

CONNECT
PUERTO RICO®

THE DIGITAL DIVIDES IN PUERTO RICO:

**THE 2016 CONNECT PUERTO RICO
RESIDENTIAL TECHNOLOGY ASSESSMENT**

The adoption and use of broadband technology in Puerto Rico continues to grow—for the first time, the majority of Puerto Rico households now subscribe to fixed home broadband service (55%). In addition, two thirds (67%) of Puerto Rico adults now report that they regularly use mobile broadband technology. Even with Puerto Rico’s economic crisis, total adult subscribership to fixed broadband service has increased by over 600,000 since in 2010.

However, there are still significant and large gaps in broadband adoption, particularly among low-income and elderly Puerto Rico residents. These stubborn broadband adoption gaps are hindering the Puerto Rico economy, costing the island hundreds of millions of GDP every year.

However, broadband technology and use on the mainland is not standing still, and while adoption has increased in Puerto Rico, the island is still playing “catch up.” Consumers on the U.S. mainland now have access to and are purchasing broadband at 25 Mbps and 100 Mbps speeds to a far greater extent than residents of Puerto Rico, where availability of these more-costly, higher-bandwidth services is limited.

In 2016, the Puerto Rico Institute of Statistics commissioned Connect Puerto Rico to conduct this study of broadband and technology adoption trends among Puerto Rico adults. Connect Puerto Rico has surveyed broadband adoption and technology use trends every two years since 2010. These surveys have tracked the growth of both fixed and mobile broadband adoption in Puerto Rico and explore trends in the use of this technology for education, social engagement, and in the workforce.

Collectively, Connect Puerto Rico’s research shows that even with the economic crisis facing the island, broadband technology has grown in Puerto Rico since 2010, and that growth can be attributed in part to the focus the Puerto Rico government and private industry have placed on broadband growth as an engine of economic change. Significant broadband infrastructure investments were made beginning in 2009, and several low-income broadband adoption programs were implemented on the island in 2013.

The government and private sector have collaborated throughout this process in a comprehensive, multi-stakeholder broadband planning initiative, which included the adoption of the *Puerto Rico Broadband Strategic Plan* in 2011 and the *Gigabit Island Plan* in 2014.

The 2016 Connect Puerto Rico Residential Technology Assessment focuses on four general areas:

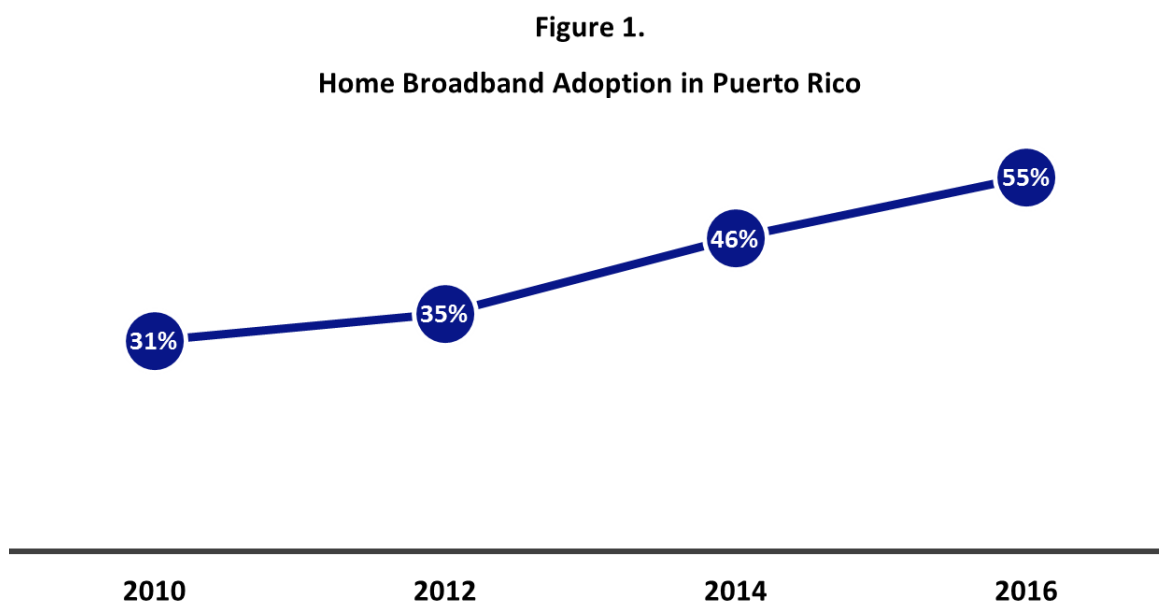
- The adoption of fixed broadband connections (cable, fiber, or DSL) in Puerto Rico households,
- The use of mobile broadband service by Puerto Rico adults,
- The demographics of the digital divides in Puerto Rico, and
- Household use of Internet services and content for education, workforce skills, or social interaction.

