

*Measuring the Effectiveness of Digital Inclusion Approaches (MEDIA)  
Policy Brief # 1*

January 2022

**A Roadmap for Affordable Broadband: Lessons from the Emergency  
Broadband Benefit**

**1. Introduction**

In December 2020, Congress set aside \$3.2B for an emergency subsidy program to help low-income households pay for broadband during the Covid-19 pandemic. Launched in May 2021, the Emergency Broadband Benefit (EBB) offered a subsidy of up to \$50 per month to qualifying households, increasing to \$75 for households in tribal lands. The program also offered a one-time discount of up to \$100 for the purchase of a device (computer or tablet). The EBB program was originally set to expire when the funds were depleted or six months after the Department of Health and Human Services declared an end to the pandemic. With the passage of the Infrastructure Investment and Jobs Act in November 2021, this temporary subsidy was extended indefinitely (at a minimum until the \$14.2 billion in existing funding is exhausted) and renamed the Affordable Connectivity Program (ACP).

The new ACP program largely builds upon the EBB, with some minor but significant differences such as a reduction in the standard subsidy level (from \$50 to \$30 per month) and an expansion in the eligibility criteria.<sup>1</sup> Another significant difference is that the ACP requires participating providers to allow qualifying households to apply the subsidy to any of the provider's broadband service offerings. Congress established a 60-day transition period (beginning December 31, 2021) for the phase out of the EBB, which will be fully replaced by the ACP by March 2022.

The phase out of the EBB and the transition to new program represents an opportunity to take stock of the EBB program's impact, and adjust key parameters to enhance the impact of the new ACP subsidy program. This policy brief seeks to contribute to this goal by evaluating the EBB program along three dimensions: 1) whether the program reached those in most need; 2) whether program uptake was higher for households with characteristics unrelated to the eligibility criteria; 3) whether local area factors affected opportunities and incentives for program participation. Ultimately, the goal of this study is to inform the design and support the implementation of the ACP program in ways that enhance its impact and cost-effectiveness.

The analysis is based on a county-level dataset that combines EBB data from USAC (Universal Service Administrative Company) with demographic information from the Census Bureau's American Community Survey (ACS) and other data sources.<sup>2</sup> A detailed discussion of how this unique dataset was created and the data sources can be found in Appendix A.

---

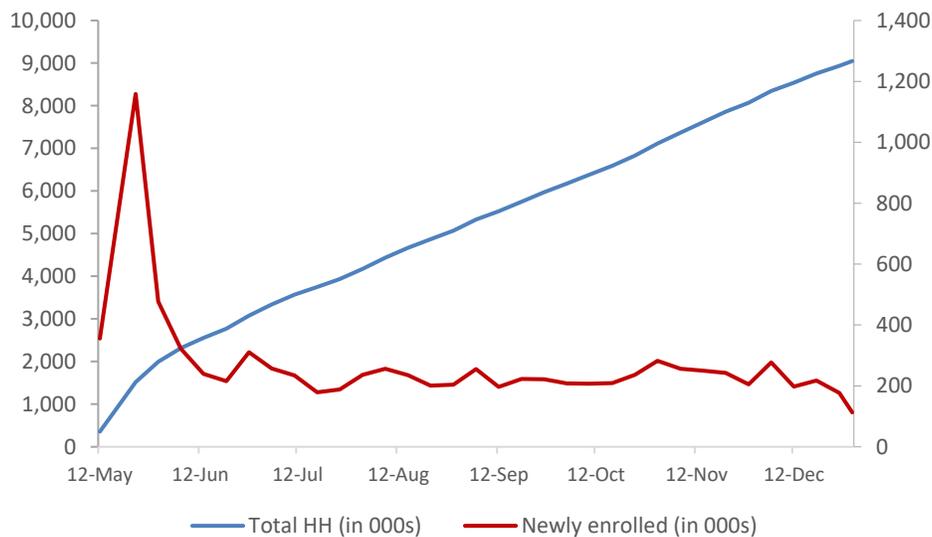
<sup>1</sup> The eligibility criteria were expanded to include households receiving the Special Supplemental Nutrition Program for Women, Infants and Children (WIC). In addition, the maximum income threshold increased from 135% to 200% of the Federal Poverty Guidelines.

<sup>2</sup> USAC administers universal service programs such as Lifeline, EBB and e-rate on behalf of the FCC.

## 2. The EBB in Numbers

When phased out on December 31, 2021, the EBB program had enrolled almost 9 million households (Figure 1, left axis). Put into perspective, this is about 40% higher than the number of those enrolled in Lifeline (about 6.5 million), a program that has existed for decades, but which offers a significant lower subsidy level.<sup>3</sup> The evolution of EBB enrollment shows that, after an initial period of rapid growth following its launch, the number of new enrollments plateaued at about 200,000 per week (Figure 1, right axis). Also worth noting is that about two-thirds of EBB recipients used the benefit to pay for mobile broadband, with only a third using the subsidy for residential broadband service. This raises concerns about the ability of EBB (and now ACP) recipients to fully take advantage of telehealth, remote work and online learning applications, which often exceed the data transmission capacity of mobile networks and the capabilities of mobile devices.

