36% in a 11-year span (see figure 7). Between 2006 and 2017 (pre-Hurricane Maria), Puerto Rico's public schools were losing about 18,000 students annually. The highest student population loss occurred in 2015 with at least 31,100 students less, from 410,950 students in 2014 to 379,818 students in 2015.

It is noteworthy that both hurricanes Irma and Maria took place in September of 2017 (2 weeks apart); thus, Puerto Rico's 2017-2018 academic year began with 346,096 students. The impact of both storms, especially Hurricane Maria, induced a massive exodus that included children as well. Approximately six months post-hurricanes Irma and

Figure 8. Puerto Rico's Private School Student Enrollment, 2009 to 2017 (pre-Hurricane Maria)

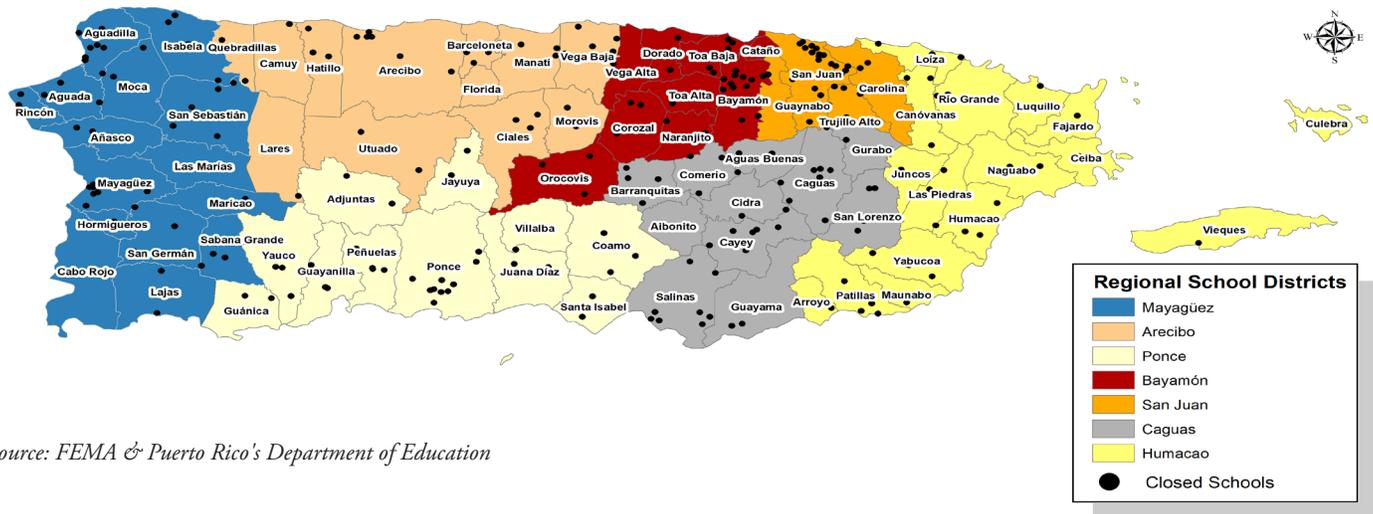


Source: 2009-2017 Consejo de Educacion de Puerto Rico

¹⁶ Private school student enrollment for 2018-2019 academic year has not been released.

¹⁷ According to Puerto Rico's Department of Education. Refer to <http://www.camarapr.org/Pres-Lamboy/PP-Educacion-marzo-2018.pdf>.

Figure 9. Puerto Rico's 7 Regional School Districts and 2018-2019 School Closures (post-Hurricane Maria)



Source: FEMA & Puerto Rico's Department of Education

Maria, a total of 319,750 students were enrolled in the Island's public schools, and one year post-Hurricane Maria, a total of 306,652 students were reported enrolled. Thus, in a six-month period, approximately 13,000 students did not return to their local public schools. In 2018, Puerto Rico's public schools started off with approximately 40,000 fewer students between 2017 (pre-Hurricane Maria) and 2018 (post-Hurricane Maria). This significant drop in student enrollment is largely attributed to students relocating to stateside schools, as a result of infrastructure damages and lack of electricity and water in their school buildings, as well as the loss of their homes or severe home damages.