This paper looks at each of these areas of inquiry, identifies key findings, and examines trends found by the data from 2010 to the present. The 2016 survey dataset is available from the Puerto Rico Institute of Statistics and from Connect Puerto Rico for prior years.

Fixed Home Broadband Adoption Grows and Contributes to Island GDP

For the first time, the 2016 survey shows that a majority of Puerto Rico households (55%) subscribe to fixed broadband service such as cable, fiber, or DSL. This is up 9 percentage points from 2014. Since the first Connect Puerto Rico residential survey in 2010, nearly one-quarter of the island's households have subscribed to a fixed home broadband connection. In 2010, fixed home broadband adoption in Puerto Rico was only 31%, far below that of the mainland United States as a whole and even many developing countries in Latin America and the Caribbean.

Figure 1 shows the steady growth in fixed home broadband adoption in Puerto Rico since 2010, up to 55% of households in 2016.



Puerto Rico has added approximately 625,000 adult home broadband subscribers since 2010, more than one-quarter of the island's adult population.

This growth has occurred in spite of the economic crisis in Puerto Rico. Indeed, without broadband growth, Puerto Rico's economy likely would be suffering even more. Various studies have found that growth in broadband has a significant impact upon GDP growth. A frequently cited World Bank study¹

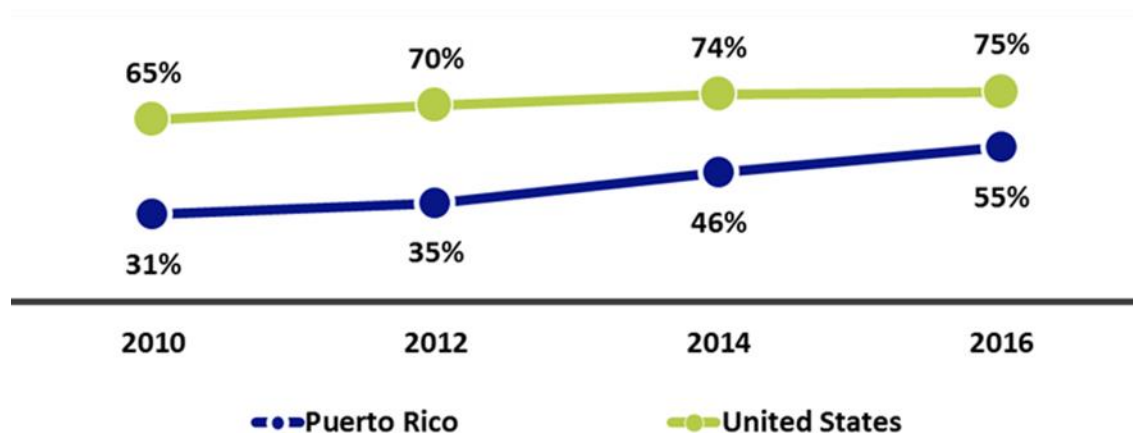
¹ Qiang, Christine Zhen-Wei, Carlo Rossotto, and Kaoru Kimura, "Economic Impacts of Broadband," in *Information and Communications for Development* (World Bank 2009), available at: http://siteresources.worldbank.org/EXTIC4D/Resources/IC4D_Broadband_35_50.pdf. This World Bank estimate may understate the potential for economic growth in Puerto Rico that results from more widespread broadband adoption. A study of Latin American and Caribbean economies undertaken by the Inter-American Development Bank in 2012 found that a 10% increase in fixed broadband adoption would increase GDP per capital by 3.19%. See Zaballos, Antonio García, and Rubén López-Rivas, "Socioeconomic Impact of Broadband," in *Latin American and Caribbean Countries* (Inter-American Development Bank 2012), available at: <http://publications.iadb.org/handle/11319/5754?localeattribute>.

found that a 10 percentage point increase in fixed broadband adoption would increase GDP per capita by 1.21-1.38%.

In Puerto Rico, a 10 percentage point increase would connect approximately 372,000 additional Puerto Rico residents to broadband, generating at least an additional \$285 million (U.S. Dollars) in GDP on the Island.