Figure 1: EBB: Total and newly enrolled HHs by week



Source: USAC.

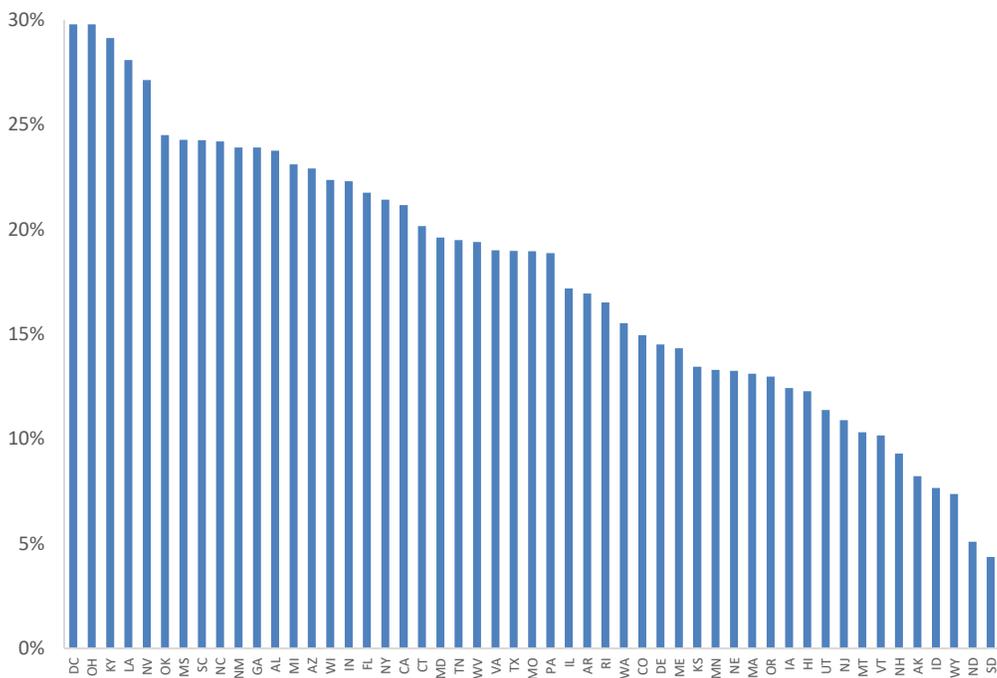
EBB was a means-tested program, with eligibility based on three criteria: 1) participation in Lifeline or affordable service programs offered by ISPs (e.g., Comcast’s Internet Essentials); 2) income-based eligibility (at or below 135% of the Federal Poverty Guidelines or if the household experienced a substantial loss of income during the Covid pandemic); 3) program-based eligibility (such as participation in SNAP, Medicaid, SSI, Pell Grant, and National School Lunch Program, among other safety net programs). Since not all households were eligible, the participation rate - defined as the ratio of enrolled households to eligible households - is a more meaningful evaluation metric for EBB than the share of recipients among the general population.

<sup>3</sup> The Lifeline program was established in 1984 to provide support for low-income households to buy telecommunications services. The current level of support is \$9.25 per month (\$25 in Tribal lands), though some states offer additional support. At its peak in 2012, there were about 17 million Lifeline subscribers. Households could combine Lifeline with EBB support.

At the same time, because of the EBB’s broad eligibility criteria, it is far from trivial to estimate with precision the number of eligible households. Given the broad similarity in the eligibility criteria between programs, for the purposes of this study Lifeline eligibility is used as a proxy for EBB eligibility.<sup>4</sup> To qualify for Lifeline, households must meet any of the following criteria: a) annual income at or below 135% of the federal poverty guidelines, or; b) a household member receives SNAP, Medicaid, SSI or other public assistance income defined at the state level. Because Lifeline guidelines are more restrictive than those for EBB, this method underestimates the number of EBB eligible households in a given area, and therefore overestimates the participation rate. It is however the best approximation possible given the available data.

Based on these parameters, at the end of December 2021 the overall EBB participation rate stood at about 20%. This is higher than estimated participation in Lifeline (about 14%), but significantly below participation in other safety net programs such as SNAP and Medicaid (about 80% participation).<sup>5</sup> There is however wide variation in EBB participation across states (Figure 2). In Ohio for example, about a third of eligible household are enrolled in EBB, in contrast to South Dakota where only about 4% of eligible households participate in the program.