Private Schools¹⁸

Similarly, to the Island's public schools, private school student enrollment has also severely declined. In 2010, private school student enrollment increased by 2,966, from 155,050 in 2009 to 158,016 in 2010 (see figure 8).

Between 2011 and 2014, student enrollment declined about -3,400 per year, from 153,775 in 2011 to 144,034 in 2014. Between 2015 and 2016, student enrollment declined from 142,235 to 139,394, with an absolute change of -2,841 students. Lastly, in 2017 student enrollment decline was at its highest from 139,394 in 2016 to 122,924 in 2017, with a student loss of -16,470.

2018-2019 School Closures/Opening¹⁹

From a geographic perspective, school closures disproportionately took place in Puerto Rico's rural areas (65%) than urban areas (35%). On the other hand, schools that remained open were mainly located in urban areas (59%) compared to rural areas (41%). Overall, closed school buildings were largely elementary and elementary/middle schools, and, to a lesser extent, middle schools only, high schools only, and elementary/middle/high schools. The Department of Education's criteria to close or keep schools

Table 1. 2018-2019 Schools Closed in Puerto Rico

School Type	Rural		Urban		Grand Total	
	N	%	N	%	N	%
Elementary School only	109	63%	66	72%	175	66%
Elementary/Middle School	50	29%	7	8%	57	22%
Elementary/Middle/High School	1	1%	2	2%	3	1%
High School only	3	2%	5	5%	8	3%
Middle School only	7	4%	12	13%	19	7%
Middle/High School	3	2%	0	0%	3	1%
Total	173	100%	92	100%	265	100%

Source: FEMA & Puerto Rico's Department of Education

¹⁸ Source: Consejo de Educación De Puerto Rico. Refer to http://www.agencias.pr.gov/agencias/cepr/inicio/estadisticas_e_investigacion/Pages/default.aspx.

¹⁹ There are six types of school buildings that house the following by grade levels: (1) elementary schools, (2) elementary/middle schools, (3) elementary/middle/high schools, (4) high school only, (5) middle school only, and (6) middle/high schools.

open are primarily about costs savings, other than buildings not being suitable to resume classes due to damage caused by either Hurricane Irma or Maria. By school regions, 46 schools were closed in Mayagüez, 43 in Caguas, 40 in Ponce, 35 in Humacao, 34 in Arecibo, 34 in Bayamón, and 33 in San Juan.

Puerto Rico is divided into seven Local Education Agency (LEA)²⁰ regions: Arecibo, Bayamón, Caguas, Humacao, Mayagüez, Ponce, and San Juan (see Figure 9). The Ponce region saw the highest loss of students in public schools (-43.4%) compared to other regions and the state as a whole (-40.4%), followed by Bayamón (-42.6%), Humacao (-41.5%), Caguas (41.3%), San Juan (-39.5%), Mayagüez (-37.8%), and Arecibo (-35.9%). The district of Toa Baja, located in the Bayamón region (which comprises the municipios of Cataño, Toa Alta, and Toa Baja) had the highest loss of students between the 2007-2008 and 2018-2019 school years, losing over half of its student population (-53.4%). On the other hand, the district of Vega Alta (which includes the municipios of Dorado, Vega Alta, and Vega Baja, and is located in the region of Arecibo) was the district with the lowest decrease in student enrollment in public schools between the 2007-2008 and 2018-2019 school years (-25.4%).

