



# Broadband Adoption Gap Analysis

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CALIFORNIA ADVANCED SERVICES FUND  
ADOPTION ACCOUNT



June, 2019

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<http://www.cpuc.ca.gov/casf/>

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# Purpose

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The purpose of this Adoption Gap Analysis is to identify a baseline for demographic barriers to broadband adoption and provide information to support important program and regulatory decisions related to the California Advanced Services Fund (CASF) Broadband Adoption Account (Adoption Account). Based on the results of the Adoption Gap Analysis, staff has produced the following: 1) an updated online California Interactive Broadband Map (<http://www.broadbandmap.ca.gov/>) to include adoption rates and various demographic data at the census tract, block group or block level, 2) a list of the top ten low income and low adoption communities that should be of focus for adoption work, and 3) a map highlighting all census tracts in California with low adoption rates (< 50%) and low income (those with a median household income  $\leq$  \$51,500). The purpose of identifying these communities and providing access to these maps is to aid decision makers, stakeholders and potential applicants in determining areas with the greatest need and where CASF Broadband Adoption funds might have the greatest impact.

## Summary and Key Findings

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Based on consumer connection and broadband deployment data collected by the California Public Utilities Commission (CPUC), as of December 31, 2017, the statewide adoption rate is 87.3% at speeds exceeding 200 Kbps in at least one direction, or 80.2% at CASF served speeds of 6 Mbps down and 1 Mbps up.<sup>1</sup>

As broadband and internet use are becoming an integral part of everyday life, we are seeing more Californians use the internet for email, financial services, health care, entertainment, social media, education, and job searches. However, even with internet usage and adoption rates increasing at home, our analysis finds that gaps still exist for some households based on certain demographic characteristics. This analysis finds that characteristics including poverty/income, ethnicity/race, primary language, education and those living in rural areas are highly correlated to low adoption rates. Other demographic characteristics such as age, household size, and home ownership were also contributing factors, however, they do not appear to be as significant at the census tract level. Above all, we observe that the most constant and significant factor affecting adoption is income.

With income concluded as the most significant factor contributing to low adoption rates, staff has identified ten communities with some of the lowest adoption rates and lowest incomes in California that will be prioritized for grant funding. In addition to these ten communities of focus, staff has produced a map (see Figure 1) that also highlights regions in California that have overall low adoption rates and are low income<sup>2</sup> that could also be prioritized for grant funding. Lastly, the online California Interactive Broadband Map (<http://www.broadbandmap.ca.gov/>) has been updated to provide adoption rates and detailed demographic data at the census tract, block group or block level. These tools shall be used by applicants interested in applying for grants in the CASF Adoption program to develop proposals and will also be used by staff to inform where best to award grants. Better understanding these communities and their specific barriers will aid in determining where CASF Broadband Adoption funds are needed most and might have the greatest impact.

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<sup>1</sup> 200 Kbps is the minimum speed defined by the FCC as having service, while 6 Mbps down and 1 Mbps up is the minimum speed defined in CASF as having service. Census blocks below 6 Mbps down and 1 Mbps up or that don't have any service are considered "Unserved" and are eligible for CASF grants.

<sup>2</sup> Adoption rates  $\leq$  50%, and those census tracts with a median household income  $\leq$  \$51,500.



Figure 1: Low Adoption - Low Income Priority Communities

## Background

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The CPUC directed the gap analysis in Decision (D.) 18-06-032. Specifically, in the Decision, the CPUC “directs staff to identify a baseline adoption analysis and gap analysis by at least statewide average, consortia region, and county. Staff will investigate whether this analysis can and should include other demographic barriers to adoption such as age, speaking a primary language other than English, income, and education. To the extent feasible, the analysis will make available subscription and adoption data in disaggregated ranges less than 20%. The analysis is to be completed no later than one year from the adoption of this Decision.”<sup>3</sup>

The Adoption Account was created via Assembly Bill (AB) 1665,<sup>4</sup> to provide up to \$20 million in grants to increase publicly available or after-school broadband access and digital inclusion, such as grants for digital literacy training programs and public education to communities with limited broadband adoption. AB 1665 requires the CPUC to give preference to programs and projects in communities with demonstrated low broadband access, including low income communities, senior citizen communities, and communities facing socioeconomic barriers to broadband adoption. Eligible applicants include local governments, senior centers, schools, public libraries, nonprofit organizations, and community-based organizations with programs to increase publicly available or after school broadband access and digital inclusion.<sup>5</sup> Publicly supported communities who are otherwise eligible to apply for grants from the Broadband Public Housing Account (Public Housing Account) are also eligible to apply only after all funds available for adoption projects from the Public Housing Account have been awarded.

Eligible projects include digital inclusion, broadband access and outreach projects. Digital inclusion projects may include digital literacy training programs and public education to communities with limited broadband adoption, including low-income communities, senior citizen communities, and communities facing socioeconomic barriers to broadband adoption. Broadband Access Projects may provide free broadband access in community training rooms or other public spaces, such as local government centers, senior citizen centers, schools, public libraries, nonprofit organizations, and community-based organizations. Lastly, community outreach projects may include providing low-income consumers information about available low-cost internet service plans and call centers that will increase broadband access and adoption.