Figure 2: EBB: Participation rate by state



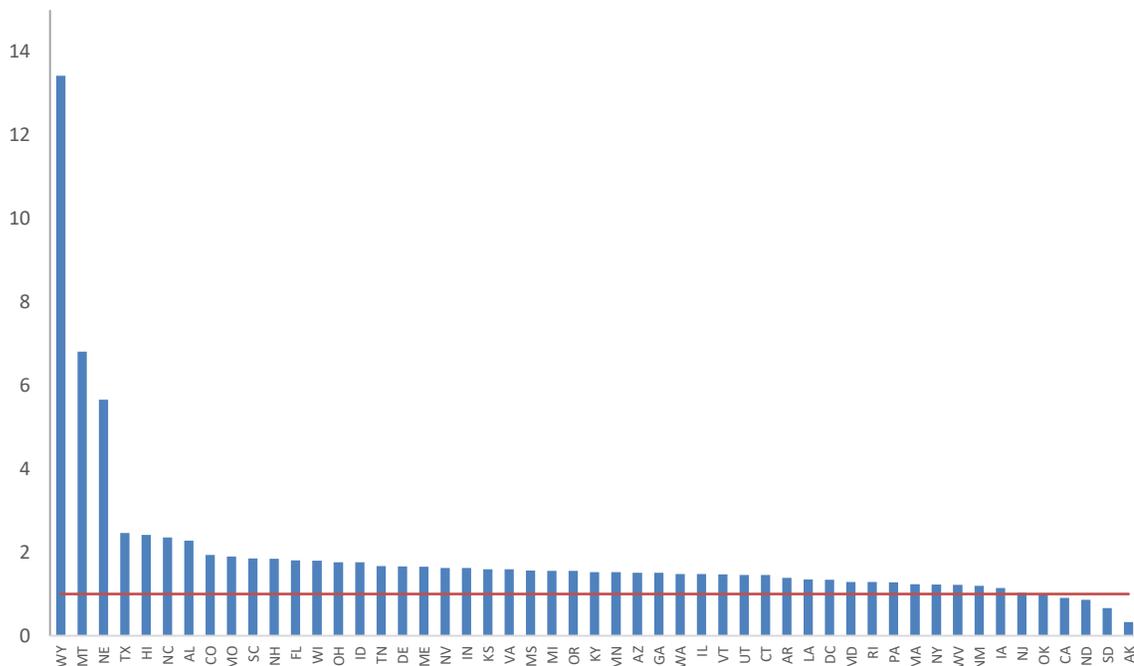
Source: USAC and ACS.

<sup>4</sup> Also worth noting is that over half of EBB recipients were verified through Lifeline participation.

<sup>5</sup> In our participation rate estimates, households are considered eligible for Lifeline (and therefore EBB) if at least one member is enrolled in the qualifying assistance programs. They differ from USAC’s calculations, which are based on householder data only. This is however inconsistent with Lifeline eligibility criteria, and tends to inflate participation rate estimates.

Figure 3 offers a comparison of participation in Lifeline and EBB. The values correspond to the ratio of EBB participation to Lifeline participation. Therefore, a value of 1 (red line in Figure 3) indicates equal uptake in both programs. As shown, in most states EBB uptake is on par or exceeds that of Lifeline, with the notable exception of Alaska, the state with the highest Lifeline uptake where EBB participation is lagging significantly behind (only about a third of Lifeline). There are also a few outliers (such as Wyoming and Montana) where Lifeline participation is negligible (around 2%) but where EBB uptake is many times higher.

Figure 3: Ratio of EBB to Lifeline participation by state



Source: USAC and ACS.

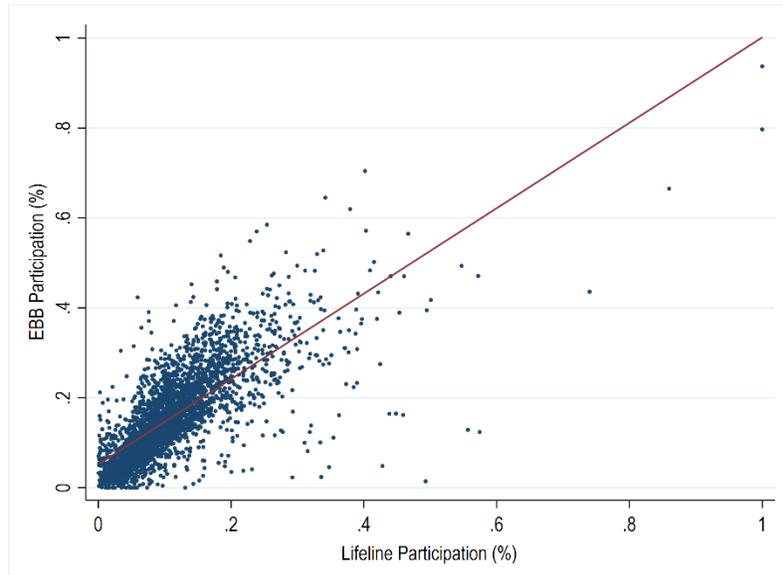
### 3. A Closer Look: EBB Participation and County Characteristics