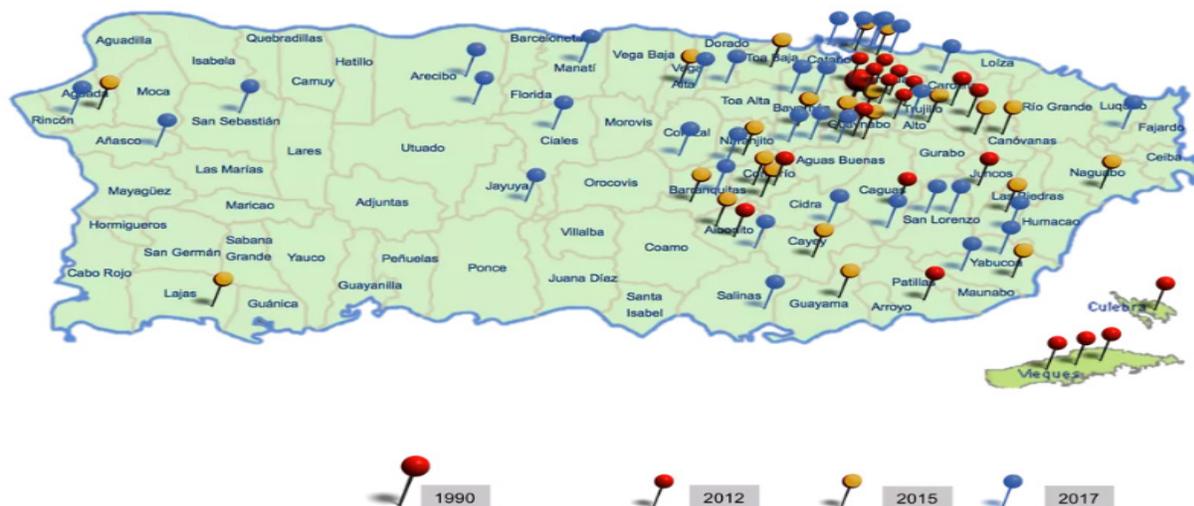
Schools Closed

Presently, 173 schools (65%) were closed in the Island's rural areas and 92 schools (35%) were closed in the urban areas (see Table 1). Within the rural areas, at least 63% of

elementary schools (109) was closed, followed by 29% of elementary/middle schools (50), 4% of middle schools (7), 2% of high schools (3), 2% of middle/high schools (3), and 1% of elementary/middle/high schools (1). Thus, the bulk of school closures mainly occurred in buildings hosting elementary school. The region with the most school closures within their rural areas included Caguas (35 schools), Mayagüez (31 schools), Humacao (29 schools), Ponce (27 schools), Arecibo (26 schools), Bayamón (15 schools), and San Juan (10 schools).

As shown in Table 1, the majority of school closures in the Island's urban areas (66 closed schools) also occurred in elementary schools. However, it was a smaller extent relative to rural areas (109 closed schools). In terms of proportion, 72% of elementary schools (66) was closed in the Island's urban areas, followed by 13% of elementary/middle schools (12), 8% of elementary/middle schools (7), 5% of high schools (5), and 2% of elementary/middle/high schools (2). Municipios with the largest number of schools closed were in areas with higher population density, which includes the Island's metropolitan areas. For example, San Juan closed 22 schools, followed by 12 in Bayamón, 10 in Ponce, 9 in Caguas, 8 in Aguadilla, 8 in Salinas, 7 in Mayagüez, 6 in Arecibo, 6 in Cayey, and 6 in Trujillo Alto. As shown in table 1, 66% of schools closed are elementary schools, followed by elementary/middle schools (22%), middle schools (7%), elementary/middle/high schools (1%), and middle/high school (1%).

