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Indiana: 2019 State of Digital Inclusion

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The COVID-19 pandemic has had a significant impact across the state. According to the Indiana State Department of Health, as of mid-January 2021, more than half a million Hoosiers have been infected and around 8,000 have died.

Beyond the human impact, many businesses have been affected, especially those in the hospitality and food industries. According to Harvard's Opportunity Insights Tracker[1], the number of small businesses in the state declined by 32% between January and December 2020.

In addition to these impacts, COVID-19 has also brought to the forefront a decades-old issue called the "digital divide". As individuals, organizations, and businesses scrambled to remote work, conduct business online, or e-learn, the issue of the digital divide became abundantly clear. The term "digital divide" was coined in the mid-1990s and refers to those that have access, can afford, and use the internet versus those that cannot.

However, like any divide, it implies that it can be bridged; yet as digital technologies and its applications continue to evolve, expecting a one-time bridge to produce an even playing field is naïve. Consider for example how the digital divide concept itself has evolved over time. The first-level digital divide was understood as a binary yes/no access to the technology; the second-level divide is understood more in terms of how the internet is used and why; and the third-level digital divide is attempting to understand how these different internet uses result in varying social, political, economic, and cultural outcomes[2].

A broader concept—digital inclusion—can be used to integrate these different digital divide levels while also accounting for distinct social and economic contexts. In other words, digital inclusion refers to the adoption and meaningful use of digital applications for social and economic benefits revolving around three main layers of connectivity, devices, and skills[3]. The interaction of these three layers across multiple socioeconomic contexts leads to varying degrees of digital exclusion, which in turn affect a community's ability to adapt to and prosper in the digital age.

To summarize, while digital inclusion can be framed as a social justice and equity issue, it can—and should—also be framed as a community and economic development issue. A digitally inclusive community or region ensures that all residents, organizations, and businesses can participate fully in an increasingly digitized community, society, and economy. This report will review a series of 2019 metrics to get a better idea of the state of digital inclusion in Indiana.

The first section discusses three distinct but related broadband availability metrics: 1) data reported to the Federal Communications Commission via Form 477; 2) a metric provided by Microsoft; 3) and speed tests results across the state. These three metrics describe a robust landscape of broadband availability. The second section explores multiple indicators associated with broadband adoption and use, including the homework gap and internet income access inequities.

The third section examines multiple innovative metrics regarding the digital divide, digital distress, and remote work and e-learning vulnerability. It also explores digital economy trends, including the impact of digitization on workers and jobs. Lastly, the concluding section presents a series of recommendations that build on the findings of this report.

1. EconomicTracker/data at main · OpportunityInsights/EconomicTracker · GitHub (link)
2. Conceptualizing and Testing a Social Cognitive Model of the Digital Divide on JSTOR (link)
3. Community Developments Investments (November 2018) | OCC (treas.gov) (link)

SECTION I. BROADBAND AVAILABILITY

The most popular source of broadband availability data is the Federal Communications Commission (FCC) Form 477, a document that Internet providers file twice per year. This dataset includes broadband availability data at the Census block level including technology and advertised maximum speeds. Although the dataset is known to overestimate broadband availability[4], it remains the only comprehensive broadband dataset available.

The FCC defines "served" as areas having access to at least 25 megabits per second download (Mbps) and 3 Mbps upload, or 25/3 for short. About 261,300 Hoosiers—or 3.9% of the population—did not have access to advertised 25/3. Regarding housing units, 3.8% do not have access to advertised 25/3. **Figure 1** shows housing unit density (shades of orange) in the state outside the 25/3 Mbps footprint at the Census block (smallest geographic level for which the Census compiles demographic information).

COVID-19 made many homes and businesses realize that advertised 25/3 is simply not enough when multiple e-learners and remote workers are attempting to go online, usually at the same time. In fact, a survey of about 2,800 households across six rural communities in Indiana found that while more than 90% had internet access at home, 60% of these were unsatisfied with their home service[5].

Figure 2 includes a significantly faster broadband threshold of 100/20 Mbps and the housing unit density outside of this footprint. Roughly 13.5% of residents or 907,000 are outside this 100/20 footprint compared to roughly 13.0% of housing units or 379,000.

