USC Annenberg
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CONNECTED CITIES AND INCLUSIVE GROWTH (CCIG)
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# COVID-19 and the Distance Learning Gap

The COVID-19 crisis has forced the closure of school campuses across California, and the transition to distance learning for more than 1.5 million students in Los Angeles County alone. This transition is exerting a disproportionate toll on low-income and minority students, as it lays bare existing inequalities in access to the required technology for distance learning. Unless remedial initiatives are put into place, distance learning is likely to aggravate existing student achievement gaps across income and racial lines.

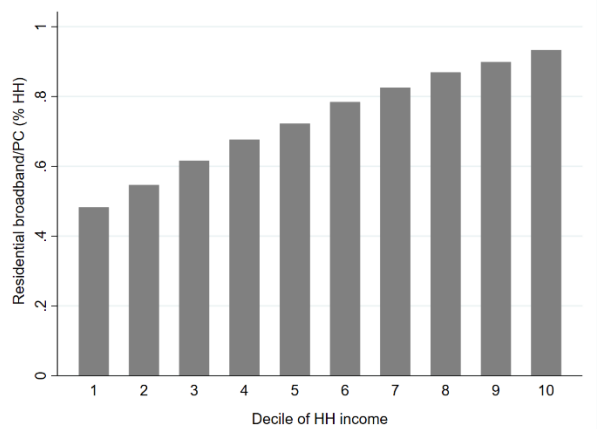
This policy brief examines the availability of distance learning resources for households with K-12 students in Los Angeles County. The focus is on two technology components necessary for effective distance learning: a desktop or laptop computer and a residential Internet connection. This assumes that, for a variety of reasons, mobile broadband services and devices fall short of meeting the needs of K-12 students for distance learning.[1] The data is sourced from the American Community Survey (ACS) 5-year estimates for 2018, the latest year available.

## *Distance learning resources are lacking among low-income families.*

Overall, over a quarter (27%) of K-12 households do not have a desktop or laptop computer and broadband at home. In other words, about 1 in 4 families with school-age children in Los Angeles County lack the technology resources for their child or children to engage effectively in distance learning. This represents approximately 250,000 households whose children are likely to fall behind in educational attainment.

Not surprisingly, there is a strong association between wealth and technology resources at home. Only about half of the families in the bottom 20% of the household income distribution have a desktop or laptop computer and subscribe to residential broadband. This compares to about 90% of families in the top income quintile, as shown in Figure 1.

*Figure 1: Residential broadband and PC by income decile (2018)*




[1] For a discussion see Brookings Institute (2020). Bridging digital divides between schools and communities (available at www.brookings.edu).

The gap in technology resources for distance learning is also illustrated in Figure 2, where the concentration curve (on the y axis) reflects the share of household resources (residential broadband and PC) across a rank order of households by income (x axis). The curve therefore indicates the extent to which the distribution of household resources for distance learning deviates from the theoretical case of a distribution that perfectly matches that of household incomes.

As shown, the technology resources curve lies below the theoretical case of perfect equality (dashed line), which indicates that the distribution of resources for distance learning is skewed towards wealthier households. In other words, the relative inequality in distance learning resources is even larger than that for income. For illustration purposes, the figure plots the curve for households receiving SNAP benefits, which as expected skews towards low-income families.

*Figure 2: Concentration curve for household resources for distance learning over HH income*

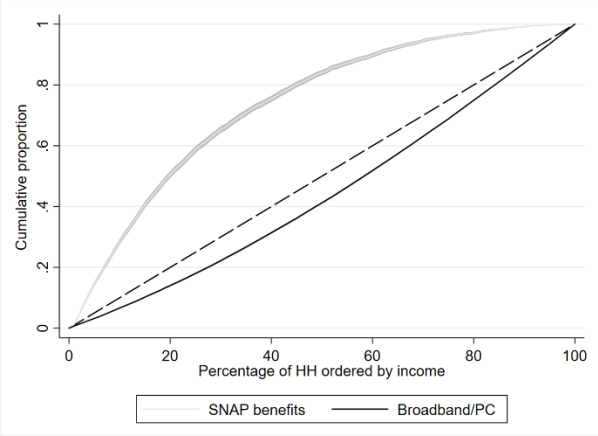



Figure 3 plots technology resource availability and household income (median) by PUMA (the smallest geographical unit for which data is available).[2] As shown, families without residential broadband and a desktop or laptop computer tend to live in lower-income areas, thus validating the association between distance learning resources and wealth at the broader community level.