Since the implementation of Adoption Account, the CPUC continues to receive applications for adoption projects. As of June 2019, \$2.7 million has been awarded to schools, libraries, community-based organizations and nonprofit organizations to implement adoption projects throughout the state. Project applications will continue to be accepted until all funds have been exhausted.

## Definition of Terms

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Specific to this analysis, the following terms are defined as follows:

- Consumer fixed internet access connections: Wireline or fixed wireless broadband internet access service subscribed at speeds of 6 mbps down and 1 Mbps up, as reported by service providers to the CPUC as of December 31, 2017.
- Broadband Internet Access Service: Wireline or fixed wireless broadband internet connections available at speeds of 6 mbps down and 1 Mbps up.

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<sup>3</sup> D.18-06-032, p. 11

<sup>4</sup> AB 1665 is codified at Public Utilities (Pub. Util.) Code section 281.

<sup>5</sup> Pub. Util. Code section 281(j)(2)

- Adoption Rate: The number of consumer fixed internet access connections divided by the total number of households offered Broadband internet access service.
- Penetration Rate: The number of consumer fixed internet access connections divided by the total number of households.
- Low-Income: Households with a total household income at or below the California Alternate Rates for Energy (CARE) program income limits for a household of four (currently <\$51,500), or communities or census tracts with a median household income at or below the CARE program income limits for a household of four.<sup>6</sup>

## Gap Analysis Objectives

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The specific objectives of this analysis are to:

- Report the most currently available adoption rate and other demographic data at the census tract level;
- Identify those demographic characteristics that are most correlated with low adoption rates; and
- Identify those communities and regions with low adoption rates and other barriers that could be targeted for grant funding.

## Methodology and Data Sources

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Demographic data from the U.S. Census Bureau and data collected by the CPUC were used to conduct a baseline broadband adoption analysis to identify barriers to adoption. Broadband and demographic data from 7,999 census tracts was collected and analyzed.<sup>7</sup> Consumer connection and broadband deployment data is collected as of December 31, 2017 from the CPUC's Communications Division, Broadband Analysis Section. A simple linear regression analysis was then performed using SPSS statistical software for each demographic variable and broadband adoption rate by census tract (at served speeds of 6 Mbps down/1 Mbps up). Please see Appendix 3 for further details on the methodology.

Other data and information sources for this report were relied upon, including:

- Consumer Connection and Broadband Deployment data collected by the CPUC as of December 2017;
- Federal Communications Commission Broadband Progress Report 2016;
- Federal Communications Commission Form 477 Data;
- U.S. Census Bureau/ 2017 American Community Survey (ACS); and
- Literature Review.

## Baseline Analysis and Key Findings

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Below we present the results as they relate to the baseline analysis objectives.

- What is the current baseline adoption rate, at any speed, by census tract, county and consortia?

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<sup>6</sup> CARE income limits can be found here: <http://consumers.cpuc.ca.gov/lowincomerates/>

<sup>7</sup> Fifty-eight census tracts were not analyzed because they had zero population.

California's statewide adoption rate is 87.3% at speeds exceeding 200 Kbps in at least one direction.<sup>8</sup> The California Interactive Broadband Map located on the CPUC website (<http://www.broadbandmap.ca.gov/>) has been updated to add the most current adoption rate at speeds exceeding 200 Kbps in at least one direction, by census tract. Please refer to Appendix 1 for the latest adoption rates by county and Appendix 2 for the latest adoption rates by consortia.

- What is the current adoption rate at served speeds of 6 Mbps down and 1 Mbps up by census tract, county and consortia?

California's statewide adoption rate is 80.2% at speeds of 6 Mbps down and 1 Mbps up.<sup>9</sup> The California Interactive Broadband Map located on the CPUC website (<http://www.broadbandmap.ca.gov/>) has been updated to add the most current adoption rate at speeds of 6 Mbps down and 1 Mbps up or greater, by census tract. Please refer to Appendix 1 for the latest adoption rates by county and Appendix 2 for the latest adoption rates by consortia.

## Gap Analysis and Key Findings

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Below we present the results as they relate to the gap analysis objectives.

- Do certain demographic characteristics affect adoption?

Yes. The following characteristics were studied and identified as being influential factors affecting whether households subscribed to broadband.

### Income

Our analysis finds that income is the most critical factor affecting adoption. Only 52.9% of households in census tracts where the median annual household income levels are less than \$20,000 have in-home broadband access, compared to 85.7% of households in census tracts with a median annual household income at \$80,000 or more. For the Adoption Account, low income is defined as those households with incomes at or below the CARE program income limits for a household of four, currently \$51,500.<sup>10</sup> By this definition, 2,855 census tracts in California are categorized as low income. This accounts for 35.4% of the total census tracts in California. Of these low-income designated tracts, the average adoption rate is 58%,<sup>11</sup> 22 percentage points below the statewide average of 80%.