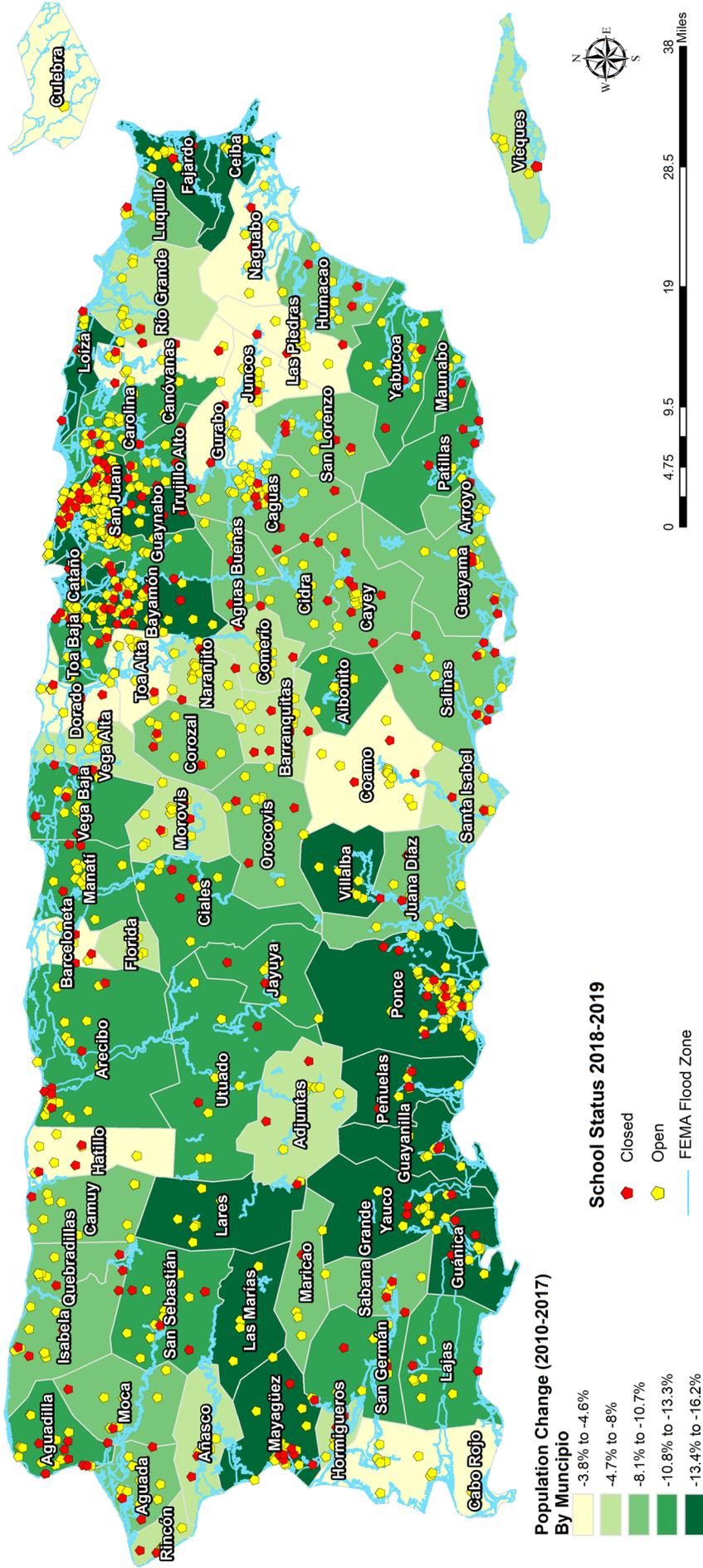
Figure 10. Growth of Public Montessori Schools in Puerto Rico, 1990 to 2017 (Pre-Hurricane Maria)



Source: Ayer, David, *Public Montessori in Puerto Rico*. Montessori Public, February 8, 2018. <https://www.montessoripublic.org/2018/02/public-montessori-puerto-rico/>.

²⁰ Within each Local Education Agency (LEA) region, there are four school districts, which are composed of various municipalities.

Puerto Rico's Overall Percent Change in Population and School Closures, 2010 and 2017



Source: U.S. Census Bureau, Puerto Rican Community Survey 2010-2017 (5-year estimate) & 2018-2019 Academic School year (Puerto Rico's Department of Education & FEMMA)

In the 2018 school year, a total of 26,043 students were enrolled in elementary schools scheduled to closed in the 2018-2019 academic year, 14,352 students from rural areas, and 11,691 in urban areas. A total of 9,109 students enrolled in either elementary/middle schools will be displaced, and schools within rural areas are disproportionately affected. An immediate impact is overcrowding in classrooms, especially those where children will be enrolled in elementary and middle schools. As shown in table 1, higher rates of school closure are among elementary schools and schools that contain both elementary and middle schools.