Figure 1 ▶

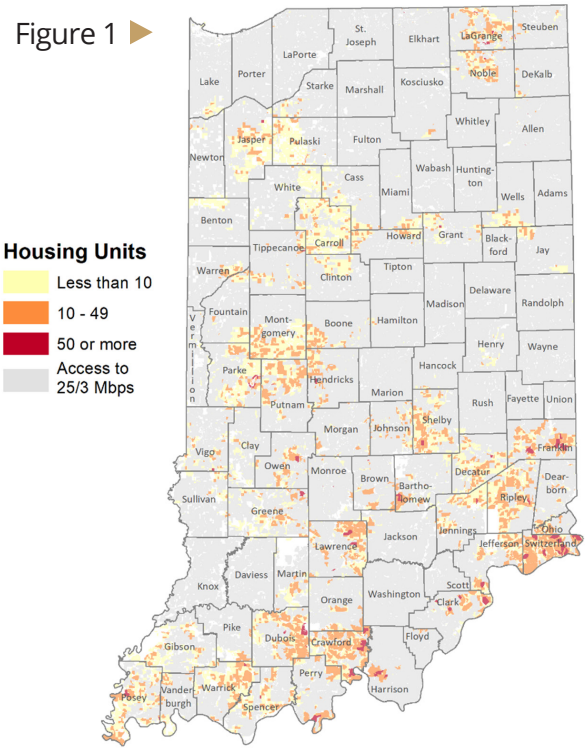
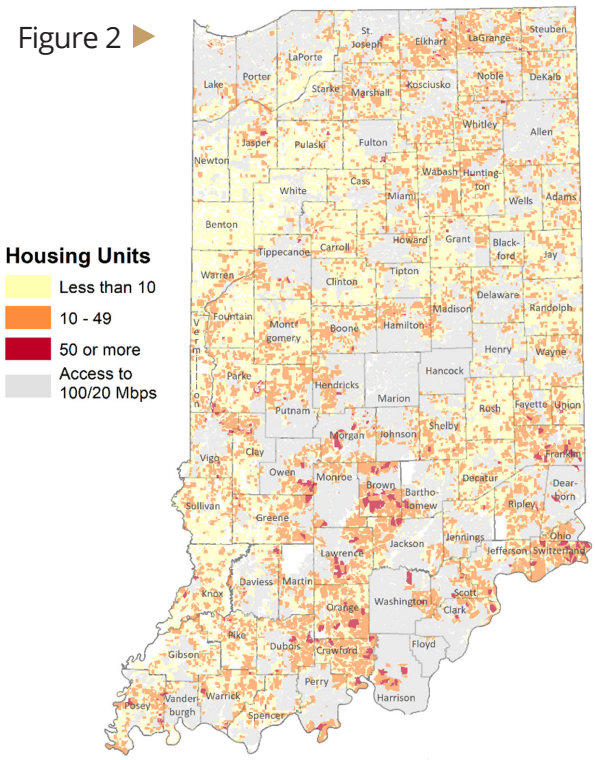


Figure 2 ▶



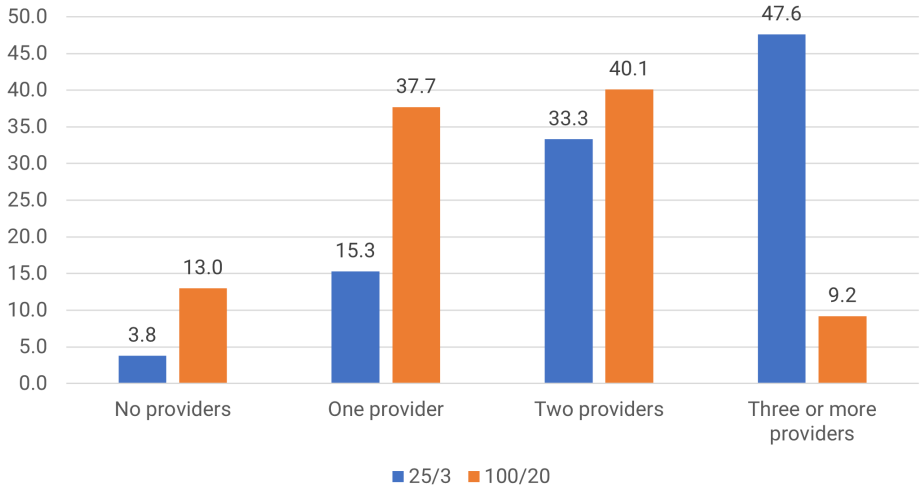
4. FCC Underestimates Americans Unserved by Broadband Internet by 50% (broadbandnow.com) (link)

5. Internet connectivity in rural Indiana: A quality of service problem (link)

Aside from the speed thresholds, it is important to understand access to a variety of providers. **Figure 3** shows the percent of housing units with access to multiple providers for both advertised 25/3 and 100/20 Mbps. For example, 47.6% of housing units in the state have access to three or more providers offering advertised 25/3 versus 9.2% offering 100/20 Mbps.

Different broadband technologies offer different advertised speeds. **Figure 4** showcases the average maximum advertised speed by broadband technology. Notice how cable and fiber provide the fastest average download speeds. Also, note that fiber offers the closest to symmetrical speeds (where download and upload speeds are identical).

Another key metric to consider in addition to maximum advertised speeds, is actual speeds. While speed tests are not the perfect assessment of broadband availability, they do provide a valuable piece of additional information. Microsoft published a county-level dataset estimating the percent of people not using the internet at a minimum download speed of 25 Mbps[6]. This percent was obtained by using server logs when computer users were requesting updates of Microsoft Office, Windows, Xbox, and/or other software applications. **Figure 5** shows the percent of population per county in Indiana that did not use the internet at a minimum of 25 Mbps during November of 2019. These are classified into three equal (same number of counties) groups: low, medium, and high.