There is a clear income trend; as the level of poverty increases in these census tracts, the adoption rates decrease. This is in line with other studies that also point to income and costs as the main barrier to adoption.<sup>12</sup> Figure 2 below depicts how broadband adoption rates vary by income.

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<sup>8</sup> CPUC collected data is as of December 2017.

<sup>9</sup> CPUC collected data is as of December 2017.

<sup>10</sup> CARE income limits can be found here: <http://consumers.cpuc.ca.gov/lowincomerates/>

<sup>11</sup> At speeds 6 Mbps down/1 Mbps up.

<sup>12</sup> Federal Communication Commission Staff report, [https://www.tellusventure.com/downloads/fcc/fcc\\_staff\\_report\\_low\\_income\\_broadband\\_pilot\\_22may2015.pdf](https://www.tellusventure.com/downloads/fcc/fcc_staff_report_low_income_broadband_pilot_22may2015.pdf)

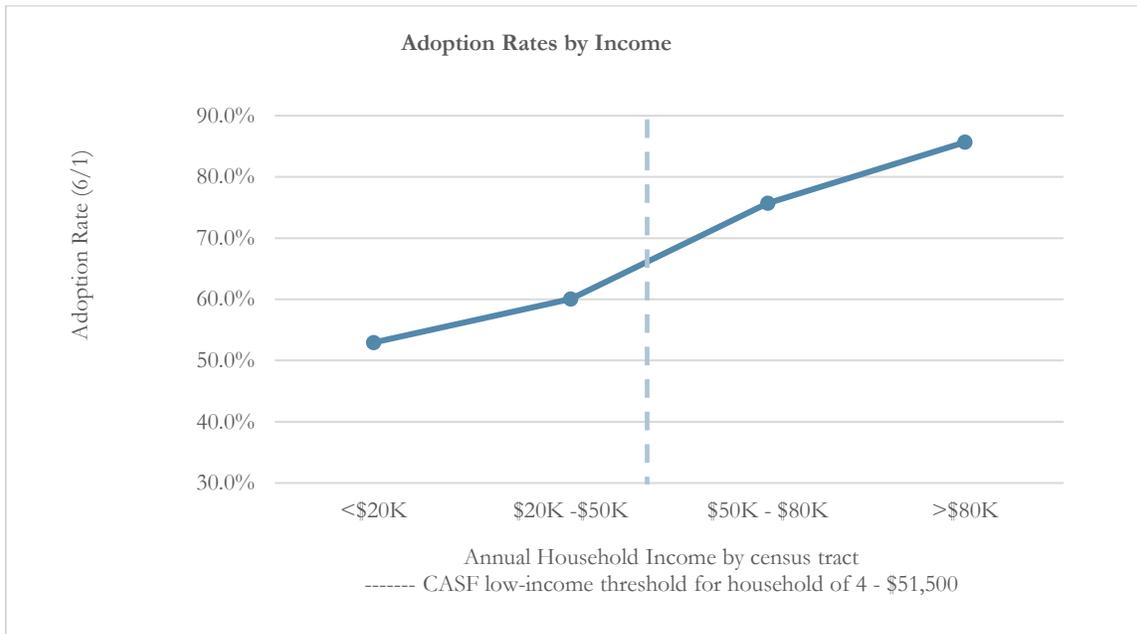


Figure 2: California Broadband Adoption Rates by Income<sup>13</sup>

### Urban versus Rural<sup>14</sup>

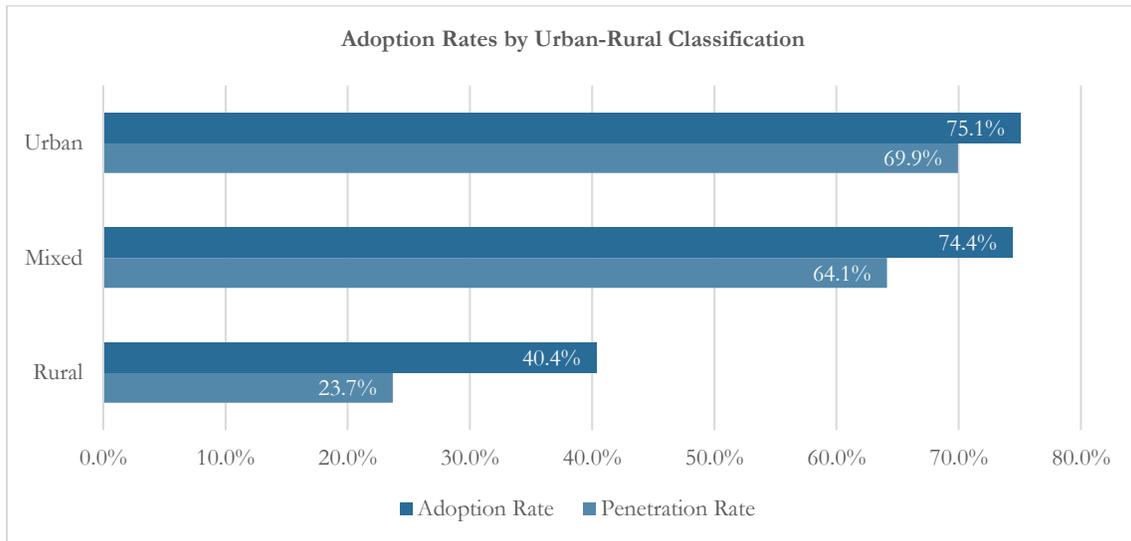
Urban and rural designations also have a significant impact on adoption rates. Households in urban census tracts were reported to have significantly higher adoption rates and penetration rates than those census tracts identified as rural. Figure 3 below depicts adoption and penetration rates by urban/rural designation. In California, we have 6,346 urban census tracts, 1,457 mixed census tracts (some combination of urban and rural census blocks), and 255 rural census tracts. Based on CPUC collected data, census tracts identified as strictly urban had an adoption and penetration rate of 75.1% and 69.9% respectively compared to 40.4% and 23.7% for those census tracts identified as strictly rural. This is no surprise as the pattern of higher adoption rates for urban areas is similarly observed at the national level as reported by both the ACS<sup>15</sup> and National Telecommunications and Information Administration.<sup>16</sup>