Conclusion and Policy Recommendations

The fact that Puerto Rico is undergoing a profound demographic shift that adversely affects economic development and, by implication, the government's capacity to sustain services to the population is undeniable. Demographically, Puerto Rico's child and working-age population continues to decline while the senior population expands. These trends are driven by the exodus of child rearing population—a trend exacerbated by the impact of hurricanes Irma and Maria—and declining births in the island. These population trends, in turn, are inducing unavoidable social and economic repercussion that are likely to continue in coming years. The decline of the working-age population may lead to economic and further demographic disadvantages for Puerto Rico, especially diminished government spending on children. Puerto Rico's demographic winter requires a reassessment of social and economic needs in order to implement effective policies that accommodate the Island's population age structure and address possible negative economic impacts.

Yet, to date, the narrative about population loss in Puerto Rico has been dominated by school closings and other austerity measures affecting education. In this section, we discuss some elements for consideration when developing a more wholistic approach when responding to population trends and their consequences. A more comprehensive and wholistic approach—what often would be referred to as a master plan for schools' facilities development—would consider the closing, repurposing, or construction of new of schools in the context of ongoing demographic trends and future projections, and the necessary programs to accommodate the evolving needs of the population.

In this report we have identified several components of demographic change and policies that must be considered for the development of a more comprehensive approach. One of the core findings of this study is that school closings have affected rural areas disproportionately. By the 2018-2019 academic year, 24% of public schools were closed (265) and 855 remained open. The closed schools were disproportionately located in rural areas (65%) relative to urban areas (35%). This is particularly impactful due to the reduced availability of transportation for students now required to travel further to attend school. Additionally, most of the closed school consisted of elementary or elementary/middle schools, the type of schools that are more likely to influence the residential location of parents. Though cost considerations have justified school consolidation and closing of facilities, the implicit policy of population relocation from the rural areas to urban areas have significant unintended consequences. These impacts are not just on children, who now have to travel longer distances and are more prone to increased absenteeism and reduce parental involvement in their education, but also for labor availability in key industries in rural areas such as agriculture and health services to an aging population.

Montessori Schools

One of the programs that have emerged as an alternative to school closings are Montessori schools. Increasing the presence of Montessori schools, especially in rural communities, can reduce and prevent additional school closures throughout the Island. Montessori schools are an alternative educational program that blends private and public partnerships, and relies heavily on community involvement (especially parental involvement). Combining children from different age groups in a classroom is a unique feature the Montessori method offers in its self-paced curriculum and can eliminate the pressures of filling up classrooms in traditional public schools every school year. As discussed in this research brief, school closures were highest among elementary schools relative to middle and high schools in the 2018-2019 academic year (post-Hurricane Maria). Thus, replacing emptied school buildings or instituting the program in facilities at risk of closing with Montessori-like programs can reduce travel time to consolidated schools, reduce future dropout rates, increase parental and community participation in education, and lessen the burden of communities already suffering from further depopulation.

In the United States, Montessori schools are part of a social movement to reform education, and more specifically public education. Like in Puerto Rico, some of these Montessori schools are public, though most Montessori schools are private, nonprofit institutions. Public Montessori schools are a hybrid public-private partnership in which local government pays for faculty salaries and other school expenses and the management, governance, pedagogy, and professional development is overseen (typically) by nonprofit organizations. Montessori schools, though with a focus on classroom pedagogy and teacher's training, are part of a broader group of community-based schools that practice student-center pedagogies, promote parental involvement, support self-governance and teachers' engagement, and have significantly improved education in disadvantaged communities.

In Puerto Rico, the number of Montessori school has expanded rapidly over the last decade. Such expansion is especially evident in the most populated eastern coast municipios and less so on the western part of the island (see Figure 10). An industry newsletter summarizes the impact of public Montessori schools in Puerto Rico as follows:

"By 2012, four schools had grown to twelve. By 2014, that number had more than doubled to 25, and by 2014, it had reached 50. Also in 2014, the government recognized public Montessori schools as an official part of the department of education, and created a Secretary of Montessori Education position. [...] Violence, drug use, and drop-outs have been eliminated in the INE schools [Instituto Nueva Escuela], and before [Hurricane] Maria hit, the Institute was working with a backlog of 37 schools wanting to join the project. Over and over, across the island, in municipalities and remote rural areas, schools scheduled to be closed down for low enrollment have re-opened as Montessori schools with long waiting lists."²¹

One of the important elements to consider when promoting community schools such as the public Montessori model is that these schools serve as magnet schools, with parents traveling longer distances to enroll their children and participating more actively in school activities and their children's education. Long-term solutions such as expanding Montessori-like schools, specifically elementary and middle schools, can help reduce depopulation in rural communities, especially among families with children.

