

Gauging Household Digital Readiness



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Roberto Gallardo, Ph.D.

Assistant Director | Purdue Center for Regional Development
Community & Regional Development Specialist | Purdue Extension

Maria Wiltse

Program Coordinator | Purdue Center for Regional Development



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Executive Summary

As the socioeconomic landscape continues to change, households seeking to adapt and prosper in this digital age need to be digital ready. While research on the impact of broadband continues to increase, a broad understanding of what being digital ready entails is missing.

This study—based on a 1,214 nonrepresentative household survey weighted by income, age, and educational attainment—developed a digital readiness index (DRI) score based on three related but distinct dimensions: device & internet access (DIA), digital resourcefulness and utilization (DRU), and internet benefits and impact (IBI). In addition, specific socioeconomic characteristics were analyzed to further understand how they impact these dimensions. All scores calculated (refer to Appendix A for more information) were normalized to a range from 0 to 10 for easier comprehension and comparison, where a higher score indicates a higher level for that particular digital readiness dimension.



Below are some of the key findings:

- Regarding device & internet access, nonmetro respondents relied more on their smartphones and mobile data to connect to the internet compared to their metro counterparts. They also had slightly higher device performance issues as well as more extended downtime periods with their internet access. Despite these disadvantages however, they connected to the internet as frequently and with diverse devices as their metro counterparts. In the end, nonmetro did have a lower DIA score compared to metropolitan respondents.
- Regarding digital resourcefulness and utilization, metro respondents had a slightly higher and statistically significant score but overall had similar digital resourcefulness levels as well as number and frequency of internet uses as nonmetro. On digital resourcefulness, while both metro and nonmetro respondents felt electronic devices made them more productive, a higher share of nonmetro respondents needed help setting up new electronic devices as well as finding it difficult to discern online information as trustworthy. Likewise, the share of nonmetro responses was higher compared to metro in all three statements regarding online echo chambers. On internet utilization, both metro and nonmetro households used the internet on average 11 different ways (out of 25 listed) at least once monthly. As expected, households relying more on mobile data (50 percent or more of the time over the past year) had a lower internet utilization.

- Regarding internet benefits and impact, there is ample room for growth. A higher share of respondents saved money online compared to earning money regardless of metro status. More than four-fifths of respondents did not make money online gauged by selling, freelancing or renting. In addition, about twelve percent of respondents, regardless of metro status, saved money online regarding healthcare. Less than ten percent of respondents obtained a promotion due to online educational credentials, but nonmetro households had a higher share compared to metro. Lastly, a little more than one-fifth of respondents (metro) secured a job due to the internet over the past year, while less than fifteen percent of nonmetro did.
- Regarding the digital readiness index score, metro households had a higher score (5.2) compared to nonmetro (4.5), leaving ample room for improvement given 10 is the highest score. More interestingly, when it comes to digital readiness a metro-nonmetro divide was not as large and surpassed by income and occupation differences.
- Lastly, the dimension that yields more bang for the buck regarding improving digital readiness is digital resourcefulness and utilization after controlling for specific socioeconomic characteristics. On the other hand, of the three dimensions analyzed, internet benefits and impact had the lowest score. In other words, the impact of the internet on households—as measured by this study—is lagging. This implies that focusing on improving digital literacy and skills is critical to ensure the benefits of internet continue to accrue to households.

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Introduction

As the socioeconomic landscape changes, households seeking to adapt and prosper in this digital age need to be digital ready. Research on the impact of broadband in multiple areas continues to increase (Gallardo, Whitacre, & Grant, 2018). However, even though the internet urban/rural availability gap is well documented (Federal Communications Commission, 2018) and that recent estimates peg the percent of Americans using the internet below broadband speeds as high as 49 percent (Microsoft, 2018), there is limited information on how the internet is actually used beyond national studies¹.

This lack of more detailed data on internet adoption and use, necessary to truly leverage the technology's potential has huge implications, especially for workforce development. An analysis done by the Brookings Institution found that two-thirds of new jobs generated between 2010 and 2016 required medium to high digital skills (Muro, Liu, Whiton, & Kulkarni, 2017) and another report from Burning Glass Technologies found that 46 percent of labor demand is for middle-skill jobs² and that 82 percent of these jobs require digital skills (Burning Glass Technologies, 2017).

Therefore, digital readiness is affected not only by access to and being able to afford digital infrastructure (internet & devices) but also by digital skills and use. Research has found that a little more than 50 percent of U.S. adults felt unprepared, traditional learners or reluctant when it came to digital readiness³ (Horriggan, 2016) and more importantly, internet utilization and know-how is not randomly distributed among the population. A study among young (college-age) internet users found that parental education, gender, and race/ethnicity impacted the level of web-use skills (Hargittai, 2010).

In addition, college students without reliable devices have lower grades and higher stress (Gonzales, Calarco, & Lynch, 2018) and in general access to healthcare and employment resources are disrupted when cellphones and internet services breakdown (Gonzales, Ems, & Suri, 2016). In fact, no internet access was a strong predictor among low income households of not having a checking or savings account or being unbanked (Hayashi & Minhas, 2018). Not surprisingly, a study found a link between broadband and human development across U.S. counties (Devaraj, Sharma, Wornell, & Hicks, 2017).

For these reasons, this study proposes a household-level digital readiness index score made up of three distinct but related dimensions placing an emphasis on metro-nonmetro differences: device & internet access; digital resourcefulness and utilization, and internet benefits and impacts. The next sections describe these dimensions in detail as well as relationships between them.

¹ Two Pew Research studies have dealt into this topic at the national level. One was completed in 2011 (<http://www.pewinternet.org/2011/08/09/search-and-email-still-top-the-list-of-most-popular-online-activities/>) and the other in 2016 (<http://www.pewinternet.org/2016/09/20/digital-readiness-gaps/>).

² These are occupations that typically don't require a bachelor's degree and pay above the national living wage.

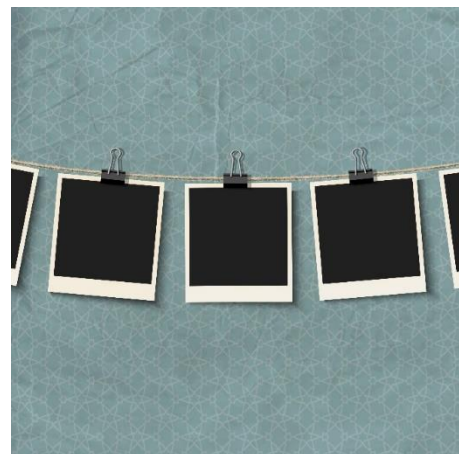
³ The term digital readiness used in this study is different from Horriggan's digital readiness concept

Methodology

In an attempt to broaden the knowledge of this topic, a 20-question survey instrument⁴ was designed to capture five different dimensions known to affect digital readiness and thus provide a more robust understanding. The first dimension measured socioeconomic characteristics known to affect technology adoption and use such as age, income, and education attainment (Anderson, Perrin, & Jiang, 2018) as well as county type (metro versus nonmetro), households with children and whether households were located inside or outside city limits. City limits location indirectly gauges broadband availability since connectivity outside tends to be less accessible than connectivity within city limits (Gallardo, 2015; Rinehart, 2018).

The second dimension looked at device ownership and performance (desktop, laptop, tablets, and smartphones). Also included was device & internet access, duration of issues due to unpaid bills, broken devices, running out of minutes/data, etc. and locations used to connect to the internet (including mobile data). Location of connections is important since relying solely on mobile data may undermine the potential benefits of internet applications. Finally, diversity and frequency of devices used to connect to the internet (at least once daily, at least once weekly and at least once monthly) was an element of this dimension as well.

The third dimension delved into digital resourcefulness & utilization. Digital resourcefulness looked at requiring help with new electronic devices, perceived increased productivity, and finding it difficult to know whether the information found online was trustworthy (Horrigan, 2016) as well as the ability to minimize or avoid what is known as online echo chambers. An online echo chamber, specifically a political one, is understood as a situation where only certain ideas, information, and beliefs are shared (Dubois & Blank, 2018). A way to minimize or escape these online echo chambers is to consume diverse political content, which in turn requires a higher interest in politics as well as the ability to successfully search, find, trust, compare, and consume different political online content.



Regarding utilization, the frequency and diversity of the respondents' online interaction with multiple community organizations were included. Also, a list of twenty-five internet uses was listed including the frequency of their application (at least once daily/weekly/monthly or one or several times annually). Some of these internet uses aligned with those used in previous instruments (Hargittai & Hsieh, 2012).