However, fixed broadband adoption in Puerto Rico continues to trail broadband adoption in the U.S. as a whole. Figure 2 compares fixed home broadband adoption by U.S. and Puerto Rico households from 2010-2016, and shows that while Puerto Rico has closed the gap, the gap still extends to 20 percentage points, or one in five Puerto Rico adults.

Figure 2.
Household Fixed Broadband Adoption Trends



On the other hand, Puerto Rico's growth in fixed broadband adoption since 2010 has been stronger than many other Latin American and Caribbean economies. In 2011, Puerto Rico's fixed broadband adoption rate was below that of many Latin American and other developing economies, but growth in recent years has made Puerto Rico a leader in the region. In 2011, Puerto Rico's home broadband adoption rate was below that of Brazil, Chile, and Argentina, and was commensurate with household Internet use in Trinidad & Tobago, Morocco, and Costa Rica.² In 2016, home broadband adoption in Puerto Rico is now higher than that of Brazil (48%), Argentina (52%), and Chile (54%).³

This growth in fixed broadband adoption has occurred in all demographic groups in Puerto Rico. In particular, broadband adoption has also increased significantly among the elderly, low-income households, adults with disabilities, and in rural areas.

² ITU, <http://www.broadbandcommission.org/documents/bb-annualreport2012.pdf> at Annex 5

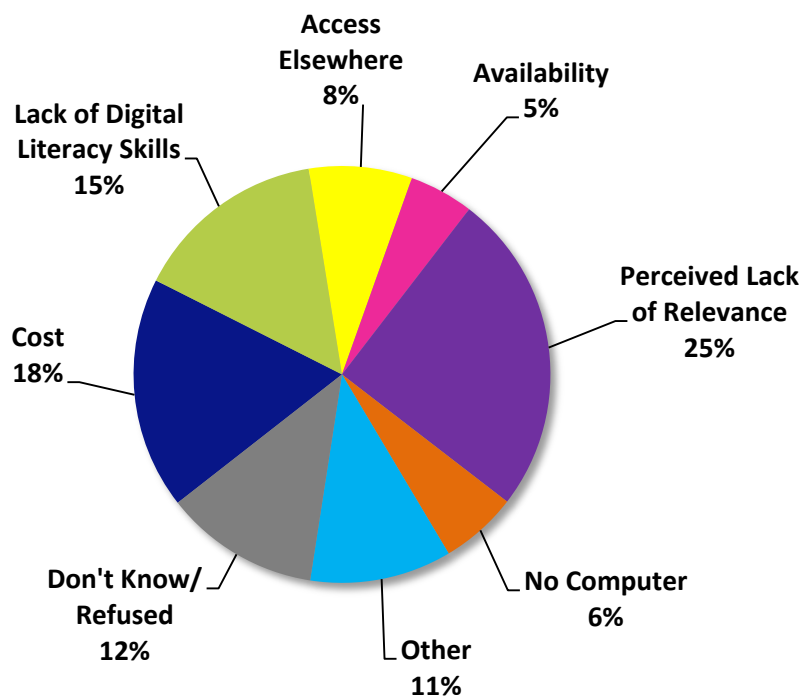
³ ITU, <http://www.broadbandcommission.org/Documents/reports/bb-annualreport2015.pdf> at Annex 4.

Table 1. Broadband Adoption Trends Among At-Risk Populations in Puerto Rico

	2010	2012	2014	2016
Island-Wide	31%	35%	46%	55%
Age 65 and older	5%	13%	27%	34%
Households with annual incomes below \$15,000	15%	19%	38%	39%
Adults with disabilities	21%	18%	37%	40%
Rural households	34%	31%	51%	61%

Connect Puerto Rico also asked about barriers to home broadband adoption in Puerto Rico. The belief that a home broadband connection is not beneficial or worthwhile is still a top barrier to adoption, and the cost of service was cited by 18% of all non-adopting households as the main reason why the household did not subscribe. A lack of knowledge of how to use the Internet or computer technology also stands as a significant barrier.