<sup>13</sup> Source: US Census Bureau: <https://factfinder.census.gov>, CPUC – Communications Division: <http://www.broadbandmap.ca.gov/>

<sup>14</sup> This report uses the Census Bureau’s urban-rural classification. <https://www.census.gov/programs-surveys/geography/guidance/geo-areas/urban-rural.html>. If a census tract had both urban and rural census blocks, then it was classified as “Mixed.”

<sup>15</sup> 2016 ACS Report: <https://www.census.gov/content/dam/Census/library/publications/2018/acs/ACS-39.pdf>

<sup>16</sup> National Telecommunications and Information Administration, The state of the Urban/Rural Divide: <https://www.ntia.doc.gov/blog/2016/state-urbanrural-digital-divide>



**Figure 3: Adoption Rates by Urban - Rural Classification**

### Race/Ethnicity

Race and Ethnicity is also observed to be a significant factor affecting broadband adoption. Our analysis finds that White and Asian households have higher adoption rates at 69.1% and 80.4% respectively, while Black/African American and Latino households have adoption rates at 57.5% and 60.8% respectively. We observe that census tracts with a larger population of Black/African American and Hispanic households have lower adoption rates than those census tracts with a smaller proportion of Black/African American and Hispanic households. The reverse is true for those census tracts with increasingly larger Asian households.

This finding is also consistent with what has been observed on the national level, where Black/African American households overall are least likely to have adopted, while Asian households have the highest connectivity levels.<sup>17</sup> Figure 4 below depicts how adoption rates vary by race and ethnicity.

<sup>17</sup> Computer and Internet Use in the United States: 2016, American Community Survey Reports.