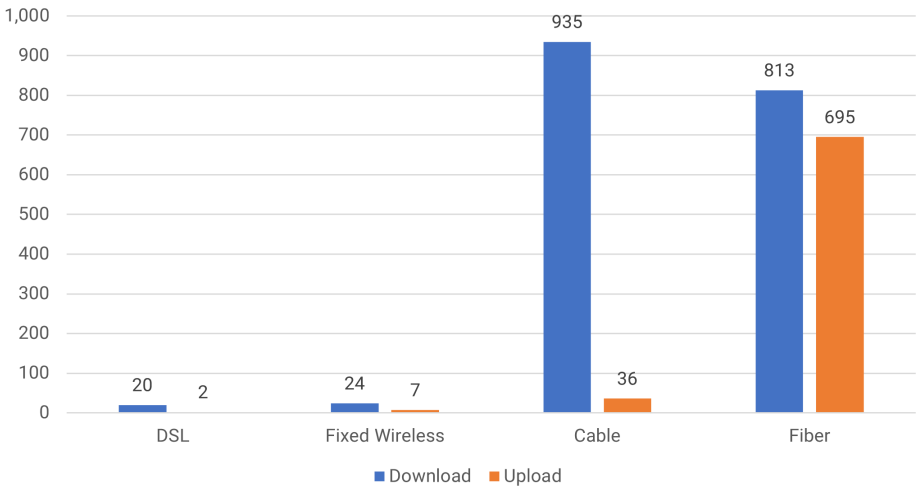


◀ Figure 3

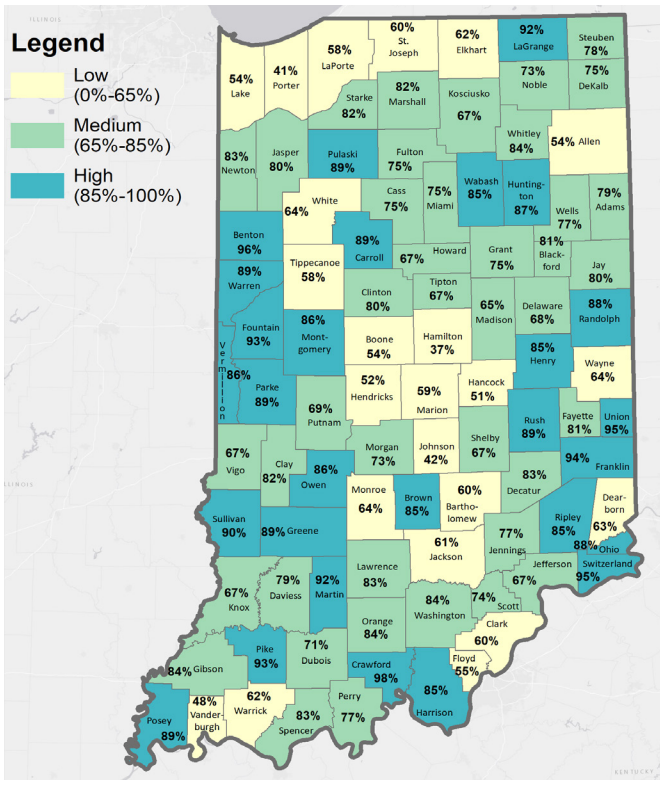
Percent of population per county in Indiana that did not use the internet at a minimum of 25 Mbps during November of 2019.

Figure 4 ▶

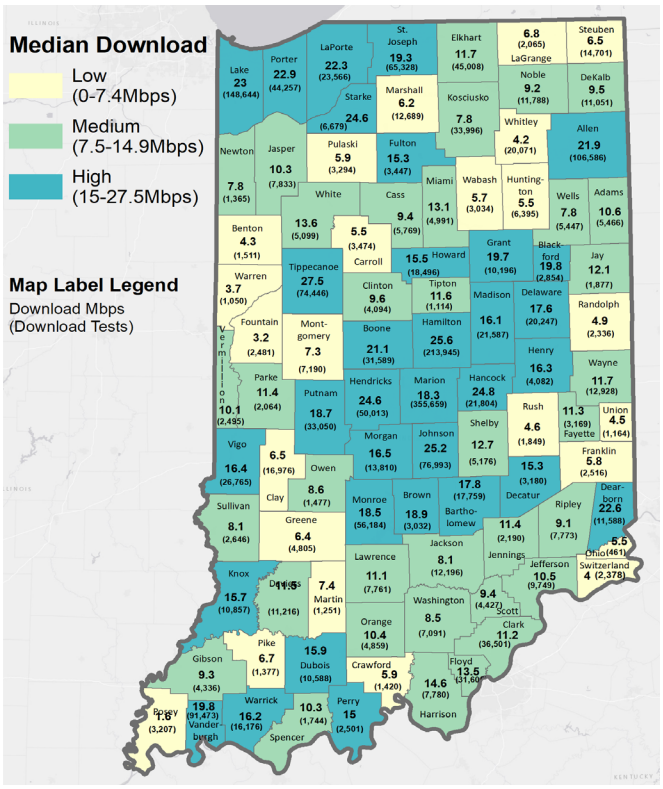
Average maximum advertised speed by broadband technology.