The EBB program was largely created as an extension of the Lifeline program (in fact, Lifeline households do not require additional verification to enroll in EBB). As such, it is not surprising that EBB participation rates at the county level track closely with Lifeline participation (Figure 4). At the same time, the close association between the two programs ( $R^2=0.56$ ) also suggests that EBB may have replicated the problems that have resulted in low participation rates for Lifeline, despite offering a significantly larger subsidy.<sup>6</sup>

---

<sup>6</sup> The R-squared statistic measures how much of the variation in one variable is explained by variation in another variable. Standardized to range from 0 (no correlation) to 1 (perfect correlation), it represents the percentage of variance explained. For example,  $R^2=0.56$  means that 56% of the county variation in EBB participation rates is explained by county variation in Lifeline participation rates.

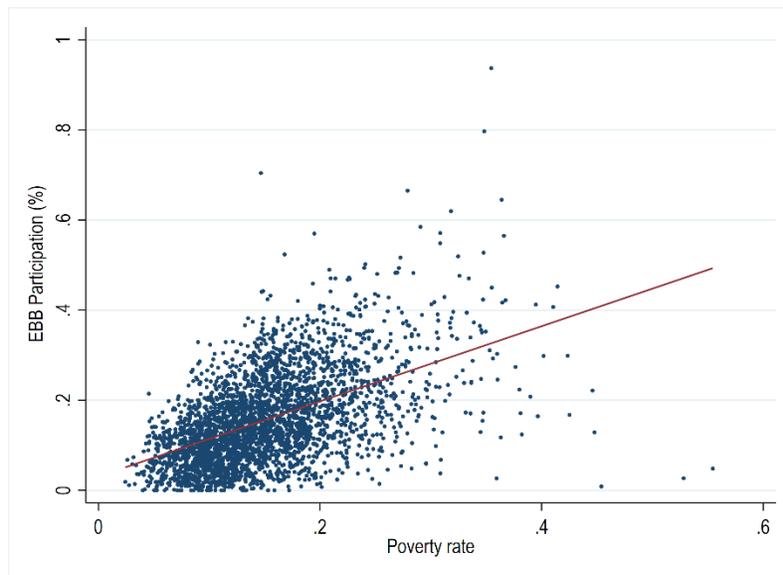
Figure 4: EBB and Lifeline participation rates by county



Source: USAC and ACS.

Did the EBB program reach the households most in need? Figure 5 examines this question by plotting EBB participation against the share of households below the federal poverty line. The figure shows a moderately strong association ( $R^2=0.27$ ), suggesting that counties with higher poverty levels also had higher levels of EBB uptake.

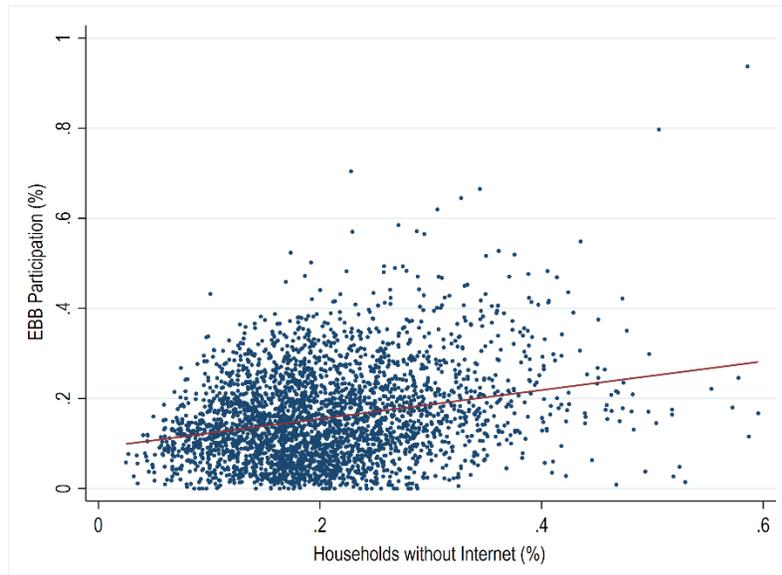
Figure 5: EBB participation and poverty rate (2019) by county



Source: USAC and ACS.

The EBB was a connectivity subsidy designed to promote broadband adoption by alleviating the burden of Internet service cost for low-income households. As such, one would expect higher participation rates in counties with lower levels of broadband adoption pre pandemic. Figure 6 examines this question by plotting EBB participation rates against the share of households that lacked Internet in 2019. As shown, there is only a modest (though statistically significant) correlation between EBB uptake and the share of unconnected households per pandemic ( $R^2=0.07$ ), and the correlation is noticeably weaker than that for poverty rate. The fact that lack of Internet in 2019 only explains about 7% of county variation in EBB participation suggests significant room for improving program targeting.