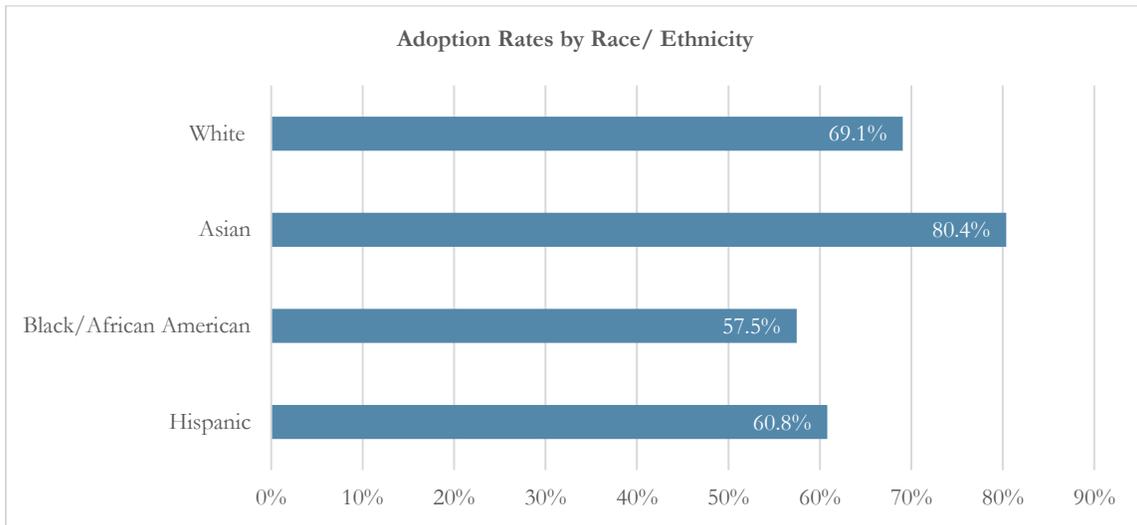


Figure 4: California Broadband Adoption by Race/ Ethnicity<sup>18</sup>

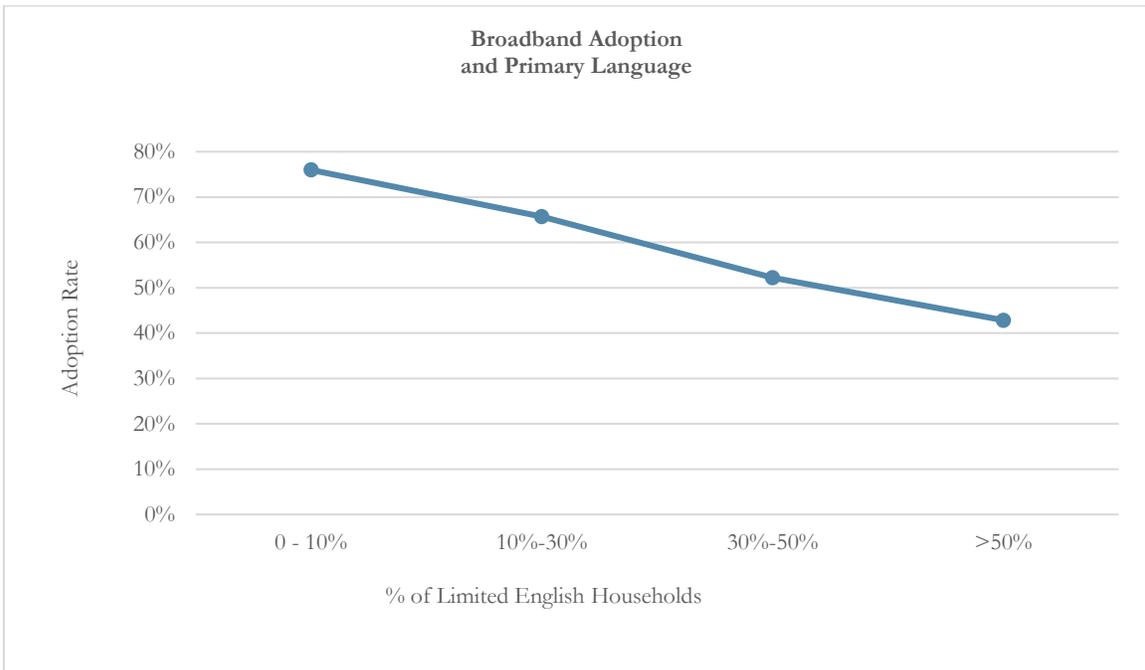
## Language

Whether English is the primary language in the household is also observed to be a significant factor affecting broadband adoption. Our analysis finds that census tracts with a majority of English-speaking households have higher adoption rates compared to those with a majority of limited English-speaking households.<sup>19</sup> This pattern is confirmed to be true at the national level also where the ACS reported that non-limited English-speaking households had higher subscription rates than that of limited-English speaking households.<sup>20</sup> Figure 5 below compares adoption rates for those census tracts with a majority of English and Limited English-Speaking households.

<sup>18</sup> Source: US Census Bureau: <https://factfinder.census.gov>, CPUC – Communications Division: <http://www.broadbandmap.ca.gov/>

<sup>19</sup> The US Census Bureau defines a “limited English-speaking household” as one in which no member 14 years and over speaks only English or speaks a non-English language and speaks English less than “very well”. i.e., all members 14 years and over have at least some difficulty with English.

<sup>20</sup> 2016 ACS Report: <https://www.census.gov/content/dam/Census/library/publications/2018/acs/ACS-39.pdf>



**Figure 5: California Broadband Adoption Rates and Primary Language<sup>21</sup>**

## Education

Lastly, our analysis finds that the level of educational attainment also influences adoption. Higher adoption rates are observed in those census tracts where the head of the household holds a bachelor’s degree. Census tracts where a least 30% of the households hold a bachelor’s degree have an adoption rate close to 84%, compared to only 57% for those census tracts where less than 10% of the households hold a bachelor’s degree. Figure 6 below compares adoption rates for those census tracts with adults (25 or older) holding a bachelor’s degree.

<sup>21</sup> Source: US Census Bureau: <https://factfinder.census.gov>, CPUC – Communications Division: <http://www.broadbandmap.ca.gov/>.