⁴ I would like to thank my colleagues Dr. Gonzales from University of California-Santa Barbara as well as Dr. Wornell and Dr. Devaraj from Ball State University for their valuable input designing the survey instrument.

The fourth dimension gauged benefits and impact of internet use, including dollar amounts saved or earned through online applications such as bargains & coupons, price matching, driving less, selling, freelancing, and/or renting as well as obtaining promotions or securing jobs due to online educational resources, including dollar amounts associated with these.

A fifth, digital readiness dimension was compiled from the following three dimensions—device & internet access, digital resourcefulness & utilization, and internet benefits and impact—and analyzed using the first dimension or multiple socioeconomic indicators, including metro-nonmetro categories. This new and improved digital readiness index score is the key contribution of this study. Refer to Appendix A for more information on how each of these dimensions were operationalized.

The survey was approved by the Purdue University Institutional Review Board (IRB) in the spring of 2018 (IRB Protocol #1802020313). The research design purposefully focused only on online delivery—no paper surveys—since the intention was to gauge the level of digital readiness⁵. The survey was sent to households through multiple email listservs and social media accounts during April and May 2018. The three locations involved in the study were selected primarily due to the working relationships with the lead researcher and included the states of Minnesota and Nebraska as well as the City of Dublin in Ohio.

Key partners in the survey distribution among others included the Blandin Foundation and Growth & Justice Foundations in Minnesota; the Nebraska Information Technology Commission and the University of Nebraska Extension; and the City of Dublin Ohio. These partners, in turn, distributed the online survey to multiple stakeholders in their locations such as but not limited to online neighborhood groups, educators, librarians, economic developers, local extension stakeholders, and others.

The number of valid responses was 1,214 (increased slightly to 1,224 after weighting the sample). The response rate could not be calculated since the actual number of households reached was unknown. Efforts to remove duplicate answers were limited due to the fact of not being able to pinpoint specific IP addresses to a single home. However, three responses were removed from the Nebraska dataset due to the responses coming from outside the state.

Table 1 shows the population distribution for the aggregate of the three locations using the 2012-2016 ACS dataset (column titled population) as well as the survey distribution (column titled survey). Those with high school or less, lower incomes, and younger age groups were underrepresented in the sample (notice column titled weight). Therefore, the sample was weighted using weight coefficients by educational attainment, household income, and age groups. The overall n size is slightly higher due to the weights applied and was not adjusted to its original size since the discrepancy was not significant.

⁵ An argument could be made that households that are not active online and whose digital readiness level is clearly lower were overlooked. Future research should gauge the level of digital readiness using offline methods. However, survey was sent via email and posted on social media sites allowing those without a home broadband connection to respond via their smartphones and/or through non-home connections such as libraries and schools.

Table 1. Population & Survey Distributions by Location

	Population	Survey	Weight	Survey Weighted
High school or less	0.343	0.029	11.841	0.287
Some college*	0.349	0.175	1.995	0.325
Bachelor's or more	0.308	0.796	0.386	0.388
n		1,208		1,218
Less than \$35,000	0.278	0.067	4.148	0.249
\$35,000-\$74,999	0.321	0.290	2.531	0.290
\$75,000 or more	0.401	0.643	1.352	0.461
n		1,154		1,125
Less than 35	0.303	0.125	10.506	0.285
35-64	0.509	0.665	1.566	0.540
65 or older	0.188	0.209	0.899	0.175
n		1,201		1,207

Source: 2018 PCRD Household Internet Utilization Survey; * includes associate's degree

An equal number of responses among locations was not achieved. However, this was not a concern since one of the objectives was to identify urban-rural differences, not differences between places. Respondents listed their county of residence⁶, which was then grouped using the USDA ERS 2013 Urban Influence typology into metropolitan, small city (micropolitan), and rural (noncore)⁷. Small city and rural were then grouped into a “nonmetro” category. Table 2 shows the survey's responses by county type.

Table 2. Survey County Type Distribution

	Number	Percent
Metro	538	43.9
Nonmetro	686	56.1
Small City	233	19.0
Rural	453	37.0
Total ⁸	1,224	100.0

Source: 2018 PCRD Household Internet Utilization Survey

Regarding the distribution of the weighted survey, Table 3 shows a more detailed breakdown. As expected, metro respondents were wealthier and more educated⁹ while nonmetro had a higher share of those ages 65 and over. Note that although the share of those working in management, professional or education occupations barely exceeded 50 percent, according to the 2012-2016 ACS almost 40 percent worked in these occupations. White respondents were also slightly overrepresented although a higher share of minorities responded in metro counties, as expected. Weight adjustments for both occupations and race/ethnicity were not possible since survey questions did not precisely match census categories. The ACS 2012-2016 column shows the population distribution with comparable variables.

⁶ All responses from the City of Dublin in Ohio were coded as metropolitan and inside city limits.

⁷ For more information, please visit <https://www.ers.usda.gov/topics/rural-economy-population/rural-classifications/what-is-rural.aspx> or <https://www.ers.usda.gov/data-products/urban-influence-codes/>

⁸ Number is slightly higher than 1,214 due to weighting of the survey

⁹ While the metro share of those with a bachelor's degree or higher seems high, keep in mind that one of the locations surveyed had a bachelor's degree or higher share of more than 70 percent. This number was adjusted down after the overall sample was weighted.

Table 3. Socioeconomic Characteristics by County Type, Percentages

	Metro	Nonmetro	Overall	ACS 2012-2016
Less than \$35,000	14.4	33.5	24.9	27.8
\$35,000-\$74,999	20.9	35.7	29.2	32.1
\$75,000 or more	64.7	30.8	46.0	40.1
n	507	618	1,125	-----
Less than 35	28.5	28.6	28.6	30.3
35-64	58.0	50.7	53.9	50.9
65 or older	13.4	20.6	17.5	18.8
n	530	678	1,207	-----
High school or less	15.7	38.8	28.7	34.3
Some college*	23.4	39.7	32.5	34.9
Bachelor's or more	60.9	21.5	38.8	30.8
n	534	683	1,217	-----
Households without children	56.4	65.5	61.5	68.8
Households with children	43.6	34.5	38.5	31.2
n	537	684	1,221	-----
Households inside city limits	86.6	71.4	78.1	N.A.
Households outside city limits	13.4	28.6	21.9	N.A.
n	538	685	1,223	-----
Management, Prof., Education	56.3	45.4	50.1	N.A.
Sales or office support	12.6	14.2	13.5	N.A.
Other**	31.1	40.4	36.4	N.A.
n	533	685	1,218	-----
White	83.2	93.0	88.8	N.A.
Minorities***	16.8	7.0	11.2	N.A.
n	519	675	1,194	-----

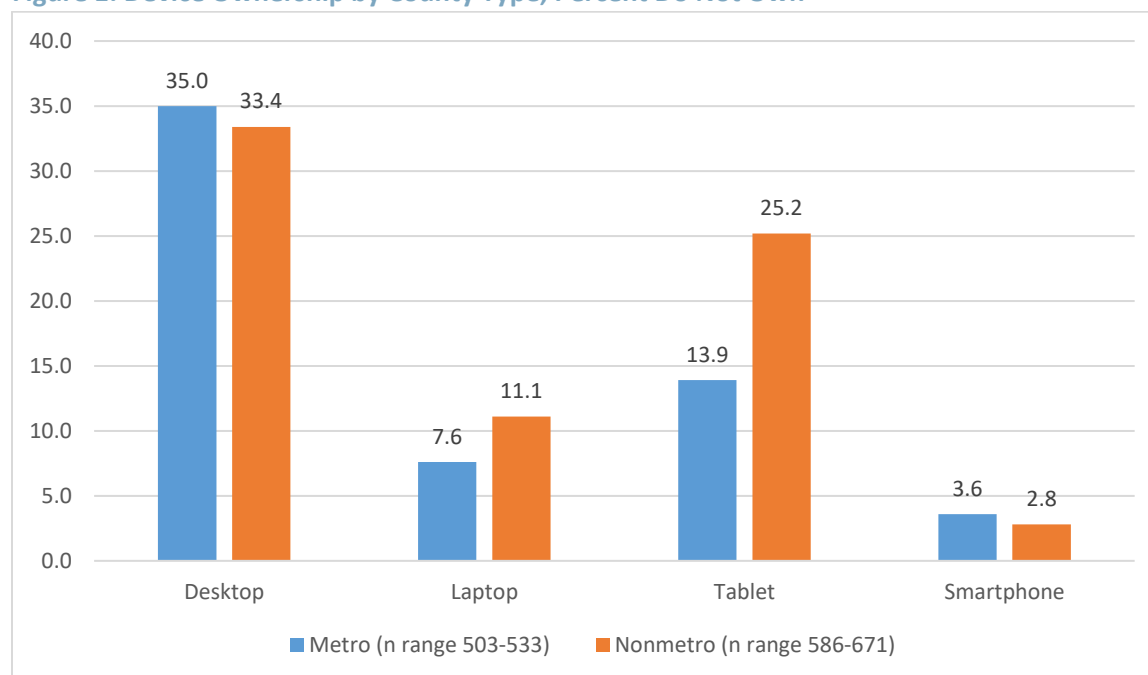
Source: 2018 PCRD Household Internet Utilization Survey; Note: * includes associate's degree; ** includes construction, installation or maintenance, agriculture, production, transportation, or warehousing, food service or personal care, healthcare support or public safety, government, retired and other; *** includes Black, Asian, Hispanic, Native American, and other.