The Economic and Disaster Recovery Plan for Puerto Rico earmarked \$7.5 billion for improving student success and system reforms that could finance the expansion of Montessori and other community schools. The proposed new financial model for Puerto Rico's education system will evaluate school closures in order to better "realign" current educational facilities to student enrollment.²² The Economic and Disaster Recovery Plan for Puerto Rico proposes a set of policies that could mitigate the impact of school closings and reduce population losses in rural areas.

Repurposing Closed Schools

Given demographic trends, it is likely that school closings will continue as population continues to decline. If true that some closed buildings and at-risk schools could be reoriented to a Montessori school or other types of community schools, other social purposes must be found for closed school buildings before selling these facilities to the private sector. The government of Puerto Rico is currently evaluating proposals for many of these schools. If these facilities cannot be devoted to schools or other educational purposes, such as adult training or distance learning facilities, we recommend that priority be given to the creation of multi-purpose community centers targeting special needs population such as the elderly or for targeted economic development programs in rural areas. Multi-purpose community centers may offer much needed services to a growing aging population, especially in more isolated rural areas, and serve as emergency facilities. Community centers can be equipped with alternative energy sources, communications equipment, medical supplies and other necessities in case of emergencies and to serve as shelters.

Perhaps the greatest benefits and potential impact of community centers is on rural areas and agriculture. Despite the prolonged recession affecting Puerto Rico for more than a decade, farming was amidst a revival prior to Hurricane Maria and was one of the few sectors generating new jobs and economic activity. According to a government report, "farm income grew 25 percent to more than \$900 million in 2012-2014. The amount of acreage under cultivation rose 50 percent over the past four years, generating at least 7,000 jobs."²³ Besides farming-oriented businesses and programs,

²¹ Ayer, David, Public Montessori in Puerto Rico. Montessori Public, February 8, 2018. <https://www.montessoripublic.org/2018/02/public-montessori-puerto-rico/>.

²² See Transformation and Innovation in the Wake of Devastation: An Economic and Disaster Recovery Plan for Puerto Rico. <https://documents.recovery.pr/assets/documents/pr-transformation-innovation-plan-congressional-submission-080818.pdf>

²³ Associated Press, Puerto Rico Experiences an Agricultural Renaissance. Sept. 28, 2016. <https://www.nbcnews.com/news/latino/puerto-rico-experiences-agricultural-renaissance-n656001>.

rural community centers could serve as shared workspace, small businesses, and microenterprise incubators, and as commercial space for nonprofit services, credit unions, and community development financing institutions (CDFIs), community development corporations (CDCs), and other social purpose-oriented facilities.

The proposed focus on social purpose enterprises and programs is important for the financing of multi-purpose community centers. The recommended multi-purpose community centers could focus on industries favored by economic reconstruction and projected to generate jobs in the immediate future and over the next decade. The Government of Puerto Rico's disaster recovery plan²⁴ lays out recovery priorities for the island. In order of importance, industries with the largest expected expenditures include housing (\$33 b), water and energy infrastructure (over \$40 b), transportation (\$8.4 b), educational institution infrastructure and other public buildings (\$7.7 b, \$5.8 b), and health and environmental conservation (\$5.2, \$2.3). Corresponding occupations include construction-related jobs, technicians, professionals, and others. These centers could serve as regional training centers to support the education and training of the unemployed or underemployed, with a focus on persons

disproportionately affected by disasters who are in high-need occupations. Potential partners for the creation and operations of multipurpose community centers and for the creation of regional workforce development systems anchored at those centers abound in all these industries and occupations.