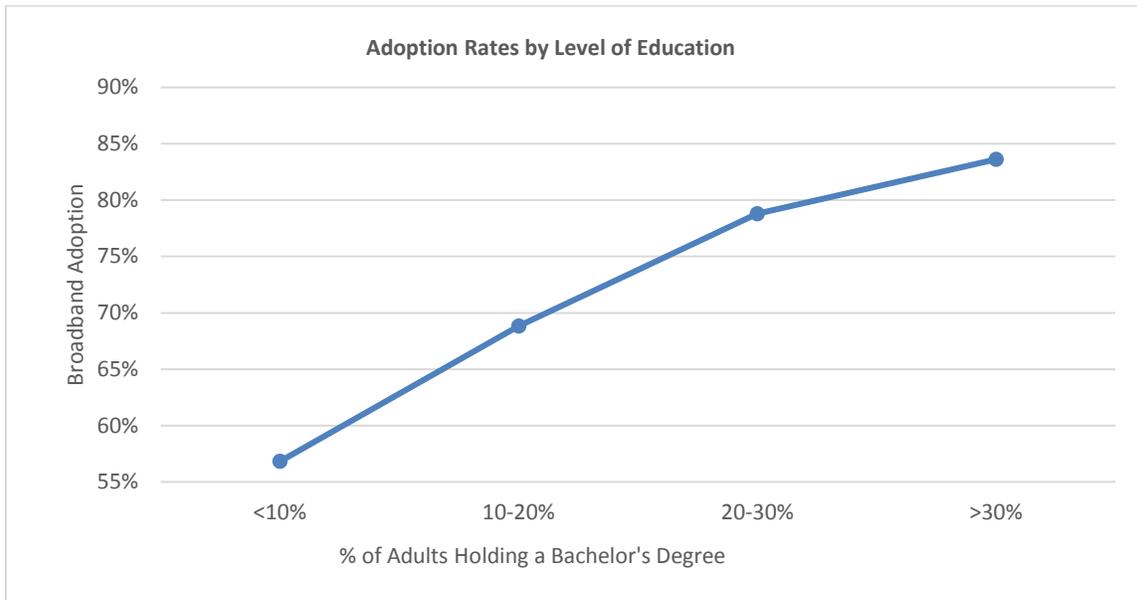


Figure 6: California Broadband Adoption Rates by Level of Education<sup>22</sup>

## Results

### Ten Priority Communities of Focus

Using the results gathered above, staff has identified ten communities of focus. In identifying these communities, staff looked to those that have very low adoption rates, are very low-income, and have relatively high density. This list should assist stakeholders and potential applicants in focusing on areas that would benefit most from adoption projects and funding. Therefore, applications proposing Adoption projects within these communities shall be prioritized for staff review and consideration. The following, in no particular order, are the ten priority communities.

Priority Community	Adoption Rate <sup>23</sup>	Median Annual Income	Number of Households
Huron, CA (Fresno County)	46.2%	\$22,802	1,751
San Joaquin, CA (Fresno County)	38.3%	\$24,661	1,035
Orange Cove, CA (Fresno County)	21.4%	\$25,619	2,342
Mecca, CA (Riverside County)	10.4%	\$25,863	1,934
Cottonwood, CA (Shasta County)	40.3%	\$27,437	1,230
Mendota, CA (Fresno County)	35.2%	\$27,479	2,738
Earlimart, CA (Tulare County)	36.4%	\$27,629	2,038
Ivanhoe, CA (Tulare County)	25.6%	\$29,898	1,100
Mount Shasta, CA (Siskiyou County)	45.5%	\$30,000	1,676
Lindsay, CA (Tulare County)	2.0%	\$30,029	3,567

Figure 7: Ten Priority Communities of Focus

<sup>22</sup> Source: US Census Bureau: <https://factfinder.census.gov>, CPUC – Communications Division: <http://www.broadbandmap.ca.gov/>

<sup>23</sup> Reflects adoption rates at served speeds of 6 Mbps down and 1 Mbps up

## Low Adoption – Low Income Regions of Focus

The map provided as Figure 1 of this report highlights regions in California that should also be targeted for Adoption projects. This map identifies all census tracts that have low adoption rates (<50%) and are low income (median household income <\$51,500). These regions could also be prioritized for grant funding.

## Updated California Interactive Broadband Map with Detailed Demographic Data

Lastly, staff has updated the online California Interactive Broadband Map to provide adoption rates and relevant demographic data at the census tract, block group or block level. This map (<http://www.broadbandmap.ca.gov/>) can be assessed publicly and provides the following demographic information at the census tract, block group or block level:

- Adoption Rates;
- Number of Households;
- Number of Housing Units;
- Median Income;
- % of Low-Income Households;<sup>24</sup>
- Median Age;
- Urban/Rural Designation;
- % Limited-English Households; and
- % of Households that hold a bachelor's degree or higher.

## Conclusion

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The ten priority communities listed above and both the low adoption-low income map and the updated California Interactive Broadband map shall serve as tools to assist decision makers, stakeholders and potential CASF applicants to 1) better understand their communities and its needs, 2) identify the area's specific barriers and how to address them, and 3) know where to best implement Adoption projects to yield greater benefits. Applicants interested in applying for grants in the CASF Adoption Account shall use these tools to develop proposals. These tools can also be used by grantees to track adoption rate progress among census tracts year over year. Staff will also use these tools to help award grants and prioritize approving projects in communities that demonstrate such barriers to adoption as identified in this report. Better understanding these communities and their specific barriers will aid in determining where CASF Broadband Adoption funds are needed most and might have the greatest impact.