**Figure 3.
Main Barrier to Home Broadband Adoption**



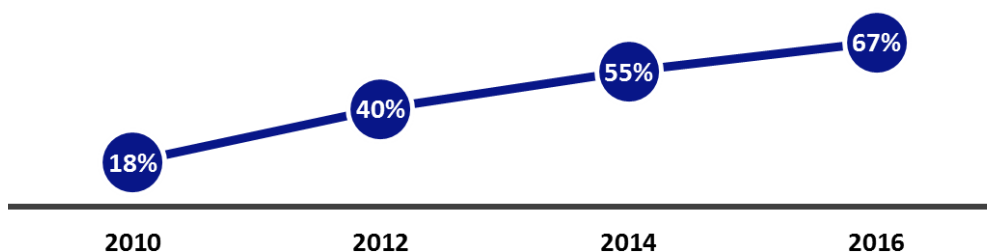
These persistent adoption gaps demonstrate the need for continued focus on digital inclusion in Puerto Rico. Since the first survey in 2010, Puerto Rico has undertaken an extensive broadband planning initiative, leading to the *Gigabit Island Plan* that was released in February 2015. This public-private process has resulted in a number of adoption-focused initiatives, including increased focus on digital skill training and public access centers. One main target population has been the elderly, highlighted by the

TechnoAbuelos training programs administered by the Telecommunications Regulatory Board of Puerto Rico. However, despite sharp increases in adoption among seniors and low-income households concurrent with these initiatives, substantial gaps remain.

Mobile Broadband Use Continues to Grow

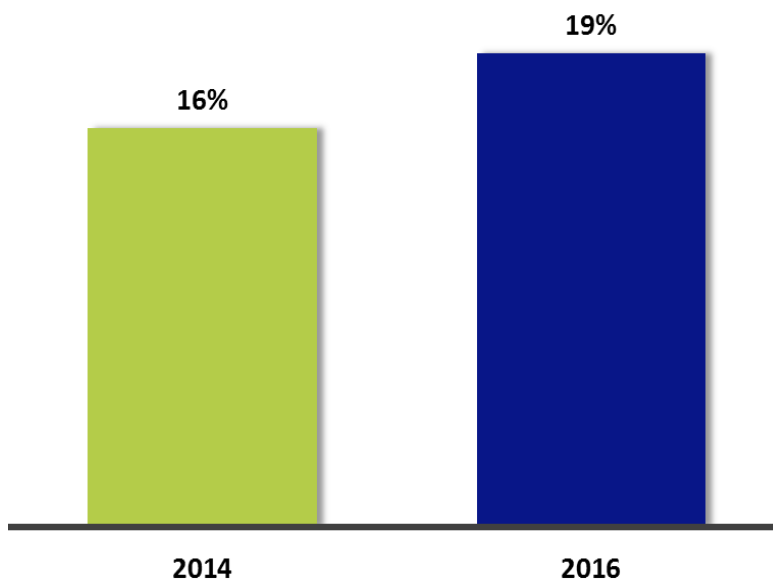
Mobile broadband use among Puerto Rico adults continues to grow sharply. Two out of three adults in Puerto Rico (67%) now say they have a mobile device, such as a cell phone, for which they subscribe to a data plan. This is up from only 18% in 2010.

Figure 4.
Mobile Broadband Adoption, Adults in Puerto Rico



For 19% of Puerto Rico households, Internet over their cell phone is their only form of Internet access. This number is up three percentage points from Connect Puerto Rico's 2014 survey.

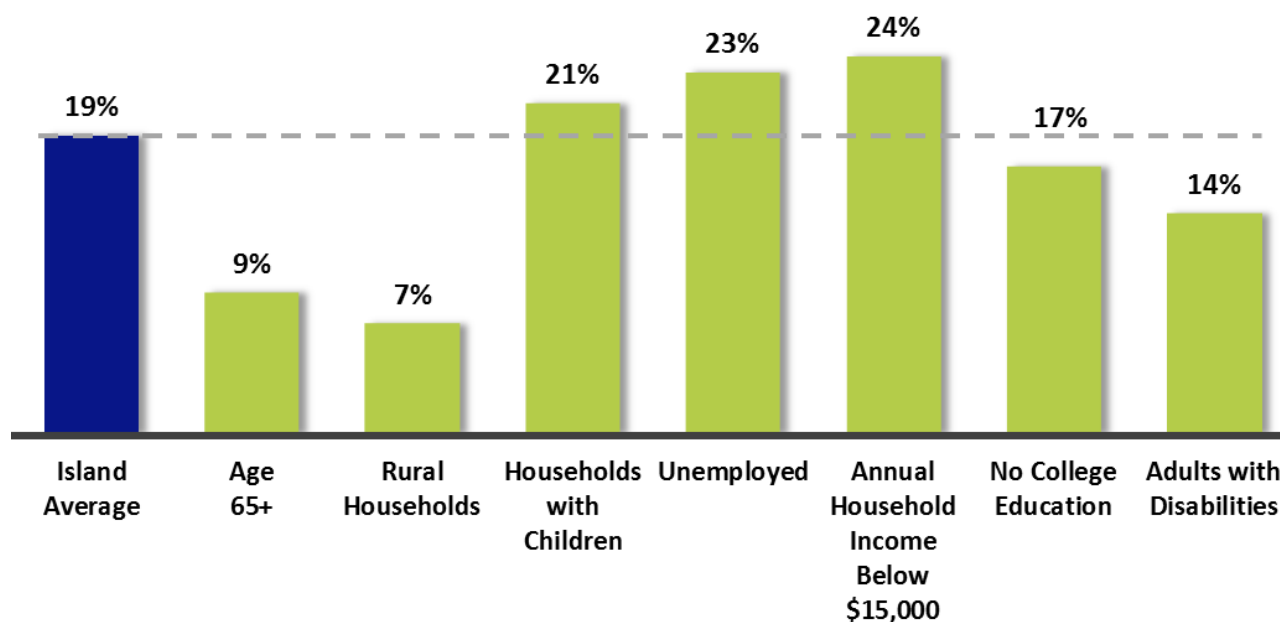
Figure 5.
Adults Living in "Mobile Broadband-Only" Households