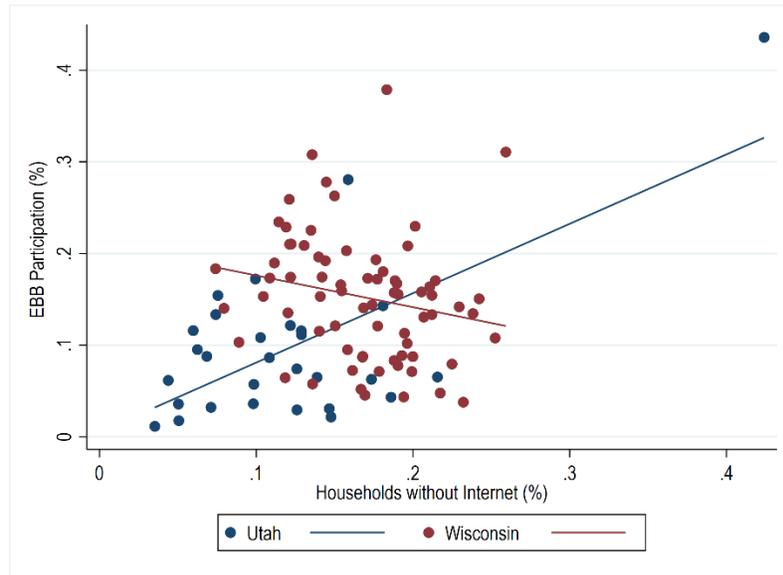
Figure 6: EBB participation and share of households without Internet (2019)



Source: USAC and ACS

The association between EBB participation and lack of Internet also varies by state. While in some states EBB uptake is higher in counties with low connectivity rates, in other states there is no correlation between EBB program uptake and the share of unconnected households. This is illustrated in Figure 7, which compares two states: Utah and Wisconsin. In Utah, there is a rather strong correlation between EBB uptake and the share of unconnected households ( $R^2=0.4$ ). In Wisconsin, contrary to expectations, EBB uptake drops as the share of unconnected households rises, though this (negative) correlation is not statistically significant. Overall, weak or no correlation between EBB participation and pre-pandemic broadband adoption raises flags about program targeting and inadequate outreach efforts. However, as discussed in the next section, there is a more complex combination of individual characteristics, county demographics and other factors that explains the observed differences in EBB participation rates across counties.

Figure 7: EBB participation rate and households without Internet (2019)



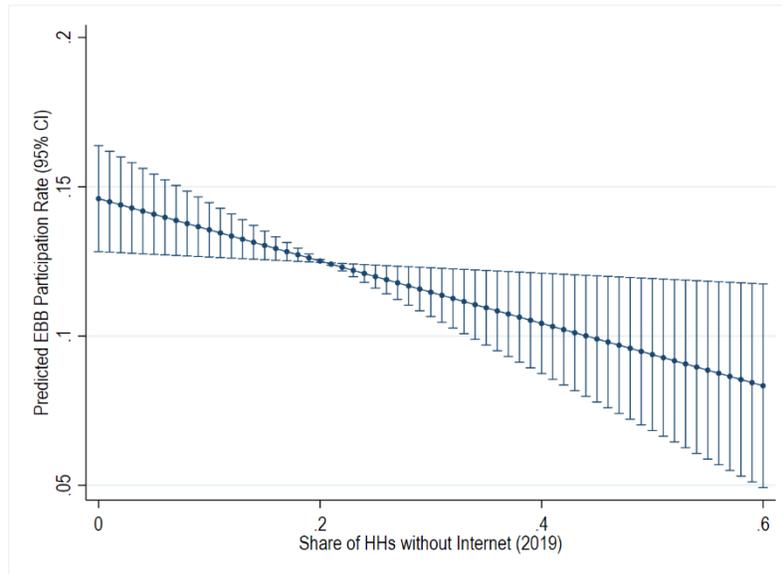
Source: USAC and ACS.

#### 4. What are the factors driving EBB uptake?

To examine the factors that explain variations in EBB participation rates across counties, this study models EBB participation as a linear function of both individual-level and household-level variables, as well as county characteristics. Given the variations in EBB uptake across states, some models also include state controls, thus accounting for unobserved differences across states (such as the number of participating providers) that affect EBB participation. In addition, the models include a variable that measures the share of the county population that lives in tribal areas, which accounts for the higher subsidy level available to tribal area residents. Finally, some models include an interaction term that captures the joint effect of poverty and lack of broadband. The full results are available in Table A1.