In sum, the U.S. Census Bureau estimates that Puerto Rico lost 4% of its population after Hurricane Maria. Hurricane Maria intensified migration, but the massive exodus started a decade earlier because of the economic crisis. Population losses have led to school closures across the island, especially in rural areas where population losses have been proportionally higher than in urban areas. Overall, the total number of schools declined from 1,515 at its peak in 2016 to 855 in 2018. Partly in response to the impact that school closing is having in communities, public Montessori schools have emerged as viable policy to provide quality education to disadvantaged communities in higher-risk rural areas. Another emerging policy option is the creation of multi-purpose community centers. Both policies align with the government's economic recovery plan and its implementation in rural areas and other disadvantaged communities is likely to make a difference for the population and economic stabilization of these communities.

²⁴ See Transformation and Innovation in the Wake of Devastation: An Economic and Disaster Recovery Plan for Puerto Rico. <https://documents.recovery.pr/assets/documents/pr-transformation-innovation-plan-congressional-submission-080818.pdf>

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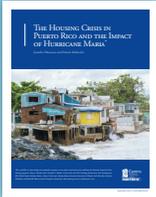




Puerto Rico One Year After Hurricane Maria

September 20, 2018 marked a year since hurricane Maria wrought havoc on the Island of Puerto Rico. Though the media has reported the crisis in a myriad of ways—for better or worse—our intention here is to provide a timeline of the major occurrences in the aftermath, a meta-analysis of the media’s coverage of the disaster, and an updated account of the exodus of people.

<https://centropr.hunter.cuny.edu/research/data-center/research-briefs/puerto-rico-one-year-after-hurricane-maria>



The Housing Crisis in Puerto Rico and the Impact of Hurricane Maria

By all counts, Puerto Rico’s housing market is in a deep and prolonged crisis. At least 18 percent of Puerto Rico’s housing stock is vacant as a result of the island’s prolonged economic recession. This report examines the housing crisis which commenced in 2006, and how the spike in foreclosures after Hurricane Maria suggests that vacant units are increasing at an accelerated rate.

<https://centropr.hunter.cuny.edu/research/data-center/research-briefs/housing-crisis-puerto-rico-and-impact-hurricane-maria>



Puerto Rico in Crisis Timeline

Since 2006 Puerto Rico has been facing an unprecedented economic and fiscal crisis that shows little signs of ending or abating in the foreseeable future. In this timeline, we summarize the most important milestones and turning points since 1898, and the impacts that United States and local policies have had on Puerto Rico’s Economy.

<https://centropr.hunter.cuny.edu/education/puerto-rico-crisis-timeline>



Rebuild Puerto Rico: A Guide to Federal Policy and Advocacy

The impact of Hurricane Maria will be felt for decades, and long-term recovery and rebuilding efforts in Puerto Rico are expected to take years. This report provides an overview of federal disaster relief policy, dissects the recovery process and the role of federal assistance, and discusses possible entry points for advocacy efforts.

<https://centropr.hunter.cuny.edu/events-news/rebuild-puerto-rico/policy/rebuild-puerto-rico-guide-federal-policy-and-advocacy>



Celebrating 45 Years of Achievements

The Center for Puerto Rican Studies (Centro) has grown considerably over the past forty-five years, fine-tuning our research, archives, pedagogy, and programming so as to evolve with the times. This guide provides an overview of the history and achievements of Centro since its founding in 1973, and a summary of the programs and educational tools available to the public.

<https://centropr.hunter.cuny.edu/centrovoices/current-affairs/celebrating-45-years-guide-centro>

The Center for Puerto Rican Studies (Centro) is the nation’s leading university-based institution devoted to the interdisciplinary study of the Puerto Rican experience in the United States. Centro is dedicated to understanding, preserving and sharing the Puerto Rican experience in the United States. Centro invites Centro Voices contributors to make use of the extensive archival, bibliographic and research material preserved in its Library and Archives.

The Centro Library and Archives is devoted to collecting, preserving and providing access to resources documenting the history and culture of Puerto Ricans. The Centro Library and Archives was established in 1973 as a component of the Center for Puerto Rican Studies. The collections include books, current and historic newspapers and periodicals, audio, film & video, manuscripts, photographs, art prints, and recorded music. The Library and Archives provides services and programs to the scholarly community as well as the general public. Constituents are diverse and come from the United States and abroad. The Library and Archives facilitates access to information on its holdings through the City University’s online public catalog or CUNY+. It also provides research and information assistance via phone and email.

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