The total number of households according to the 2012-2016 ACS data across all three locations was 2.8 million. Valid responses totaled 1,214 resulting in a 2.8-point margin of error with a 95 percent confidence interval. While this is a nonrepresentative sample, the weighting aligned the sample as much as possible to the aggregate population distribution.

Device & Internet Access

In this digital age, access to reliable and affordable digital devices and internet connectivity is critical. Identifying any disparities among these elements is the first step toward gauging digital readiness. Figure 1 shows that more than one-third of both metro and nonmetro respondents did not own a desktop. Regarding tablets, however, a little more than 86 percent of metro respondents owned one compared to 75 percent of nonmetro respondents. In contrast, close to 90 percent or higher of both metro and nonmetro respondents owned a laptop or smartphone. In other words, nonmetro and metro respondents had similar device ownership rates except for tablets and to a lesser degree, laptops.

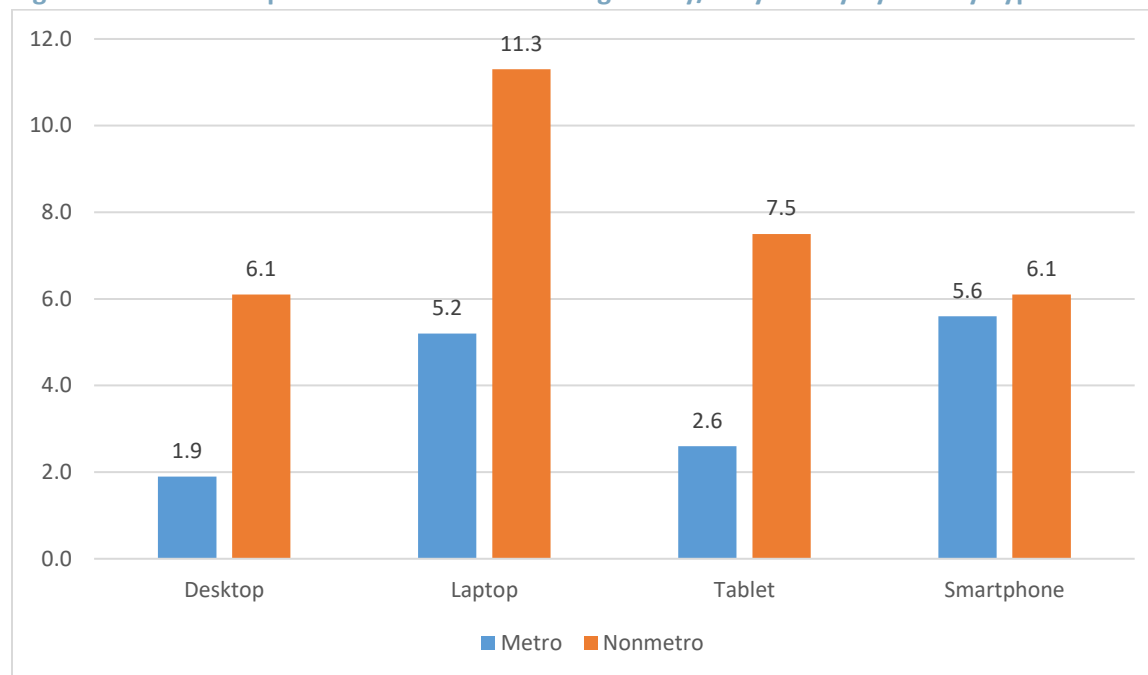
Figure 1. Device Ownership by County Type, Percent Do Not Own



Source: 2018 PCRD Household Internet Utilization Survey

Beyond ownership, reliability is also important when trying to understand digital readiness. Figure 2 highlights the percent of "poorly/very poorly" responses among metro and nonmetro respondents and device type. While desktop non-ownership was similar, nonmetro respondents were more likely to have had desktops work poorly or very poorly over the past year (1.9 percent metro versus 6.1 percent nonmetro). The most significant difference, however, is regarding laptops. A little more than eleven percent of nonmetro respondents said it worked poorly or very poorly compared to only five percent of metro respondents. Overall, nonmetro respondents had a higher share of devices working poorly or very poorly compared to metro respondents. In other words, not only were nonmetro respondents more likely to be mobile dependent but also rely on devices performing poorly or very poorly.

Figure 2. Percent Responses - Devices Performing Poorly/Very Poorly by County Type



Source: 2018 PCRD Household Internet Utilization Survey

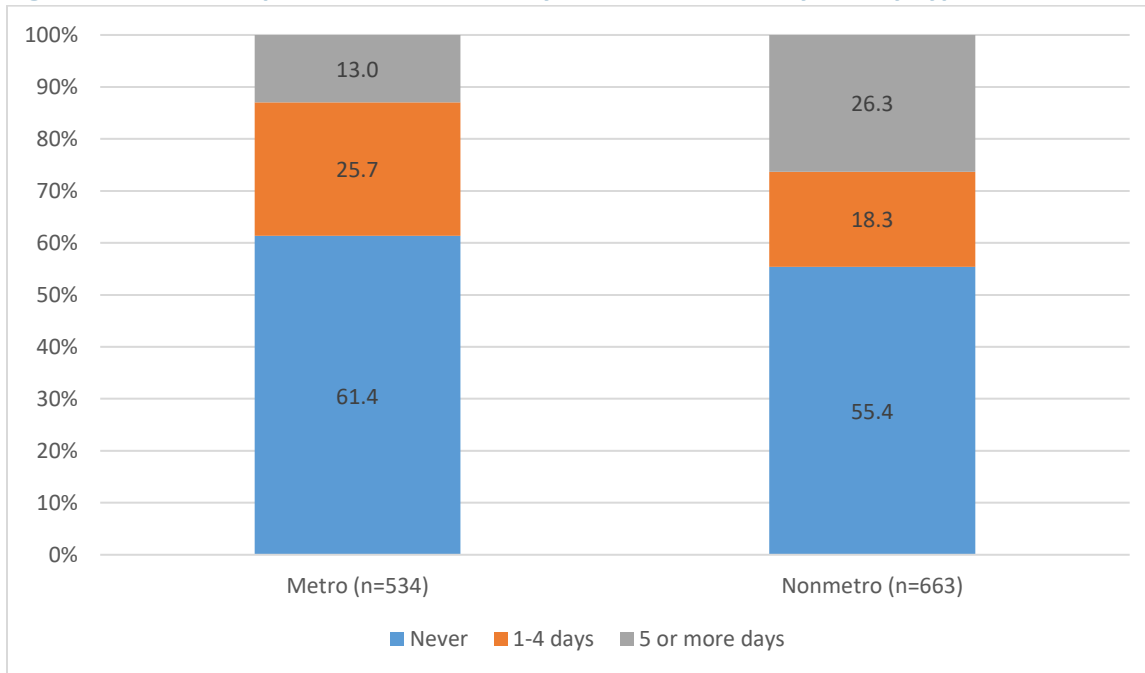
Aside from ownership and device performance, amount of downtime is vital to gauge since it can affect the level of digital readiness as well. Respondents were asked to report the amount of time without a device or internet due to unpaid bills, broken devices, running out of minutes/data, or other problems over the past year. Figures 3 through 5 highlight the responses regarding the internet, laptops, and smartphones. Laptop and smartphone responses are shown since they have the highest ownership levels among respondents in this survey.