6. Microsoft Airband: An annual update on connecting rural America - Microsoft On the Issues (link)



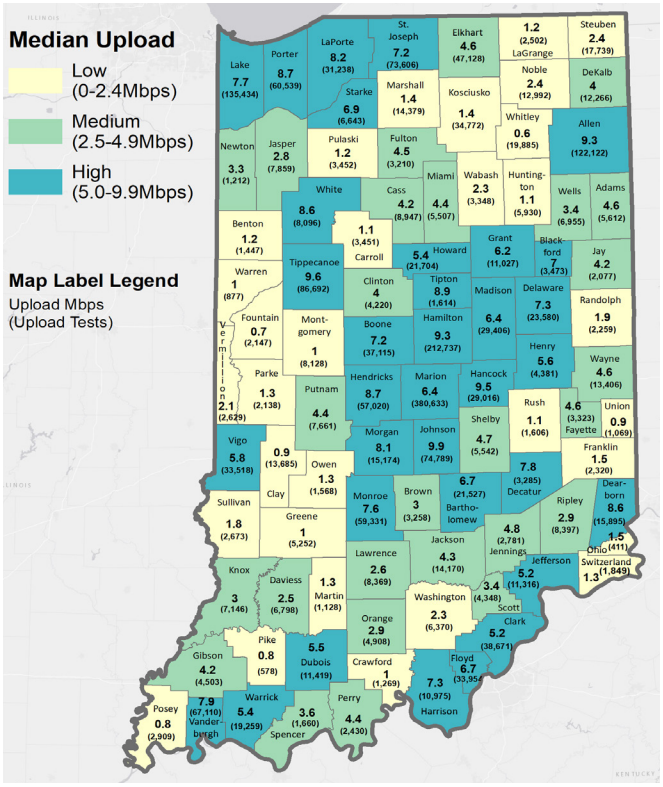
▲ Figure 5



▲ Figure 6

Another metric available is one that captures results of speed tests stored and analyzed by M-Lab. M-Lab has developed speed tests that can be embedded on websites and apps (for example, the TestIT app supported by the National Association of Counties[7]). **Figures 6 & 7** show the median download and upload speed test results conducted throughout 2019 on a per county basis, as well as the number of speed tests conducted. These two are grouped into low, medium, and high.

To summarize, FCC data show that roughly 3.8% of Hoosiers do not have access to advertised 25/3 while Microsoft found that close to two-thirds (62.4%) of Hoosiers do not use the internet at a minimum speed of 25 Mbps download, a very significant difference. This strongly suggests that more accurate broadband availability data are needed.



▲ Figure 7

7. TestIT: How Fast is Your Broadband (naco.org) (link)

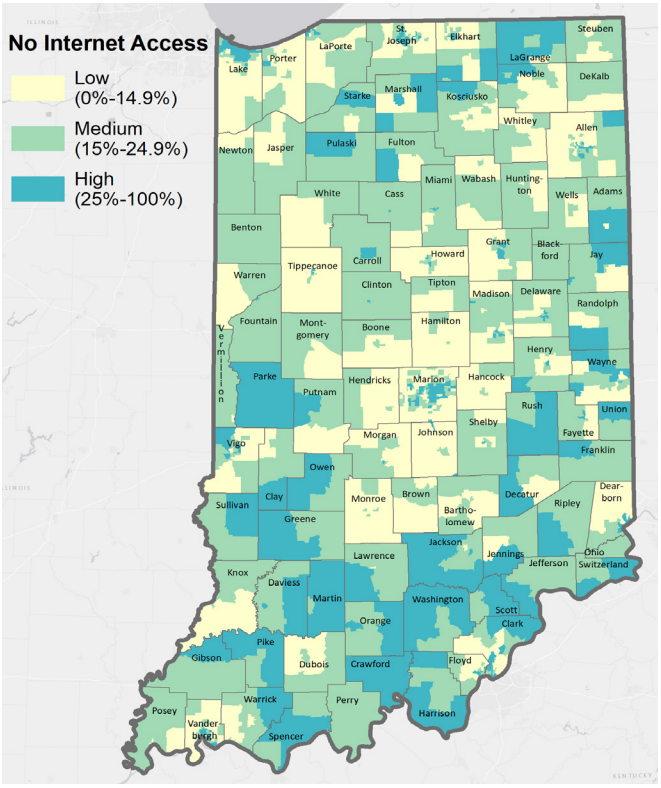
SECTION II. BROADBAND ADOPTION, HOMEWORK GAPS, AND DIGITAL EQUITY

The previous section reviewed multiple indicators associated with broadband availability. A key point to remember is that broadband availability results will vary depending on the metric used. Therefore, it is important to crosscheck these metrics with locally gathered data, such as household surveys and even word of mouth when pursuing broadband planning.