Puerto Rico adults are significantly more likely to be “mobile broadband only” than the U.S. population as a whole. In the United States, only 6% of households subscribe to only a mobile data service and no fixed connection at home, according to the most recent data released by the United States Census Bureau.⁴

In Puerto Rico, “mobile broadband only” households are more likely to be low-income, unemployed, and have school-aged children. While further study on the nature of “mobile broadband only” adults is needed, these findings imply that barriers to adoption might vary significantly between fixed and mobile broadband technologies.

Figure 6.
“Mobile-Only” Households by Demographic



Broadband Adoption Gaps Among Vulnerable Demographic Groups Persist

Broadband adoption gaps in Puerto Rico are particularly large for vulnerable populations, such as low-income households, the elderly, and those with a disability. These gaps mirror similar gaps found on the mainland, but given Puerto Rico’s overall lower adoption rates, the gaps among vulnerable populations are even more severe and a matter of concern.

⁴ U.S. Census Bureau, American Community Survey 2015 One-Year Estimates, https://factfinder.census.gov/bkmk/table/1.0/en/ACS/15_1YR/B28002.

Figures 7-10 below explore the adoption of either fixed or mobile Internet connections among vulnerable populations.

Figure 7.

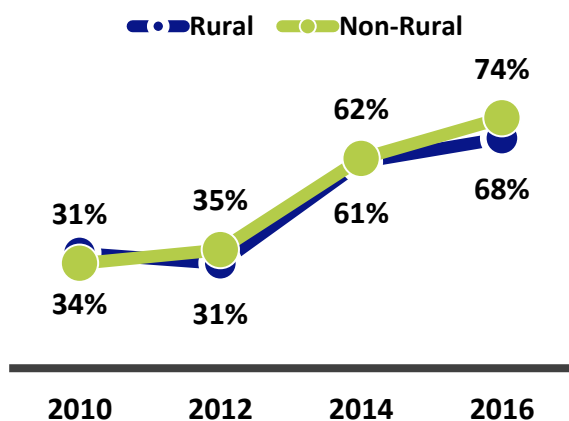


Figure 8.

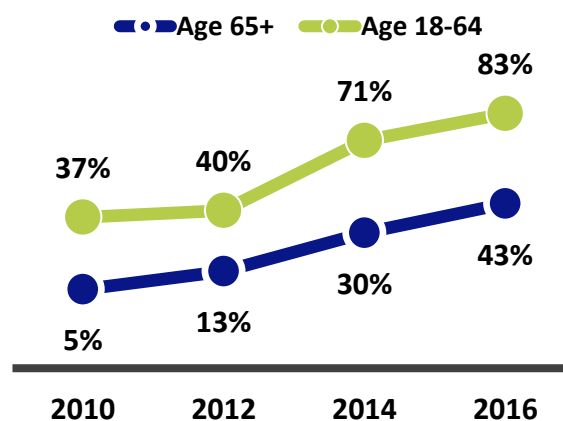


Figure 9.