Differences between metro and nonmetro responses are visible in Figure 3. The share of nonmetro respondents without internet for five or more days over the past year was double the share of metro responses (26.3 percent versus 13 percent). One-quarter of metro respondents reported being without internet for 1 to 4 days over the past year compared to 18 percent of nonmetro respondents. Overall, more than half of respondents never had internet issues over the past year.

Close to three-quarters of respondents, regardless of metro status, said they never had laptop issues over the past year, as shown in Figure 4. Almost one-fifth of nonmetro respondents said they had laptop issues for 1 to 4 days while less than ten percent of both metro and nonmetro had laptop issues for 5 or more days. Regarding smartphones, however, slightly more than ten percent of nonmetro respondents had issues for 5 or more days compared to less than seven percent of metro respondents as shown in Figure 5. Overall, the share of metro and nonmetro respondents not having smartphone issues over the past year were similar.

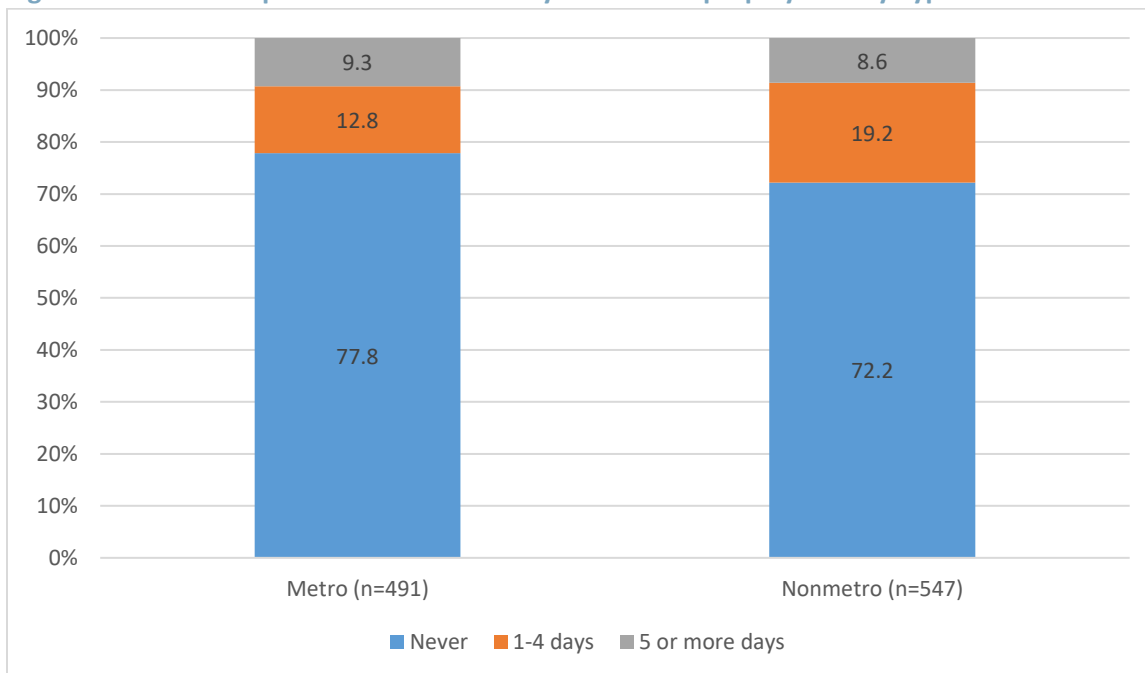
In summary, differences between metro and nonmetro respondents regarding laptop and smartphone downtimes were small. On the other hand, a gap existed regarding the length of time without internet, where nonmetro respondents had more extended downtimes compared to metro.

Figure 3. Percent Responses - Number of Days without Internet by County Type



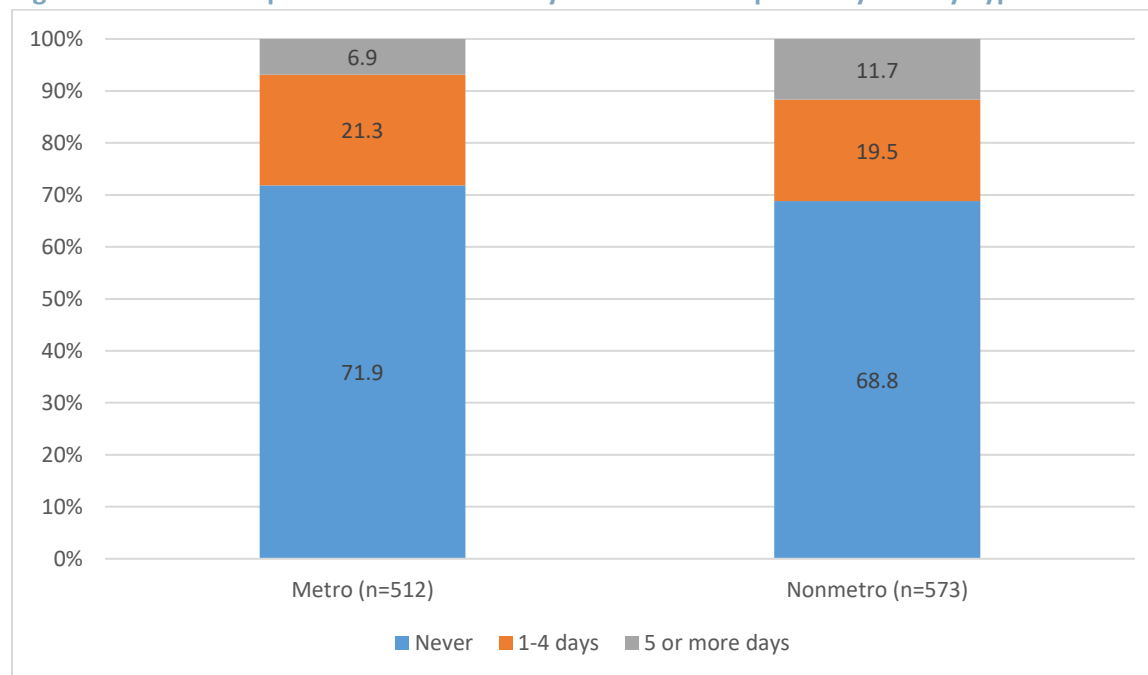
Source: 2018 PCRD Household Internet Utilization Survey

Figure 4. Percent Responses - Number of Days without Laptop by County Type



Source: 2018 PCRD Household Internet Utilization Survey

Figure 5. Percent Responses - Number of Days without Smartphone by County Type

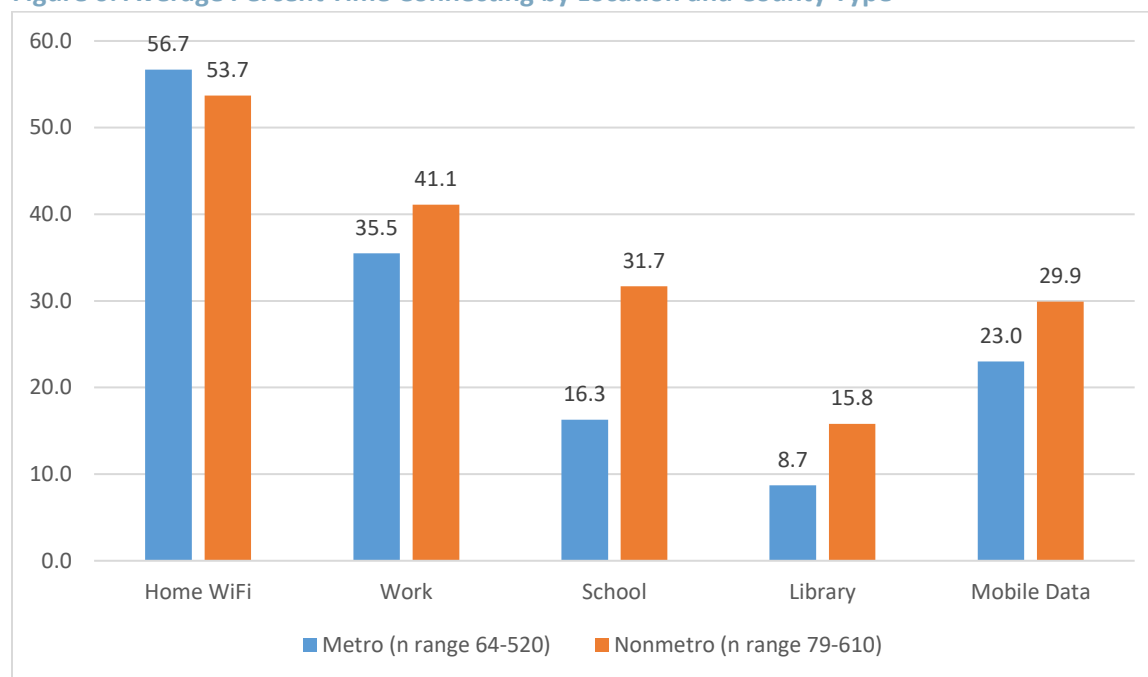


Source: 2018 PCRD Household Internet Utilization Survey

Dovetailing the internet downtime discussion, Figure 6 shows the average percent of time from where respondents accessed the internet. Both metro and nonmetro respondents spent more than half the time connecting to the internet from home. Note however that the average percent of time for metro respondents was only higher at home compared to nonmetro. Nonmetro respondents spent on average more time accessing the internet from work, school, library, and using mobile data.