*Figure 3: Technology resources and median income for K-12 households by PUMA (2018)*

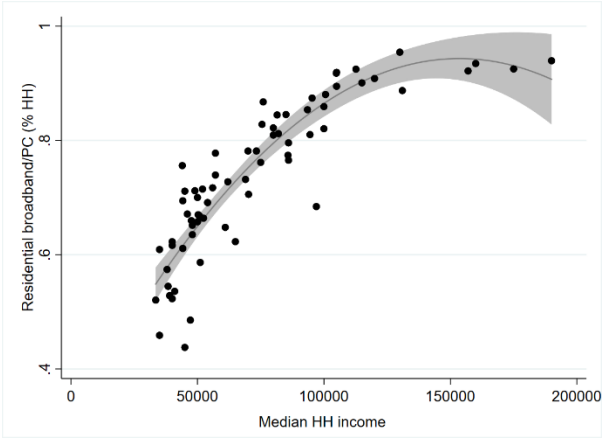


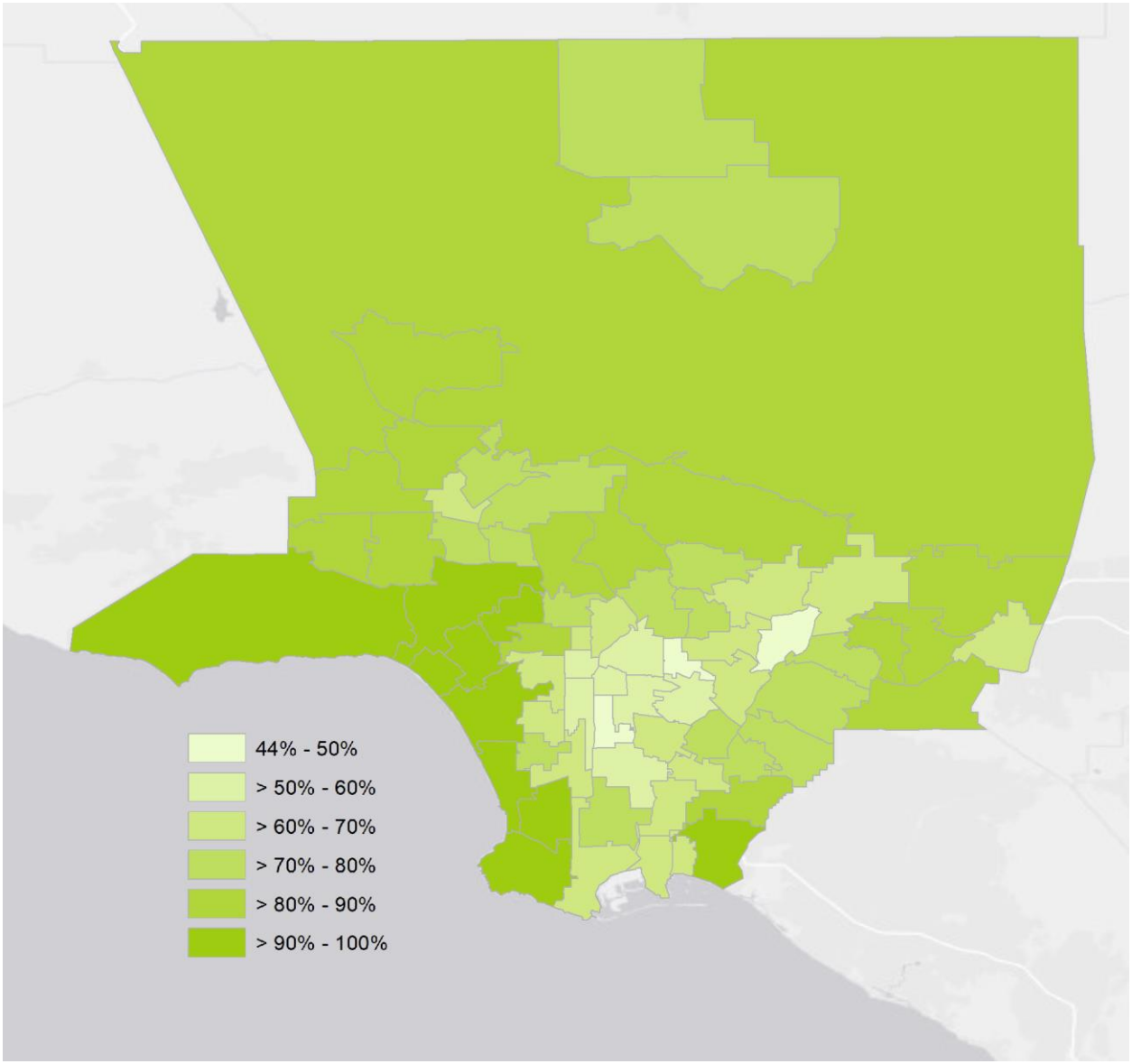

Figure 4 maps the household availability of broadband and desktop/laptop computer by PUMA. The map suggests that the spatial distribution of resources for distance learning reflects long-term disparities in the distribution of other types of resources. As shown, households lacking distance learning resources are clustered in South and East Los Angeles. In many of these communities, less than half of all families have a desktop or laptop and subscribe to residential broadband.