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<sup>24</sup> Defined as those below the 200% FPG for a household of 4 per the CARE income limits.

# Appendices

## Appendix 1- Adoption Rates by County<sup>25</sup>

County	Broadband Adoption Rate (≥200 Kbps)	Broadband Adoption Rate (6 Mbps down and 1 Mbps up)
<b>California</b>	<b>87.3%</b>	<b>80.2%</b>
Alameda	89.0%	84.8%
Alpine	150.8%	116.9%
Amador	89.5%	62.3%
Butte	80.1%	66.0%
Calaveras	102.5%	79.9%
Colusa	26.2%	24.9%
Contra Costa	94.2%	89.4%
Del Norte	78.2%	78.2%
El Dorado	88.7%	72.7%
Fresno	78.9%	73.2%
Glenn	65.9%	46.3%
Humboldt	78.1%	68.3%
Imperial	76.4%	61.3%
Inyo	91.2%	86.8%
Kern	79.3%	72.5%
Kings	76.9%	71.8%
Lake	84.8%	69.8%
Lassen	15.7%	12.5%
Los Angeles	83.6%	75.2%
Madera	76.4%	56.3%
Marin	93.3%	87.6%
Mariposa	84.5%	19.0%
Mendocino	76.3%	63.3%
Merced	74.8%	68.7%
Modoc	29.2%	23.5%
Mono	147.3%	139.4%

<sup>25</sup> Sources: CPUC broadband data collection as of December 2017; household information are based on the California Department of Finance, January 1, 2018 estimate. Ratios exceed 100% because a ratio of all connections over housing units will be inflated relative to the number of unoccupied housing connections present. Note, the number of residential connections include those to all 'housing units'; which is inclusive of both permanent housing (households) and to non-permanent vacation rental and temporary residential housing (unoccupied housing) of less than 6 months duration.

<b>County</b>	<b>Broadband Adoption Rate (≥200 Kbps)</b>	<b>Broadband Adoption Rate (6 Mbps down and 1 Mbps up)</b>
Monterey	85.5%	78.3%
Napa	90.9%	84.8%
Nevada	94.7%	71.0%
Orange	93.6%	87.6%
Placer	93.7%	80.4%
Plumas	54.4%	34.7%
Riverside	93.2%	88.0%
Sacramento	88.3%	79.6%
San Benito	82.9%	72.4%
San Bernardino	87.4%	81.5%
San Diego	92.3%	87.6%
San Francisco	85.7%	77.8%
San Joaquin	83.1%	77.1%
San Luis Obispo	88.3%	77.0%
San Mateo	96.7%	91.3%
Santa Barbara	87.0%	77.5%
Santa Clara	91.8%	87.1%
Santa Cruz	89.1%	78.4%
Shasta	68.6%	60.1%
Sierra	92.9%	57.3%
Siskiyou	69.1%	52.5%
Solano	90.9%	86.3%
Sonoma	87.9%	82.3%
Stanislaus	81.3%	74.9%
Sutter	81.9%	74.9%
Tehama	64.1%	43.3%
Trinity	56.9%	47.1%
Tulare	71.7%	62.4%
Tuolumne	81.7%	57.5%
Ventura	91.8%	84.4%
Yolo	85.8%	79.9%
Yuba	75.4%	68.5%

## Appendix 2 – Adoption Rates by Consortia<sup>26</sup>

Consortia	Adoption Rate (≥200 Kbps)	Adoption Rate (6 Mbps down and 1 Mbps up)
Broadband Consortium of the Pacific	90.6%	80.9%
Central Coast Broadband Consortium	89.8%	77.9%
Central Sierra Connect Consortium	93.7%	60.5%
Connected Capital Area Broadband Consortium	87.8%	79.0%
East Bay Broadband Consortium	91.2%	86.6%
Eastern Sierra Connect Consortium	82.7%	68.5%
Gold Country Broadband Consortium	94.3%	76.7%
Inland Empire Regional Broadband Consortium	91.0%	84.9%
Inyo / Mono Broadband Consortium	127.0%	118.7%
Los Angeles County Regional Broadband Consortium	83.7%	75.1%
Northeast California Connect Consortium	72.0%	57.1%
North Bay / North Coast Broadband Consortium	89.4%	82.7%
Redwood Coast Connect Consortium	77.7%	68.4%
San Joaquin Valley Regional Broadband Consortium	80.5%	72.1%
Southern Border Broadband Consortium	92.5%	86.6%
Upstate California Connect Consortium	76.3%	55.9%

<sup>26</sup> Sources: CPUC broadband data collection as of December 2017; household information are based on the California Department of Finance, January 1, 2018 estimate. Ratios exceed 100% because a ratio of all connections over housing units will be inflated relative to the number of unoccupied housing connections present. Note, the number of residential connections include those to all 'housing units'; which is inclusive of both permanent housing (households) and to non-permanent vacation rental and temporary residential housing (unoccupied housing) of less than 6 months duration.