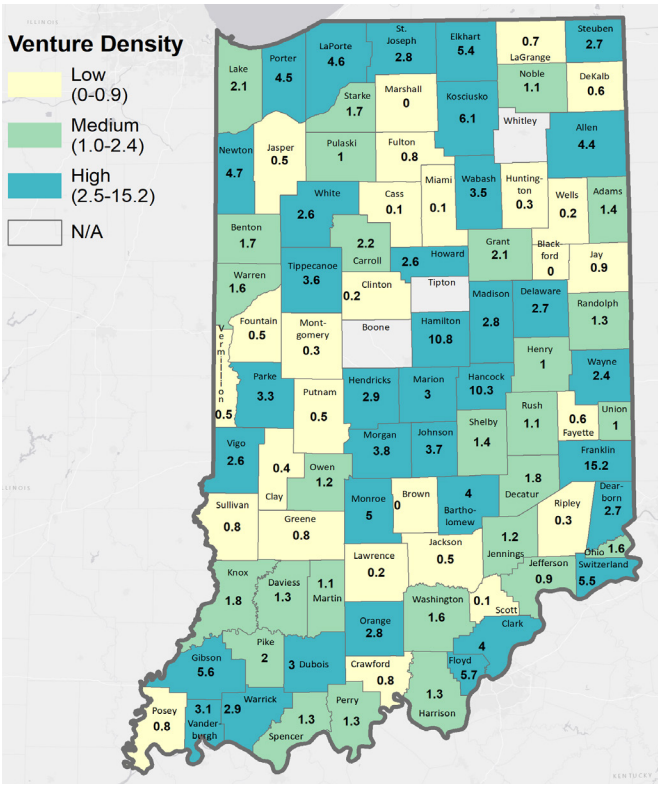
Aside from availability, research has found that broadband adoption—as opposed to availability—has a bigger bang for the buck when it comes to employment, income, etc.[8] Unfortunately, the ideal national dataset that records how the internet is being used and to what extent at the county-level, is not available. However, there are several metrics that can be used as proxies to broadband adoption.

First, **Figure 8** divides counties in the state into low, medium, and high categories depending on the percent of households with no internet access. While the data themselves do not tell us why there is no internet access (e.g., service is not available, not reliable, or it is too expensive), they do provide a better understanding of broadband adoption.

Another innovative metric regarding internet use is venture densities. A venture is a website, business or nonprofit, and its redirects including email, payments, and social media. Therefore, a venture density is the number of active and highly active websites per 100 residents. A highly active venture also considers how old is the website, its traffic, associated links, and how built-out it is. This metric was calculated by using data from the webhosting company Go Daddy. **Figures 9 & 10** showcase Indiana counties grouped into low, medium, and high buckets based on their active and highly active venture densities.

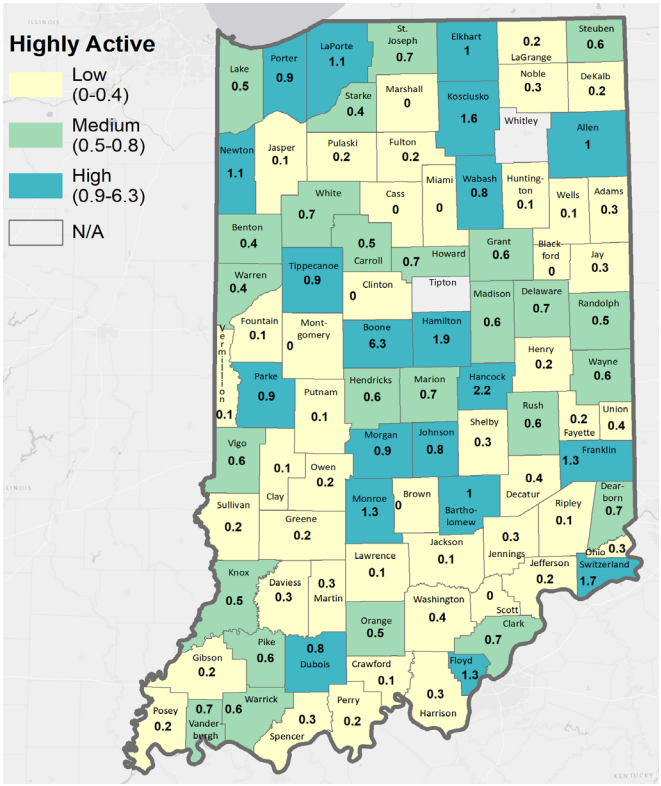


▲ Figure 8

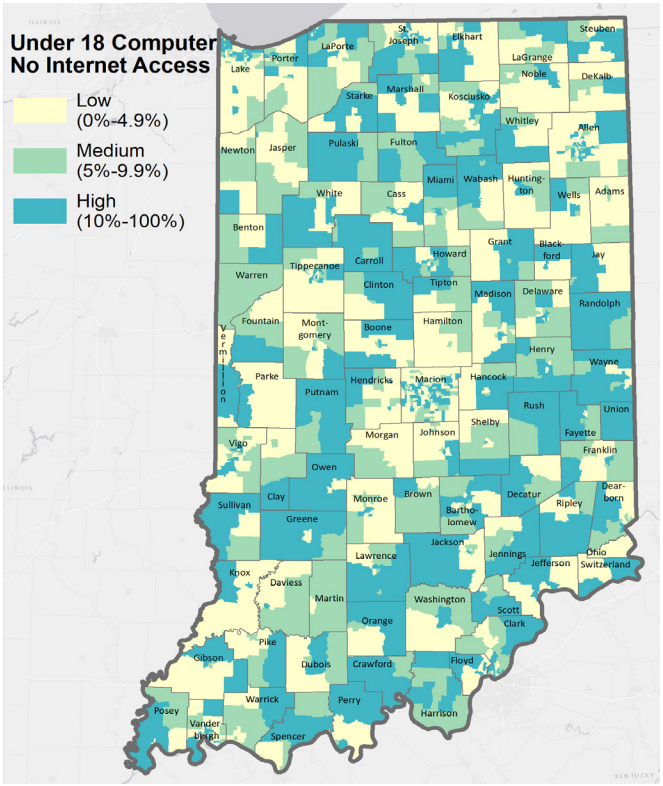


▲ Figure 9

8. Does rural broadband impact jobs and income? Evidence from spatial and first-differenced regressions - ProQuest (link)