Note that the average percent of time connecting to the internet from school is almost twice as the average reported by metro respondents (16.3 percent versus 31.7 percent). Same pattern connecting from the library: nonmetro responses averaged nearly 16 percent versus almost 9 percent from metro respondents. Finally and regarding connecting using mobile data, roughly one-third or 29.9 percent average time from nonmetro respondents versus 23 percent from metro respondents.

Figure 6. Average Percent Time Connecting by Location and County Type

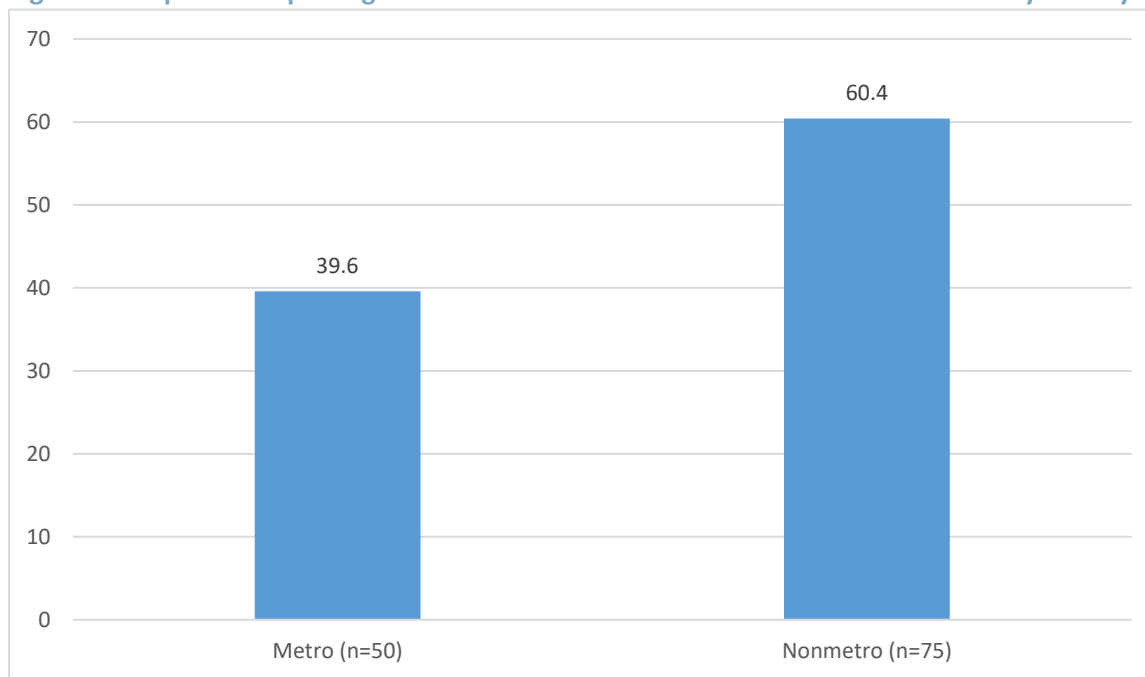


Source: 2018 PCRD Household Internet Utilization Survey

Figure 7 shows that among those respondents using mobile data to connect to the internet 50 percent or more of the time over the past year, sixty percent were in nonmetro counties versus almost 40 percent in metro counties. This supports the well-documented gap between metro-nonmetro internet availability at home resulting in nonmetro users relying on additional locations, including mobile data or smartphones only, for access¹⁰.

¹⁰ http://www.pewinternet.org/pi/factsheetredesign_smartphonedependentchart/

Figure 7. Responses Reporting 50% or More of Mobile Data to Access the Internet by County Type

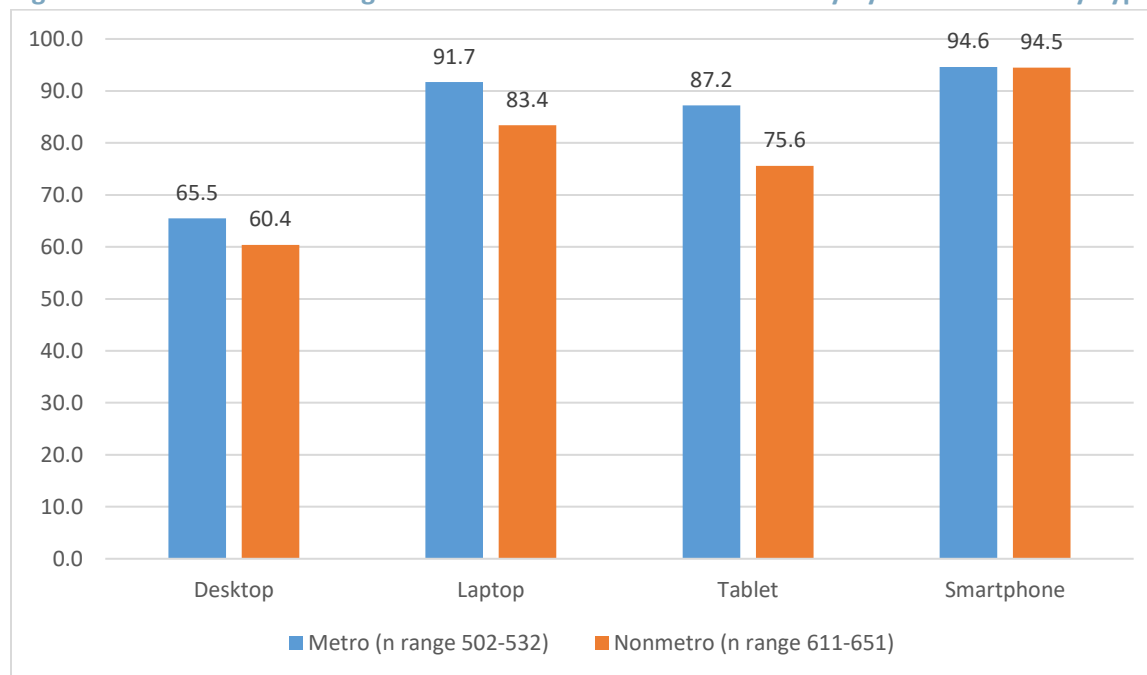


Source: 2018 PCRD Household Internet Utilization Survey; n = 125

While nonmetro respondents relied more on mobile devices, had longer internet and device downtime, and connected at a higher percentage of time from locations outside the home compared to metro respondents, Figure 8 shows that nonetheless, they accessed the internet as frequently as their metro counterparts from multiple devices.

Note how the difference in frequency is higher—exceeding the margin of error of 2.8 points—among metro respondents in all devices except, you guessed it, smartphones. Upward of 90 percent of both metro and nonmetro respondents accessed the internet from their smartphones at least once monthly over the past year.