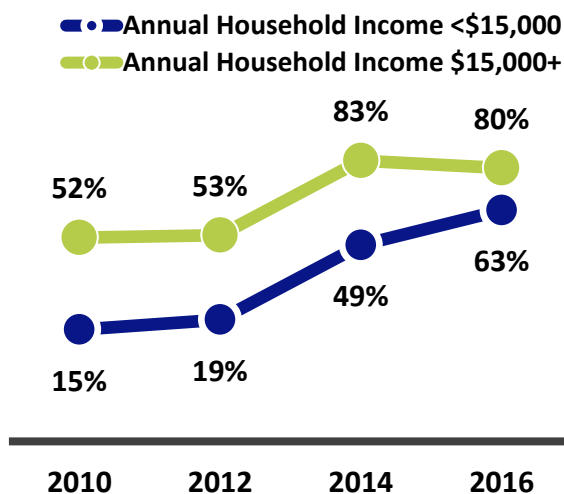
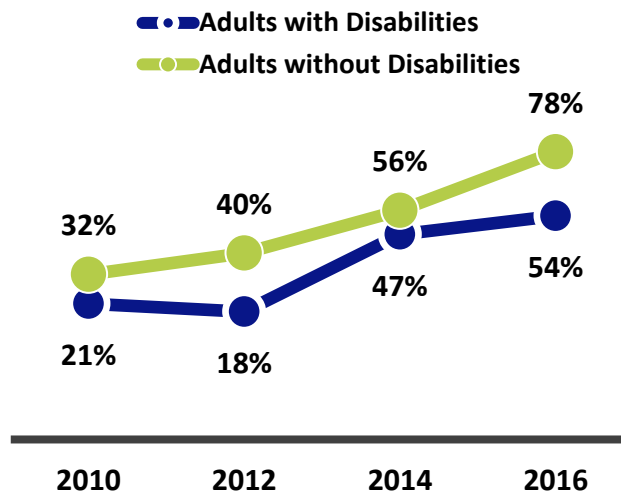


Figure 10.



Since 2010, some progress has been made to close the low-income adoption gap in Puerto Rico, but gaps for rural, elderly, and disabled populations stubbornly persist. In some instances, the gaps are growing. For instance, the adoption gap for disabled adults and rural households has widened from 2014 to 2016. In addition, the adoption gap for the elderly has increased since 2010, even though broadband adoption among the elderly has grown 860% since 2010. Because adoption of broadband technology among the general population does not stand still, closing adoption gaps in vulnerable populations requires consistent and focused attention and initiatives.

Broadband Use in Puerto Rico is Diverse, but Adopted Broadband Speeds in Puerto Rico Trail the Mainland

The Connect Puerto Rico survey also asked Puerto Rico adults about the activities they undertake on the Internet, how many activities per day, and the advertised Internet service speed to which they subscribe. Their responses paint a picture of a diverse array of Internet uses but also reveal that Puerto Rico Internet users subscribe to speeds that are significantly lower than speeds purchased on the mainland.

Table 2 presents information on the various uses of broadband reported by broadband users in urban and rural area.

Table 2.
Online Activities Conducted by Adults in Puerto Rico

Activities	All Adults	Non-Rural Households	Rural Households
Using social networking sites like Facebook	81%	81%	82%
Communicating through e-mail or other ways of sending images	74%	74%	71%
Streaming or downloading pictures, videos, movies, or music	72%	71%	76%
Reading online newspapers or other news sources	66%	66%	67%
Downloading software or applications other than games	58%	58%	53%
Banking or paying bills online	53%	53%	48%
Searching for information about government services	51%	52%	47%
Searching for medical information or communicating with healthcare professionals	48%	48%	49%
Conducting research for schoolwork	42%	43%	38%
Playing or downloading games	40%	39%	47%
Purchasing goods or services	37%	37%	35%
Searching or applying for jobs	32%	32%	28%
Advertising or selling products or services	21%	21%	16%
Taking online classes	13%	13%	11%