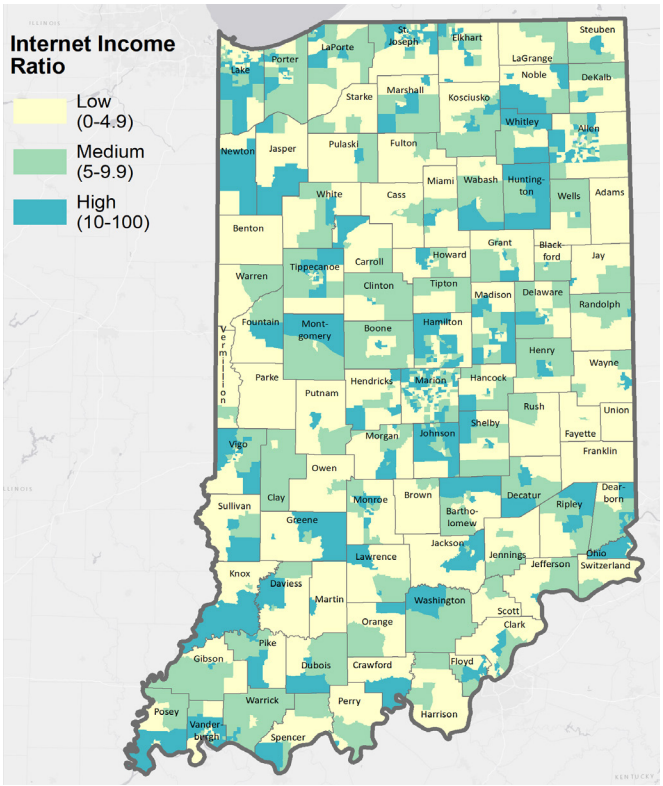
▲ Figure 10



▲ Figure 11

An important topic related to digital inclusion is the homework gap. The concept refers to children not being able to complete homework assignments at home due to lack of computers or internet, or both. **Figure 11** shows Census tracts (can include multiple neighborhoods and data are more granular than county-level) in the state based on the percent of residents under 18 with access to a computer but with no broadband subscription. Again, tracts are grouped into low, medium, and high.

Any digital inclusion effort will try to address digital inequities, especially when it comes to income. **Figure 12** shows Indiana Census tracts grouped into low, medium, and high categories based on an innovative metric called the internet income ratio or IIR. This ratio is calculated by dividing the percent of homes making less than $35,000 without internet access by the percent of homes making $75,000 or more without internet access. A higher IIR denotes a higher inequality when it comes to internet access based on income.



▲ Figure 12

SECTION III. SOCIOECONOMIC IMPACTS

Like broadband availability, broadband adoption is measured in a variety of ways. The previous section looked at multiple indicators that serve as proxies for broadband adoption and use. However, a key question that arises is this: "What metrics should be used?" While there is no singular metric that can be used to describe a complex concept, a combination of metrics can provide a more robust understanding of the digital inclusion landscape.

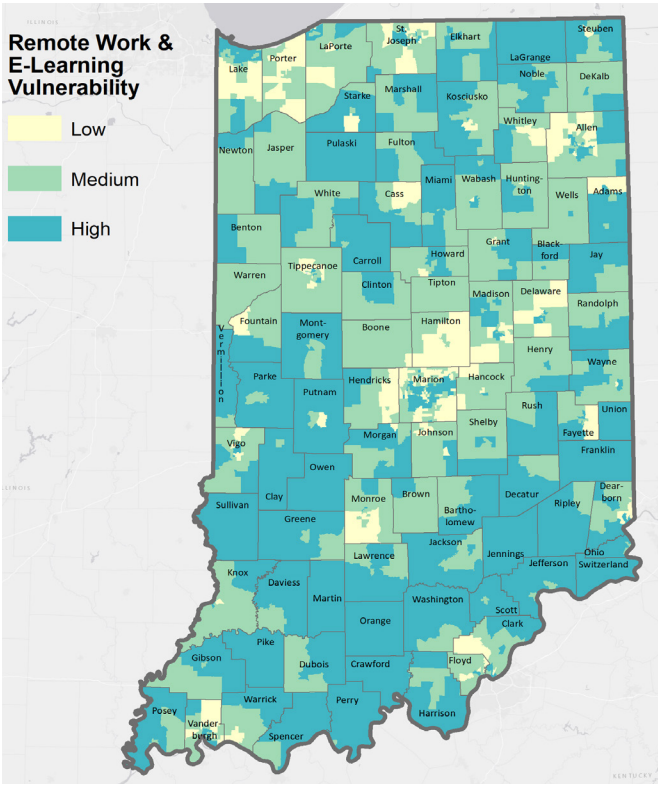
In this section, we review a combination of three innovative metrics: the remote work & e-Learning vulnerability metric or ReV; the digital distress metric; and the popular digital divide index. In addition, we examine trends regarding jobs and digital skills level as a way of framing the nature and implications of digital exclusion in Indiana.