The results confirm that, contrary to expectations, EBB participation rate is, at best, uncorrelated with the pre-pandemic share of households without Internet in a county – with some models suggesting that EBB uptake in fact drops as the share of unconnected households increases. This counterintuitive result suggests that the EBB program is primarily alleviating the cost burden for eligible households that were already connected to broadband in 2019, with only modest impact in bringing those previously unconnected online. Figure 8 illustrates this finding by plotting the model predictions for EBB participation rate over the share of unconnected households in 2019 (predicted values are from model 1 in Table A1).

Figure 8: Predicted EBB participation by share of households without Internet in 2019



Source: USAC, ACS, Federal Reserve.

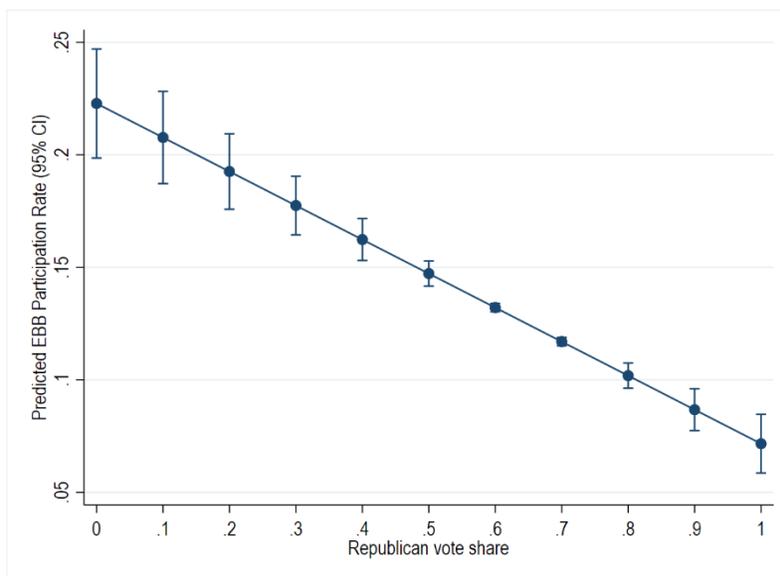
On the other hand, the large positive coefficients for poverty and unemployment rate are indicative of adequate targeting for an emergency program designed to help connect low-income households and those that lost income or employment during the pandemic. Participation rates are also higher in metro areas and in more populated counties. Since provider participation in the EBB program is voluntary, and non-metro areas tend to have fewer ISPs, this finding may partly reflect limited program availability in rural and less populated counties. However, it is also likely that outreach efforts have been more effective in large cities than in rural and less populated communities, where social service offices and community-based organization tend to have a more limited presence.

As expected, participation rates are higher in counties with younger populations. Though the magnitude of the age effect is comparatively small, this suggests the need to strengthen efforts to enroll older adults, a group that generally lags in connectivity relative to younger age groups. A surprising finding is that the share of households with school-age children is uncorrelated with EBB participation (though the coefficient is significant and positive in models without state controls). The share of county households that speak English only does not seem to affect participation rates, a finding which suggests that program outreach efforts in other language have been effective. At the same time, citizenship status is a strong predictor of EBB participation, as uptake drops significantly in counties with larger shares of foreign-born residents. Even though EBB enrollment does not require proof of citizenship or legal residency status, this suggests that households with undocumented members lack adequate information and remain wary about participating in a program administered by the federal government.

Perhaps the most unexpected finding of this study is how partisanship affects EBB program uptake. As Figure 9 illustrates, the predicted participation in EBB drops significantly as the share of Republican votes in a county increases (2020 election). There are several potential explanations for this result. On the one hand, it is possible that policymakers in Republican-controlled counties are failing to promote the EBB program, or that these counties lack organizations involved in digital

equity efforts. On the other hand, this finding is consistent with other studies showing that the stigma associated with enrollment in safety net programs deters participation by potential beneficiaries, who reject programs like EBB on ideological or partisan grounds.<sup>7</sup> This indicates the need to message the new ACP program in ways that disconnect the program from partisan fault lines.<sup>8</sup>

Figure 9: Predicted EBB participation by Republican vote share (2020)



Source: USAC, ACS, Federal Reserve.

## 5. Conclusion

The EBB program was created to mitigate the short-term impact of the pandemic on the most vulnerable households, reducing the cost burden of broadband connectivity for recipients. As the program transitions into a longer-term subsidy, it is important to take stock of its impact and adjust course as needed. Overall, the findings of this study suggest there is significant room to improve program targeting and outreach efforts, as well as to facilitate enrollment procedures for key groups of potential beneficiaries.

Critically, the findings suggest that the primary impact of the EBB program was to alleviate the cost burden for households that were already connected pre-pandemic, with only modest impact in bringing new households online. Alleviating the cost burden of broadband for vulnerable households is an important policy goal, as evidence from other studies suggests that low-income households often cut on essentials expenses (such as food and clothing) to pay for Internet service.<sup>9</sup> Nonetheless, for a program that offered a subsidy level over five times higher than Lifeline, uptake

<sup>7</sup> See Currie (2004). *The Take Up of Social Benefits*. NBER Working Paper 10488.