## Appendix 3 - Methodology

The following methodology was used to develop the statistics for this analysis. Demographic data from the US Census Bureau was used to conduct a baseline broadband adoption analysis to identify barriers to adoption. Adoption rates are defined as the percentage of households with a consumer connection in areas where broadband is deployed and with a minimum served speed of 6 Mbps down and 1 Mbps up. Penetration rates were also calculated to determine the percentage of all households that have a broadband subscription by census tract. Broadband and demographic data from 7,999 census tracts was collected and analyzed. 58 census tracts were not analyzed because they had zero population. Consumer Connections are from the CPUC, Communications Division, Broadband Analysis Section. Broadband Deployment data is as of December 31, 2017.

**Demographic Variables and Adoption Rates:** A simple linear regression analysis was performed using SPSS statistical software for each variable and broadband adoption rates by census tract. Linear regression attempts to model the relationship between two variables by fitting a linear equation to observed data by using the method of ordinary least-squares. The demographic variable is the independent or explanatory variable, and broadband adoption is the dependent variable. The results do not necessarily indicate that there is a causal relationship between the variables but show that there is a significant association between them. All the dependent variables, except for 1-person non-family households, were statistically significant at the 95% confidence level. This indicates that there is a 95% certainty that the confidence interval includes the true mean of the population.

The figures in this report illustrate the correlation between broadband adoption rates and selected demographic data from the US Census Bureau. The demographic variables were ranked based on the strength of the coefficient of determination, or R-squared. R-squared is the measure of how close the data are to the fitted line and measures the strength of the relationship between the demographic variable and the broadband adoption rate.

While the R-squared values are relatively low, the predictor variables were all significant, except for 1-person households. Therefore, we can still draw important conclusions about how changes in the demographic variables are associated with changes in the adoption rate. Furthermore, in social science studies it is entirely expected that R-squared values will typically be lower than 50% because human behavior is harder to predict than physical processes. The below table lists the variables and their correlations levels.

### Demographic Variables and Correlation Levels

Rank	Variable	Coefficient of Determination (R <sup>2</sup> )	% of Adoption Explained	Correlation
1	Households Below Poverty	0.2255	22.6%	-
2	Hispanic Households	0.1736	17.4%	-
3	Limited English Households	0.1284	12.8%	-
4	Asian Households	0.0820	8.2%	+
5	Median Age	0.0328	3.3%	+
6	65 or older	0.0109	1.1%	+
7	Black/African-American Households	0.0095	1.0%	-
8	Bachelor's Degree (25 and over)	0.0086	0.9%	+
9	Median Household Income	0.0082	0.8%	+
10	Own Home (Households)	0.0030	0.3%	+
11	White Households	0.0029	0.3%	+
12	High School Graduate (25 and over)	0.0028	0.3%	-
13	Rent Home (Household)	0.0019	0.2%	-
14	Family Household Size- 5 or more	0.0014	0.1%	-
15	Family Household Size - 3-4	0.0009	0.1%	+
16	Family Household Size - 2	0.0006	0.1%	+
16	Non-family Household Size-2-4	0.0006	0.1%	+
17	Non-family Household Size - 1	0.0000	0.0%	

## Demographic Data from American Community Survey Data, US Census Bureau

Demographic Variable	Year	Source Table
Median Income	2016	ACS_16_5YR_B19001_with_ann.csv
High School diploma	2017	ACS_17_5YR_S1501_with_ann.csv
BA degree	2017	ACS_17_5YR_S1501_with_ann.csv
Median Age	2017	ACS_17_5YR_B01002_metadata.csv
Limited English	2016	ACS_16_5YR_S1602_with_ann.csv
Family Household Size (2)	2017	ACS_17_5YR_B11016_with_ann.csv
Family Household Size (3-4)	2017	ACS_17_5YR_B11016_with_ann.csv
Family Household Size (5 or more)	2017	ACS_17_5YR_B11016_with_ann.csv
Non-family Household Size (1)	2017	ACS_17_5YR_B11016_with_ann.csv
Non-family Household Size (2-4)	2017	ACS_17_5YR_B11016_with_ann.csv
Rent Home	2017	ACS_17_5YR_S2501_with_ann.csv
Own Home	2017	ACS_17_5YR_S2501_with_ann.csv
Poverty Level	2017	ACS_17_5YR_S1701_with_ann.csv
65 and over	2017	ACS_17_5YR_B01002_metadata.csv
Black/African American	2017	ACS_17_5YR_DP05_with_ann.csv
Asian	2017	ACS_17_5YR_DP05_with_ann.csv
Hispanic	2017	ACS_17_5YR_DP05_with_ann.csv
White	2017	ACS_17_5YR_DP05_with_ann.csv

## Errata

Page 5 of the report was updated on June 26, 2019 to remove reference to the Pew Research Center and statistics related to California households' income barrier to broadband adoption.