The Purdue Center for Regional Development developed the ReV metric during the early stages of the pandemic to showcase the areas in the state that would have a harder time implementing COVID-19 mitigation strategies, such as remote work and e-learning. These areas were deemed vulnerable due to 1) poor or inadequate connectivity, 2) a higher homework gap, and 3) a higher share of jobs/occupations that were not remote work friendly[9]. **Figure 13** shows the Census tracts in the state with a low, medium, and high levels of ReV. When all is said and done, roughly about 31% of Hoosiers live in high vulnerability areas.

On a similar note, areas in digital distress have a higher share of households with either no internet access or relying solely on their cellular data connections, as well as having no computer device or relying solely on mobile devices. Cellular data plans and mobile devices undermine the technology's potential due to limited data plans and smaller screens, whereas no computing devices nor internet access places homes in "internet darkness". Therefore, these areas are in digital distress. **Figure 14** shows Census tracts in Indiana in low, medium, or high digital distress. Close to one-fifth of Hoosier households lived in high digital distress areas.

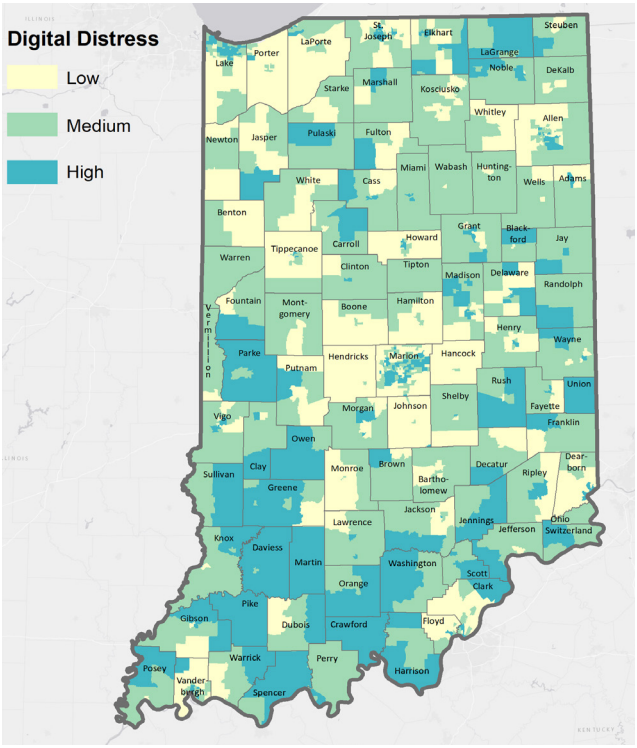
About 15% of the population living in high digital divide index score areas are children.

The final metric analyzed is the digital divide index or DDI. The DDI compiles a mix of variables that measure availability, adoption, and equity, as well as key socioeconomic characteristics that are known to affect technology adoption, into a score ranging from 0 to 100, where a higher number denotes a higher divide. **Figure 15** illustrates Census tracts in the state based on their low, medium, or high digital divide index. About 15% of the population living in high digital divide index score areas are children.