<sup>8</sup> Lifeline offers an example of the association between a safety net program and party politics. Although the program started in 1984, because of the expansion to wireless services in 2009 the program today is often referred to as the “Obama phone” program.

<sup>9</sup> See for example CCIG Policy Brief #8: *Broadband Affordability and the Emergency Broadband Benefit in California*.

fell significantly below expectations. The evidence points in particular to weak demand for residential connectivity plans, despite the fact that the \$50 EBB subsidy covered about 70% of the typical cost of residential broadband in the U.S.<sup>10</sup>

A key task for the new ACP program is to significantly expand coverage, particularly in areas with low residential connectivity pre-pandemic. The findings in this study suggest that renewed outreach efforts are urgently needed in rural and less populated areas, among older adults, and in communities with a large share of foreign-born residents. This is consistent with findings from recent research showing that low levels of awareness about the EBB program, as well as lack of appropriate information about eligibility and the application process, depressed participation rates among key potential beneficiaries.<sup>11</sup> Previous research also indicates that targeted outreach efforts are likely to be more effective if channeled through organizations with strong local community ties (such as schools and senior centers), and that these organizations can also play a key role by offering technical support for onboarding those with limited digital literacy.<sup>12</sup>

Leveraging enrollment in other social safety net programs with high participation rates (such as SNAP, WIC and NSLP) is another key outreach strategy, albeit one that will require cross-agency collaboration and appropriate funding. Participating providers also have an important role to play in disseminating clear information about ACP program eligibility, contract terms and service pricing, a statutory mandate that the FCC should closely monitor and enforce. Minimizing enrollment procedures is also critical, as is flexibility in the documentation required to verify eligibility.

Finally, given the level of funding and the long-term duration of the ACP program, a more robust monitoring system must be put into place to evaluate the program's cost-effectiveness on an ongoing basis. This will require more extensive data reporting from participating providers, including information about pricing, service speeds, access technology, data usage patterns, and beneficiary location at the census tract or block group level.<sup>13</sup> In addition, regular surveys of existing and potential ACP beneficiaries should be conducted to better understand barriers to participation and potential adjustments to key program parameters such as subsidy level, enrollment procedures, certification rules and device offerings.

---

<sup>10</sup> According to data from the FCC's Urban Rate Survey, the median cost of a 25/3 Mbps residential service in 2021 was about \$70.

<sup>11</sup> For example in a recent USC/CETF survey in California, only 20% of low-income respondents were aware of the EBB program. See *CCIG Policy Brief #8: Broadband Affordability and the Emergency Broadband Benefit in California*.

<sup>12</sup> See McPeak, S. W., & Chong, R. (2018). *Comments of California Emerging Technology Fund (CPUC Rulemaking No. 12-10-012)*.

<sup>13</sup> EBB enrollment data was reported at the ZIP5 code level, which is less granular and not readily comparable to Census Bureau data.

## **About the project**

This policy brief is part of the Measuring the Effectiveness of Digital Inclusion Approaches (MEDIA) project, a research program that seeks to analyze existing broadband inclusion initiatives and provide evidence-based recommendations on how best to connect low-income households to broadband on a sustainable basis. This policy brief is the first in a series of publications based on results from the program.

The program is supported by The Pew Charitable Trusts, and includes the California Emerging Technology Fund (CETF) as a key research partner. The views expressed herein are those of the author(s) and do not necessarily reflect the views of The Pew Charitable Trusts or the California Emerging Technology Fund.

### ***Principal Investigators:***

Dr. Hernan Galperin, Associate Professor, USC Annenberg School  
Dr. François Bar, Professor, USC Annenberg School

### ***Research Assistance:***

Dr. Ezezi Ogbo, post-doctoral scholar, USC Annenberg School  
Henouk Ha, doctoral student, USC Price School

### ***Further inquiries:***

Dr. Hernan Galperin, Associate Professor  
USC Annenberg School for Communication  
hernan.galperin@usc.edu  
tel (+1) 213-821-1320