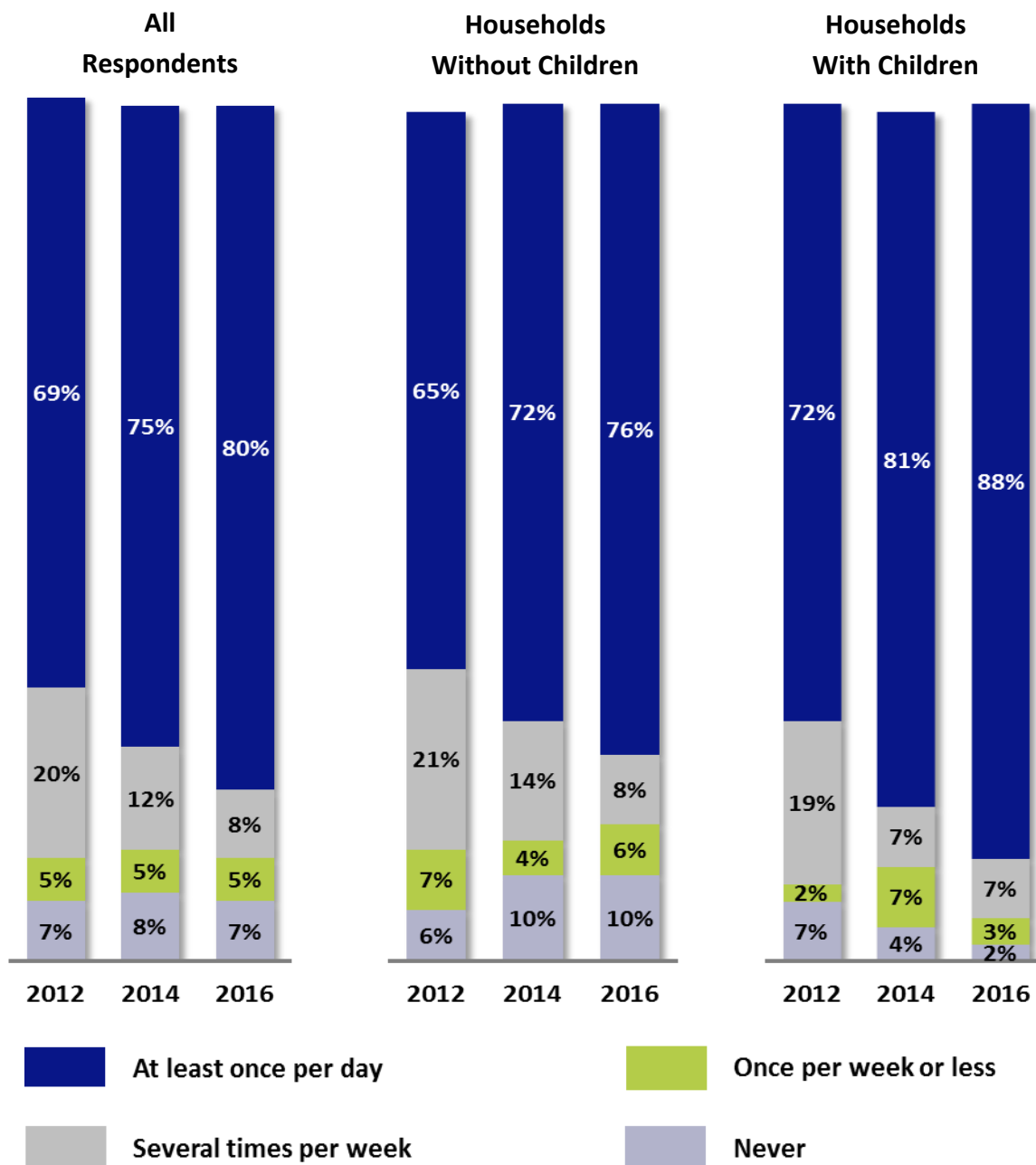
With only a few exceptions, this pattern of Internet use is generally consistent throughout different demographic groups in Puerto Rico. The only categories of use that see significantly different patterns of use are social media and gaming, as shown in Table 3.

Table 3.
Social Networking and Online Gaming in Puerto Rico by Demographic

Demographics	Use social networking sites like Facebook	Play or download games
Island-wide	81%	40%
Municipality of Residence		
Non-Rural	81%	39%
Rural	82%	47%
Age		
18-34	90%	52%
35-44	87%	43%
45-54	79%	36%
55-64	72%	22%
65 or Older	57%	23%
Presence of Children		
Children in household	85%	51%
No children in household	79%	34%
Annual Household Income		
Less than \$5,000	85%	38%
\$5,000 - \$14,999	81%	37%
\$15,000 - \$24,999	80%	42%
\$25,000 - \$34,999	84%	38%
\$35,000 or more	84%	38%
Education		
No High School Diploma	76%	48%
High School Graduate	81%	45%
Some College	84%	40%
College Graduate	81%	36%

The frequency and intensity of Internet usage at home is also increasing among Puerto Rico subscribers. This intensity of use is particularly high in Puerto Rico households with school-aged children, where 88% of households that subscribe to broadband report using the Internet at least once per day, up from 72% of such households in 2012.