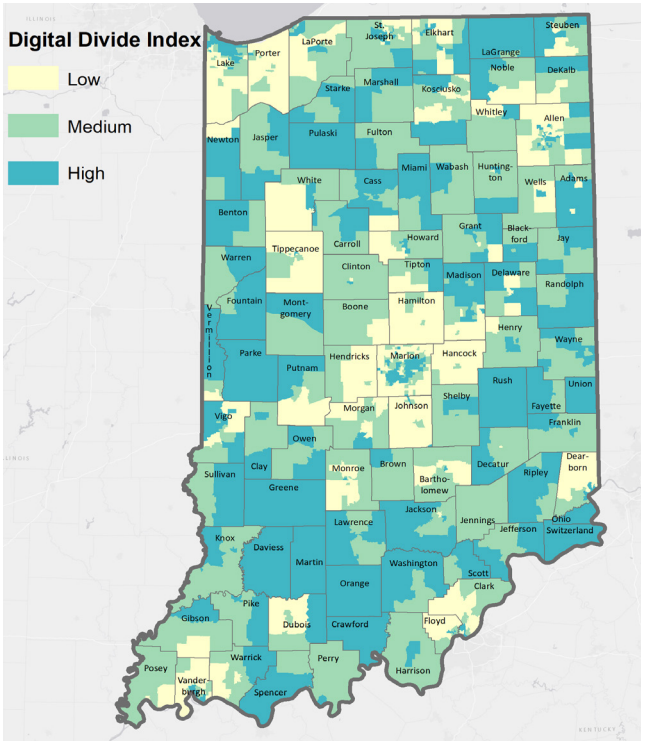


▲ Figure 13

9. Purdue Center for Regional Development (link)



▲ Figure 14



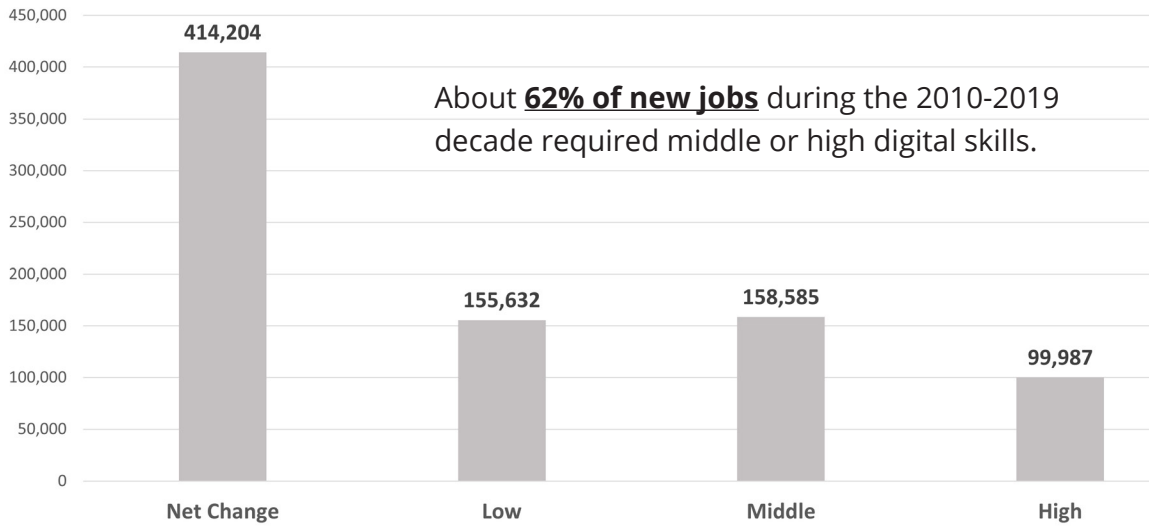
▲ Figure 15

As discussed previously, digital exclusion varies depending on the metric utilized. However, the analysis undertaken in this report highlights digital inequities and exclusion in various areas of the state. The matter of digital inclusion is an important issue to address given the increasingly rapid pace at which the society and economy are digitizing. For example, **Figure 16** depicts that the state of Indiana had a net gain of jobs of 414,204 between 2010-2019—based on occupations whose digital skill levels were identified. These constituted about 85% of all jobs.[10] Jobs requiring low digital skills increased by 155,000 while those needing middle or high digital skills also increased by 158,000 and almost 100,000, respectively. In the end, about 62% of new jobs in the state—whose digital skills level were identified—during the 2010-2019 decade required middle or high digital skills.

Figure 16 ▶

Share of Jobs by Digital Skills Level. (2010-2019)

Updated 8/16/21
Previous figure was incorrect.



10. Digitalization and the American workforce (brookings.edu) (link)

CONCLUSIONS

Although assets have been put in place and investments are being made regarding broadband in the state of Indiana, much work remains to be done to ensure Indiana is a digitally inclusive state. Below are a series of conclusions and/or recommendations moving forward that can help the state achieve this overarching goal:

1. Gather more accurate data on broadband availability.

As discussed in Section I of this report, broadband availability results vary significantly depending on the source being used. While existing federal data tend to overestimate availability, conducting speed tests alone are not the principal solution. A systematic effort must be undertaken to gather and track more accurate broadband data throughout the state, combining secondary as well as primary data sources (e.g., household surveys).

2. Revise funding eligibility criteria.

Communities securing federal broadband dollars are excluded from receiving state broadband dollars under the current law. While the intent is to avoid "overbuilding", the reality is that these networks are expensive and require multiple funding sources. If recommendation number one is in place, then unserved and underserved areas will be easier to identify. If possible, increase the minimum speed threshold to ensure networks are adequate for future—not current—digital applications. Household surveys indicate quality (including speed and cost) and not availability is more of an issue. Likewise, establish a process where communities have a say in the selection and the planning process. This will empower communities to put some skin into the game and not rely entirely on data or timing defined by the providers.

3. Continue supporting devices and connectivity for students.

The homework gap is one facet of digital exclusion. However, the state has taken steps to address this with programs such as the Governor's Emergency Education Relief (GEER). Efforts like these should continue and be flexible enough to address issues as the technology and applications evolve.

4. Increase awareness of digital exclusion and its implications.

COVID-19 has shed a bright light on the digital divide issue. While this is helpful, informing and educating community leaders and residents about this issue and potential solutions, is of paramount importance. Moreover, embedding digital inclusion into larger community and economic development planning is essential.

5. Incentivize communities and regions to engage in digital inclusion planning.

Parallel to the awareness effort (see number 3), communities and regions, especially in rural areas, need to be offered incentives to draft comprehensive digital inclusion plans and help jumpstart taskforces and coalitions to address the issue. While digital inclusion is a social justice issue, it is a vital community and economic development issue as well. Thus, digital inclusion plans should be an important component of any comprehensive community and/or economic development plan.