Figure 8. Percent - Connecting to the Internet at Least Once Monthly by Device & County Type



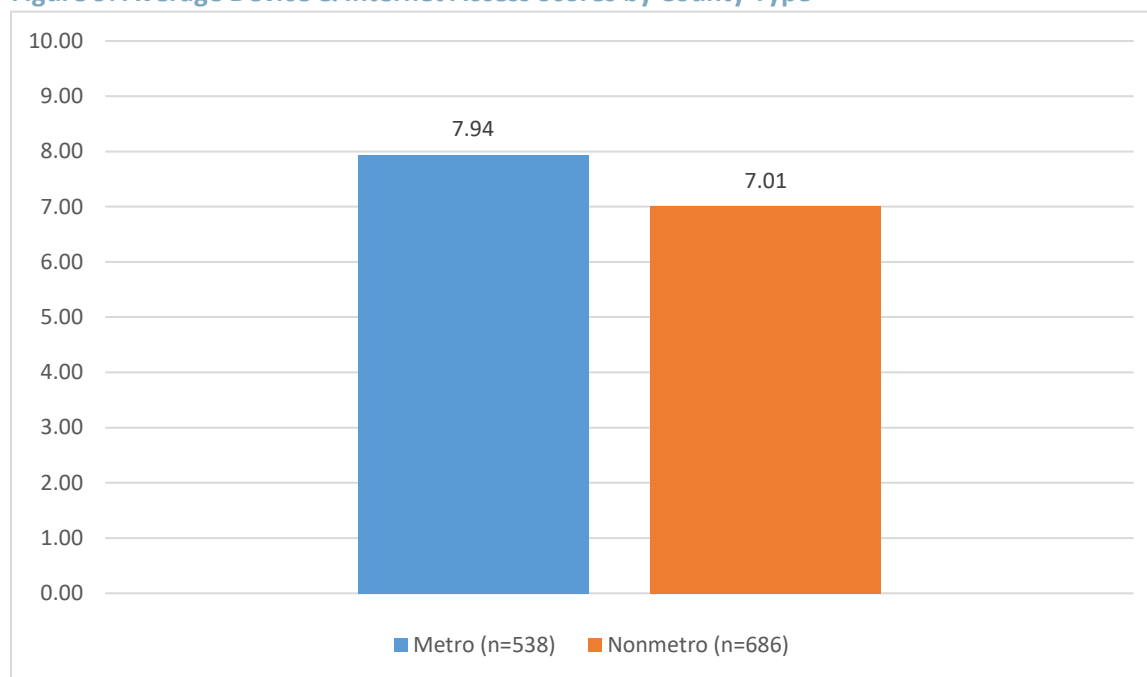
Source: 2018 PCRD Household Internet Utilization Survey

Up to this point, the following has been uncovered: nonmetro respondents relied more on their smartphones and mobile data to connect to the internet compared to their metro counterparts. They also had slightly higher device performance issues as well as more extended downtime periods with their devices and internet access. Despite these disadvantages however, they connected to the internet as frequently as their metro counterparts did.

To wrap up this discussion, we look at the device & internet access (DIA) score. This score takes into consideration all factors analyzed: device ownership & performance, duration of device & internet downtime, connecting more from home than other locations (including using mobile data), and variety of devices and frequency when connecting to the internet. The score was normalized to a range from 0 to 10. A higher score denotes a more diverse and frequency device use, more time connecting from home, less device performance issues, and shorter periods without access to devices or internet. In other words, a higher DIA score indicates a higher level of digital readiness.

Figure 9 shows the DIA score for metro and nonmetro respondents. While the difference is less than one point on our digital readiness scale, it is a ten percent difference. This difference was statistically significant at the 0.01 level, and it means that nonmetro had a lower digital readiness level compared to metro regarding device & internet access.

Figure 9. Average Device & Internet Access Scores by County Type



Source: 2018 PCRD Household Internet Utilization Survey

Note: Metro-nonmetro difference is statistically significant at the 0.01 level (ANOVA)

The fact that nonmetro had a lower device & internet access digital readiness score has several implications. First, although the internet is accessed as frequently through smartphones as metro respondents, this places nonmetro at a disadvantage. Limited data plans and smaller screens make it difficult to maximize specific internet applications. For example, writing a term paper or filling out a form on your smartphone. Furthermore, missing educational courses or business bids because you reached your data limit or having your service suspended because the bill was too high affects negatively the digital readiness level.

Second, internet access in nonmetro community anchor institutions needs to be sustained and improved. As discussed, nonmetro respondents spent a higher percentage of their time connecting to the internet from these locations compared to metro respondents. If on top of limited data plans and home internet nonmetro internet users lack adequate options and connectivity from their community anchor institutions, their digital readiness is affected by putting them, again, at a disadvantage.

Third, efforts need to be made to ensure this score improves among nonmetro respondents. Based on this survey, a nonmetro household is running at 70 percent of their device & internet access potential. While it does exceed the median of 50 percent, increasing device ownership and quality, as well as internet connectivity not only at home but also at community anchor institutions, will level the playing field moving towards a digital parity. This digital parity will most certainly empower nonmetro communities allowing them to adapt and prosper in the digital age.



Digital Resourcefulness & Utilization

The previous section focused on device & internet access found that: nonmetro respondents relied more on their smartphones and mobile data to connect to the internet compared to their metro counterparts. They also had slightly higher device performance issues as well as more extended downtime periods with their devices and internet access. Despite these disadvantages however, they connected to the internet as frequently as their metro counterparts did. In the end, nonmetro did have lower DIA scores compared to metropolitan respondents.

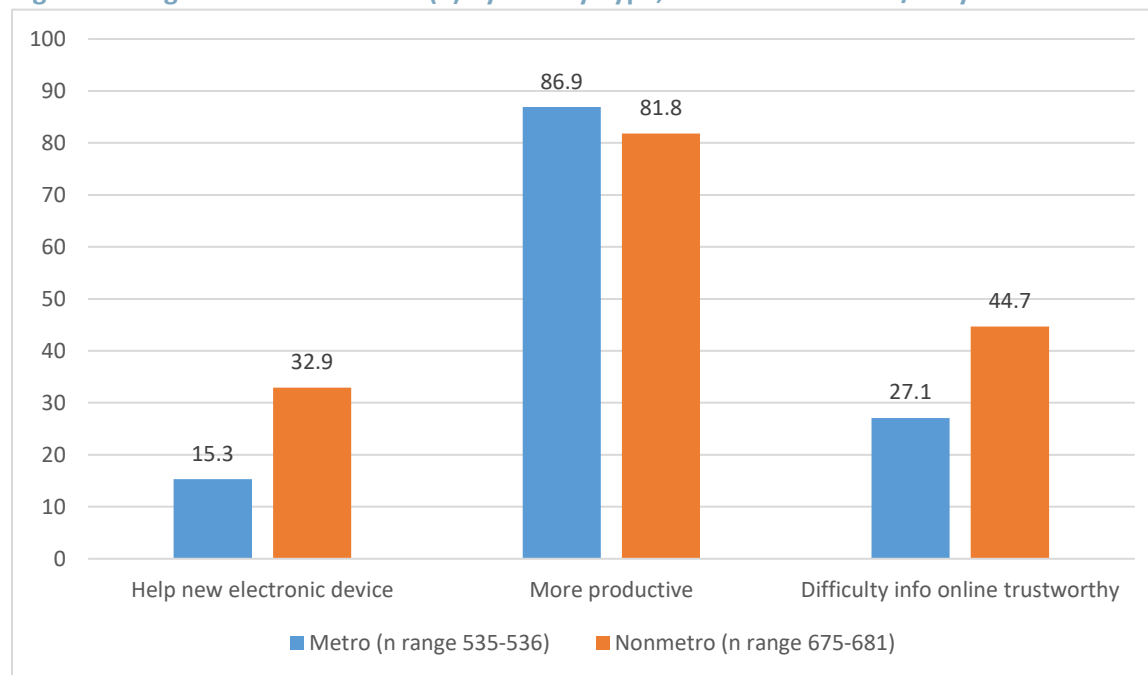
Digital resourcefulness was gauged by asking two questions, each with multiple options. The first asked about requiring help with new electronic devices, perceived increased productivity because of electronic information devices, and finding it difficult to know whether the information found online was trustworthy (Horrigan, 2016).

Figure 10 shows the percent of respondents by county type that felt these statements described them somewhat or very well. Metro respondents thought they were more productive due to electronic information devices compared to nonmetro respondents. However, the percent for both types of respondents surpassed 80 percent. In other words, both metro and nonmetro respondents felt their productivity increased due to digital devices.

On the other hand, almost one-third of nonmetro respondents reported needing help setting up new electronic devices. This amount was double that reported by metro respondents. Similarly, 44 percent of nonmetro respondents found it difficult to know whether online information was trustworthy, compared to 27 percent of metro respondents.

In other words, while both metro and nonmetro respondents felt electronic devices made them more productive, a higher share of nonmetro respondents needed help setting up new electronic devices as well as finding it difficult to discern online information as trustworthy.