## Appendix A

**Table A1: Estimations for EBB participation rate (OLS)**

VARIABLES	(1) Participation Rate	(2) Participation Rate	(3) Participation Rate	(4) Participation Rate
No Internet	-0.122** (0.0490)	-0.178** (0.0668)	-0.0303 (0.0934)	0.0352 (0.142)
Poverty rate	0.286*** (0.0803)	0.373*** (0.105)	0.406*** (0.120)	0.646*** (0.174)
Poverty rate x No Internet			-0.465 (0.542)	-1.070 (0.763)
Metro area (yes=1)	0.0190*** (0.00384)	0.0362*** (0.00464)	0.0191*** (0.00382)	0.0358*** (0.00468)
English only HHs	-0.00672 (0.0618)	0.115* (0.0681)	-0.00438 (0.0639)	0.115* (0.0680)
Foreign-born pop.	-0.388*** (0.0858)	-0.401*** (0.108)	-0.389*** (0.0856)	-0.407*** (0.107)
Children 6-17yrs.	0.0899 (0.0655)	0.208*** (0.0750)	0.129** (0.0584)	0.297*** (0.0774)
High School or higher	-0.00338*** (0.000741)	-0.00645*** (0.00117)	-0.00334*** (0.000726)	-0.00620*** (0.00102)
Median age	-0.00108*** (0.000279)	-0.000268 (0.000486)	-0.00100*** (0.000327)	-0.000150 (0.000526)
Republican vote (2020)	-0.204*** (0.0214)	-0.207*** (0.0254)	-0.211*** (0.0233)	-0.221*** (0.0259)
Total population	3.00e-08*** (7.28e-09)	3.91e-08*** (1.11e-08)	2.95e-08*** (7.17e-09)	3.80e-08*** (1.10e-08)
Median house value	-2.22e-07*** (5.32e-08)	-1.66e-07*** (4.49e-08)	-2.08e-07*** (5.05e-08)	-1.44e-07*** (4.50e-08)
Unemployment rate	1.036*** (0.293)	1.463*** (0.257)	1.015*** (0.298)	1.385*** (0.270)
Share of Tribal Population	0.0347 (0.0389)	0.0381 (0.0366)	0.0363 (0.0366)	0.0394 (0.0335)
Constant	0.659*** (0.0674)	0.701*** (0.0811)	0.625*** (0.0624)	0.620*** (0.0695)
Mean (population-weighted)	0.19	0.19	0.19	0.19
Observations	3,111	3,111	3,111	3,111
R-squared	0.620	0.494	0.621	0.498
State Controls	Yes	No	Yes	No

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Note: clustered standard errors at state level.

### ***Variable Description and Sources***

VARIABLES	Description	Source	Year
EBB participation rate	EBB enrollment/EBB eligible HHs	USAC/ACS	2021/2019
No Internet	Share of HHs without Internet (any type)	ACS	2019
Poverty rate	Share of HHs below federal poverty line	ACS	2019
Metro area	Rural-urban continuum codes 1 to 3	USDA	2013
English only HHs	Share of HHs English-only language	ACS	2019
Foreign-born pop.	Share of foreign-born residents	ACS	2019
Children 6-17yrs.	Share of HHs with children 6-17 years old	ACS	2019
High School or higher	Share of population with HS degree or higher	ACS	2019
Median age	Population median age	ACS	2019
Republican vote	Share of Republican vote 2020 election	MIT Election Lab	2020
Total population	Total population	ACS	2019
Median house value	Median house value	ACS	2019
Unemployment rate	Unemployment rate	ACS	2019
Share of Tribal Population	Share of tribal population	BIA	2019

### ***EBB Participation Rate Calculation***

USAC provides weekly EBB enrollment data at the ZIP5 code level. Since ZIP5 codes are not nested within counties (for example some ZIP5 code boundaries extend over multiple counties), we use the Census Bureau’s 2010 crosswalk relationship file to match ZIP5 data to counties, weighing the data by census tract population. Using this procedure we obtain the total number of enrolled households at the county level, which is then divided by the total number of EBB eligible households to obtain the participation rate.

To calculate the number of EBB eligible households by county, we begin by replicating USAC’s methodology, which relies on microdata (PUMS files) from the American Community Survey (ACS). Five variables are used to identify eligible households, four from the individual-level files (HINS4, PAP, SSIP, POVPIP) and one from the household-level files (FS). The variables are:

- 1) Medicaid, Medical Assistance, or any kind of government-assistance plan for those with low incomes or a disability (HINS4)
- 2) Yearly food stamp/Supplemental Nutrition Assistance Program recipients (FS)
- 3) Public assistance income over the past 12 months (any amount) (PAP)
- 4) Supplemental Security Income over past 12 months (any amount) (SSIP)
- 5) Poverty status indicating household income below the 135% poverty threshold (POVPIP)

A key difference in our calculations is that a household is considered eligible for EBB (as well as Lifeline) if any household member meets either of the eligibility criteria based on the variables above. USAC’s eligibility calculations, by contrast, are based on responses from the householder (head of household) only. This is however inconsistent with program eligibility guidelines.

The household weight variable (WGTP) is used to estimate the total number of eligible households at the PUMS level. Finally, we use the data crosswalk file from the Missouri Census Data Center ([mcdc.missouri.edu/applications/geocorr.html](http://mcdc.missouri.edu/applications/geocorr.html)) to create eligibility estimates at the county level using the most recent population share weights.