Limited disposable income often prevents families in these areas from paying for residential broadband, with many opting for more affordable (but more limited) mobile services. However, as previously documented, these are also communities that have been bypassed for investments in new broadband infrastructure, thus leaving families with fewer (and lower quality) residential broadband options to choose from.[3]

[2] PUMAs are geographical areas defined by the Census Bureau with at least 100,000 residents. Los Angeles County is divided into 69 PUMAs, which roughly correspond with neighborhood boundaries.

[3] CCIG Policy Brief #4 (September 2019), available at www.arnicusc.org.

*Figure 4: Availability of distance learning resources among K-12 households (%) by PUMA*




### *Regardless of income, students of color are less likely to have the technology resources for distance learning*

Disparities in technology resources for distance learning also exist along racial and ethnic lines. The analysis, however, needs to disentangle race and ethnicity factors from those related to income. To this goal, a multivariate regression model is used to predict whether K-12 students have the resources for distance learning at home based on student race/ethnicity while at the same time controlling for household income. Geographical location (by PUMA) is also included in the model to control for place-based factors impacting household resource availability. The results are presented in Table 1.

*Table 1: Predicting the availability of distance learning resources (logit regression coefficients)*

| VARIABLE | Residential broadband/PC |
|---|---|
| Household income | 9.16e-06*** |
| | (6.31e-08) |
| Hispanic student (=1) | -0.693*** |
| | (0.00562) |
| Black student (=1) | -0.437*** |
| | (0.00802) |
| Location control (PUMA) | yes |
| Constant | 0.941*** |
| | (0.0183) |
| Observations | 1,472,012 |

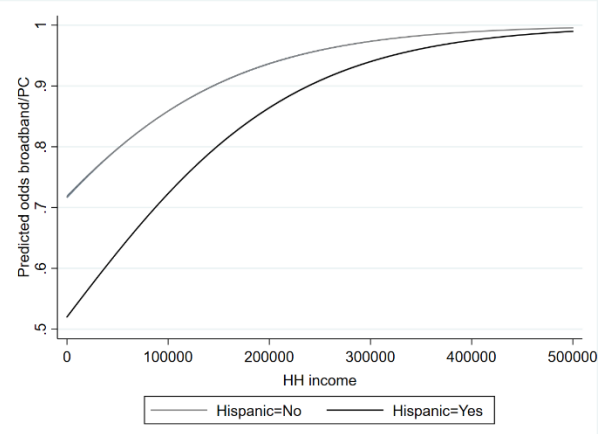
Robust standard errors in parentheses

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

The findings indicate that, regardless of income, Black and Hispanic K-12 students are significantly less likely to live in households equipped with technology resources for distance learning. Interpreting the results in odds ratios, the chances of a Hispanic student having residential broadband and a desktop or laptop computer at home are only about half of those of a non-Hispanic student. Similarly, the odds of a Black student having the resources for distance learning are about 65% of a non-Black student, regardless of income or location.

Figure 5 offers a visualization of these results by plotting the predicted odds of Hispanic and non-Hispanic students having the resources for distance learning at different levels of family income. As shown, the differences are particularly large at lower income levels, where the majority of Hispanic households are concentrated. As annual household income rises above 300K, the differences become significantly smaller.

*Figure 5: Predicted probability of residential broadband/PC by household income*




## *Urgent action is needed to prevent widening the achievement gap*

The findings discussed so far validate the need for aggressive initiatives to close the distance learning gap in Los Angeles County. The transition to online education has layed bare the disadvantages faced by students from low-income families, who often lack the means for effective distance learning. Minority students are at even greater risk of falling behind because, regardless of income, they are more likely to live in distressed communities with underfunded schools and less advanced broadband infrastructure.

Closing the distance learning gap will require concerted efforts between school districts, local and state governments, and the private sector. There are promising early signs that such cooperation is starting to emerge, but the urgency and scale of the challenge calls for immediate large-scale efforts to prevent the COVID-19 crisis from widening student achievement gaps in Los Angeles County.

**About the project**

This document is part of the Connected Cities and Inclusive Growth (CCIG) project, a collaboration between the USC Annenberg Research Network for International Communication (ARNIC) and the USC Price Spatial Analysis Lab (SLAB). More information about the project can be found at arnicusc.org/research/connected-cities.

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**About ARNIC**

The Annenberg Research Network on International Communication (ARNIC) studies the emergence of new communication infrastructures, examines the attendant transformation of government policies and communication patterns, and analyzes the social and economic consequences. The project is multi-disciplinary – including communication, sociology, economics, and political science approaches – and follows an international comparative perspective.

**About SLAB**

SLAB, the Spatial Analysis Lab at USC Price, aims to advance the visualization of the social sciences for public service through research, public engagement, and teaching. Our research experiments with developing alternative cartographies and exploring their potential roles in society, endeavoring to create knowledge and narratives that support an increasingly inclusive city. Aligned with Price's commitment to social justice and equity, the various activities of SLAB focus on bringing creativity and a humanistic attention to marginalized peoples and places.

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