Figure 10. Digital Resourcefulness (1) by County Type, Percent Somewhat/Very Well

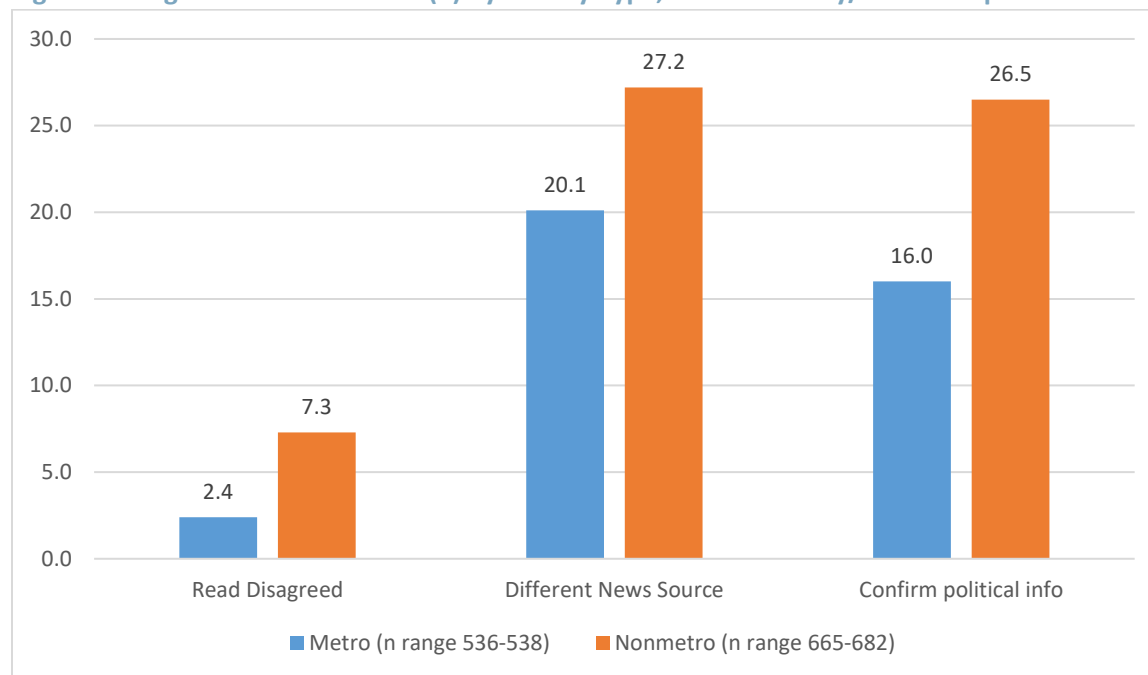


Source: 2018 PCRD Household Internet Utilization Survey

The second proxy regarding digital resourcefulness dealt with the ability to minimize or avoid what is known as online echo chambers. An online echo chamber, specifically a political one, is understood as a situation where only specific ideas, information, and beliefs are shared (Dubois & Blank, 2018). A way to minimize or escape these online echo chambers is to consume diverse political content. Higher interest in politics as well as the ability to successfully search, find, trust, compare, and consume various political content requires an above average level of digital resourcefulness.

As shown in Figure 11, the share of nonmetro responses was higher compared to the percentage of metro responses in all three statements regarding online echo chambers. Nonmetro respondents were twice as likely to rarely/never have read something they disagreed with over the past year (7 percent versus 2 percent), rarely/never checked a news source different from what they usually read (27 percent versus 20 percent) and rarely/never confirm political information by searching online for another source (26 percent versus 16 percent). On the other hand, a majority of households that participated in the survey did engage in online behavior that minimized their echo chambers, implying an above average digital readiness level.

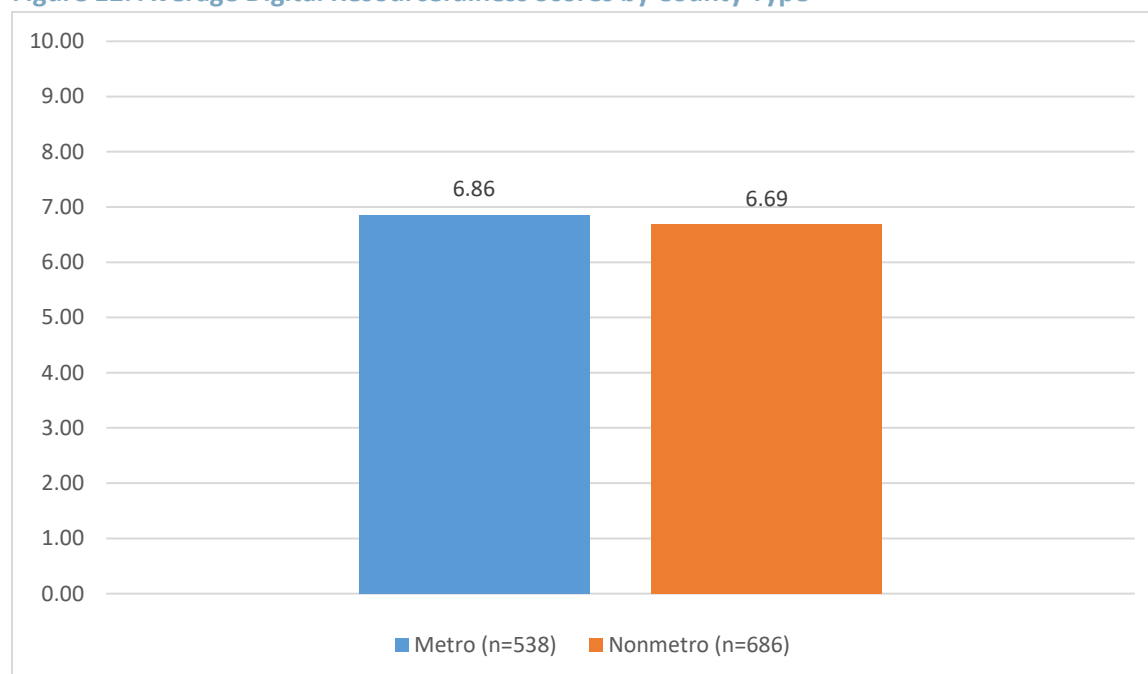
Figure 11. Digital Resourcefulness (2) by County Type, Percent Rarely/Never Responses



Source: 2018 PCRD Household Internet Utilization Survey

When considering both indicators, Figure 12 shows the difference between metro and nonmetro respondents was very low and not statistically significant. Both types of respondents were at about 67 percent of their digital resourcefulness potential as measured by this study. In other words, both metro and nonmetro respondents had similar levels of digital resourcefulness.

Figure 12. Average Digital Resourcefulness Scores by County Type

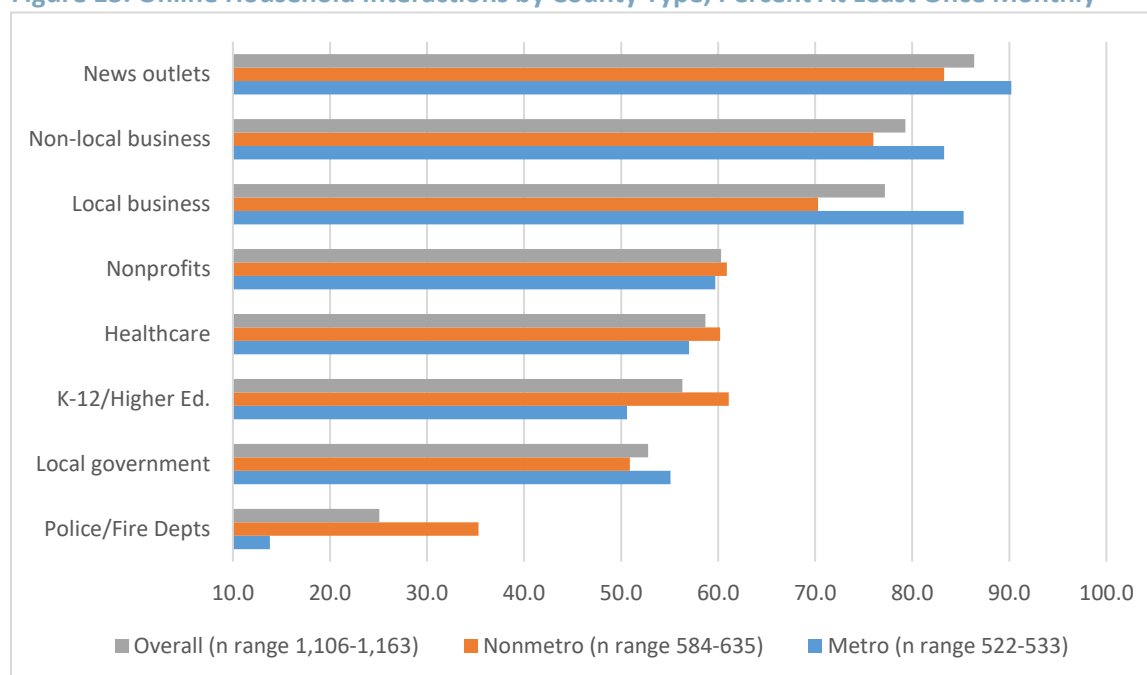


Source: 2018 PCRD Household Internet Utilization Survey

Note: Metro-nonmetro difference is NOT statistically significant at the 0.01 level (ANOVA)

Regarding online interactions, the survey asked participants with whom and how frequently they interacted digitally with specific community organizations. Figure 13 shows that overall news outlets were the most engaged with digitally followed by non-local businesses (more than 50 miles from the respondent). Metro respondents outpaced (the difference is higher than the survey's margin of error of 2.8 points) nonmetro respondents when interacting online with news outlets, non-local businesses, local businesses, and local government. Nonmetro respondents, on the other hand, outpaced metro when interacting online with healthcare, K-12/higher education, and police/fire departments.