Figure 7.
Frequency of Internet Usage among Subscribers in Puerto Rico



This increased intensity of use uncovers a potentially growing gap in Internet usage between subscribing households and those that cannot afford broadband at home. The 2016 survey found that among Puerto Rico households that do not subscribe to a fixed broadband connection at home, 32% use and access the Internet someplace other than at home, such as a library or public computing center. The survey also found that 16% of Puerto Rico households with school-aged children do not have broadband

at home and that those children use the Internet at outside locations. This amounts to 181,000 school-aged children that are dependent upon community or public access centers for Internet access.

The increasingly-diverse and intense use of broadband is driving up the demand for higher speed subscriptions. However, in this regard, Puerto Rico appears to be falling behind the mainland U.S. In 2016, the median download speed for home broadband services purchased in Puerto Rico is 10 Mbps. This median speed is *significantly* lower than the nationwide median residential download speed of 25 Mbps reported by the Federal Communications Commission (FCC) earlier this year.⁵

In addition, FCC data shows that in 2015, 13% of all residential fixed connections in the U.S. had broadband speeds of 100 Mbps. The Connect Puerto Rico 2016 survey finds that only 1% of Puerto Rico households subscribe to 100 Mbps service.

Therefore, while broadband adoption and use is growing among Puerto Rico households, Puerto Rico households are still subscribing to substantially lower speeds than households on the mainland. This can be attributed both to the overall adoption gap in Puerto Rico as well as the quality of broadband infrastructure on the island, which lags the mainland. In the future, this inequality will adversely impact the opportunity for broadband to improve Puerto Rico's economy and to improve the education and workforce training skills of Puerto Rico citizens.

Conclusion

It is a significant achievement that the majority of Puerto Rico households now subscribe to fixed broadband service. This growth in fixed broadband adoption has allowed Puerto Rico to pass many Latin American and Caribbean nations since 2010. However, there are still significant broadband adoption gaps between Puerto Rico and the U.S. mainland and among vulnerable demographic populations on the island.

For Puerto Rico to move its economy and society forward, it must build upon the broad-based, multi-stakeholder broadband planning model that has gotten Puerto Rico to this point, and invest in policies and programs that will move forward beyond these first successful steps.

While Puerto Rico has made significant progress in its overall level of broadband adoption, the relentless pace of broadband growth nationally and globally is moving the goalposts while the island is trying to catch up. The 2016 Connect Puerto Rico assessment shows that broadband adoption gaps in Puerto Rico are now no longer simply a gaps among vulnerable demographic groups. Gaps are now emerging in the quality, speed, and intensity of use of broadband in Puerto Rico. For Puerto Rico to fully participate in the twenty-first century economy, it needs to redouble its ongoing efforts to close all these gaps.

⁵ Federal Communications Division, Wireline Competition Bureau, Industry Analysis and Technology Division, *Internet Access Services: Status as of June 30, 2015* (Aug. 2016), http://transition.fcc.gov/Daily_Releases/Daily_Business/2016/db0805/DOC-340664A1.pdf at 12.

Methodology

Between June 23 and August 2, 2016, Connect Puerto Rico conducted a random digit dial telephone survey of 1,200 adults across the island. Of the 1,200 respondents randomly contacted, 600 were called on their cellular phones, and 600 were contacted via landline telephone. Once the respondent agreed to participate, surveys took approximately 10 minutes to complete.

To ensure that the sample was representative of the island's adult population, Connect Puerto Rico set quotas by age and municipality of residence, then weighted the results to coincide with 2014 United States Census population estimates. To ensure a sufficiently large sample of adults in rural portions of the island, these households were oversampled.

Connect Puerto Rico applied rim weighting to correct for minor variations and to ensure that the samples match the most recent U.S. Census estimates of the island's adult population by age, gender, and the urban/rural classification of each respondent's municipality of residence. For the purpose of setting quotas and weighting, Connect Puerto Rico defines "rural" respondents as adults living in a municipality that is not a part of a Metropolitan Statistical Area (MSA), as designated by the United States Office of Management and Budget.

Estudios Tecnicos, located in San Juan, Puerto Rico, conducted the surveys in English and Spanish. Lucidity Research, LLC, of Westminster, Maryland, provided weighting and research consultation. Cross-tabulations were calculated using WinCross 11.0, while weighting and regression analyses were conducted using SPSS Statistics v. 20. Drew Richardson of Lucidity Research, LLC, reviewed the results and survey methodology.

The effective post-weighting margin of error = $\pm 3.04\%$ at a 95% level of confidence for the island-wide sample. As with any survey, question wording and the practical challenges of data collection may introduce an element of error or bias that is not reflected in this margin of error.