Figure 13. Online Household Interactions by County Type, Percent At Least Once Monthly



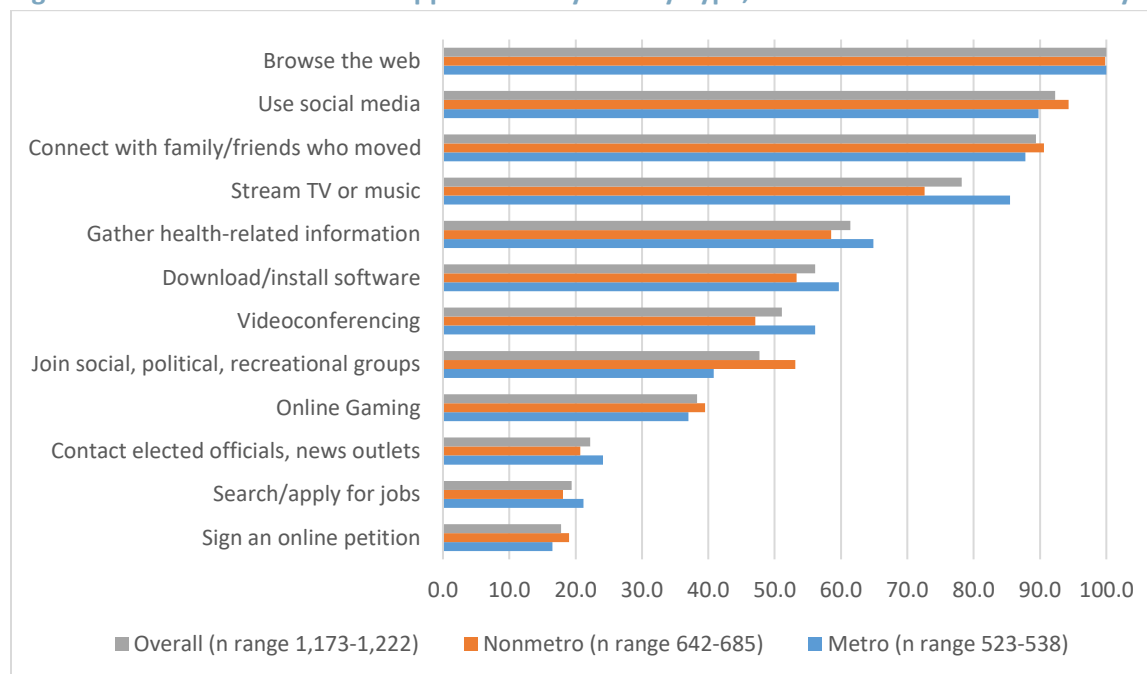
Source: 2018 PCRD Household Internet Utilization Survey

A couple of points for further discussion are warranted. The fact that slightly more than half of nonmetro respondents engaged digitally at least once monthly with the local government may imply that local governments may not have the online presence needed for this interaction to be higher. Likewise, and regarding local businesses, nonmetro respondents were less likely to interact with local businesses compared to metro respondents. The reason for this may be that specific products or services are not available locally, or it may imply local companies lack an online presence.

Participants were also asked about twenty-five internet uses and how frequently they were used to gauge internet utilization. Figure 14 shows the percent of responses for basic internet applications used at least once monthly over the past year. As expected, virtually all respondents browsed the web at least once monthly followed by about 90 percent of respondents using social media. The least utilized internet application had to do with signing online petitions followed by searching/applying for jobs. Overall, more than half of respondents—regardless of county type—utilized the internet at least once monthly to browse the web, use social media, connect with family/friends that moved, stream TV or music, gather health-related information and download/install software.

Metropolitan respondents outpaced nonmetro when it came to streaming TV or music, gather health-related information, download/install software and video conferencing. On the other hand, nonmetro respondents outpaced metro when it came to joining social, political or recreational groups.

Figure 14. Use of Basic Internet Applications by County Type, Percent at Least Once Monthly

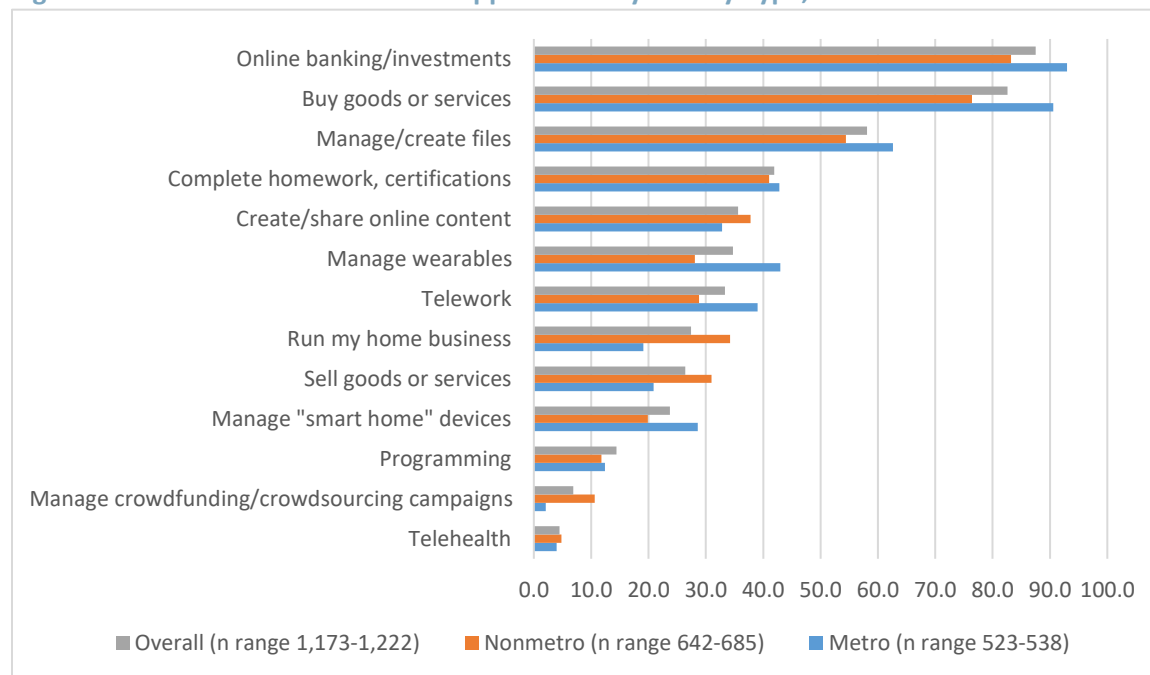


Source: 2018 PCRD Household Internet Utilization Survey

Figure 15 shows the next thirteen internet uses listed that could be considered more "advanced." For these, more than 50 percent of respondents—regardless of county type—used the internet at least once monthly for online banking/investments, buy goods or services and manage/create files. Metropolitan respondents outpaced nonmetro when it came to online banking/investments, buy goods or services, manage/create files, manage wearables, telework and control smart home devices. On the other hand, nonmetro respondents outpace metro when it came to create/share online content, run home businesses, sell goods or services and manage crowdfunding/sourcing campaigns.

Important to note that one-third of nonmetro respondents used the internet to run their home business at least once monthly compared to almost one-fifth of metro respondents. Likewise, a significantly higher share of nonmetro respondents compared to metro used the internet to sell goods or services at least once monthly (31 percent versus 21 percent).

Figure 15. Use of Advanced Internet Applications by County Type, Percent at Least Once Monthly

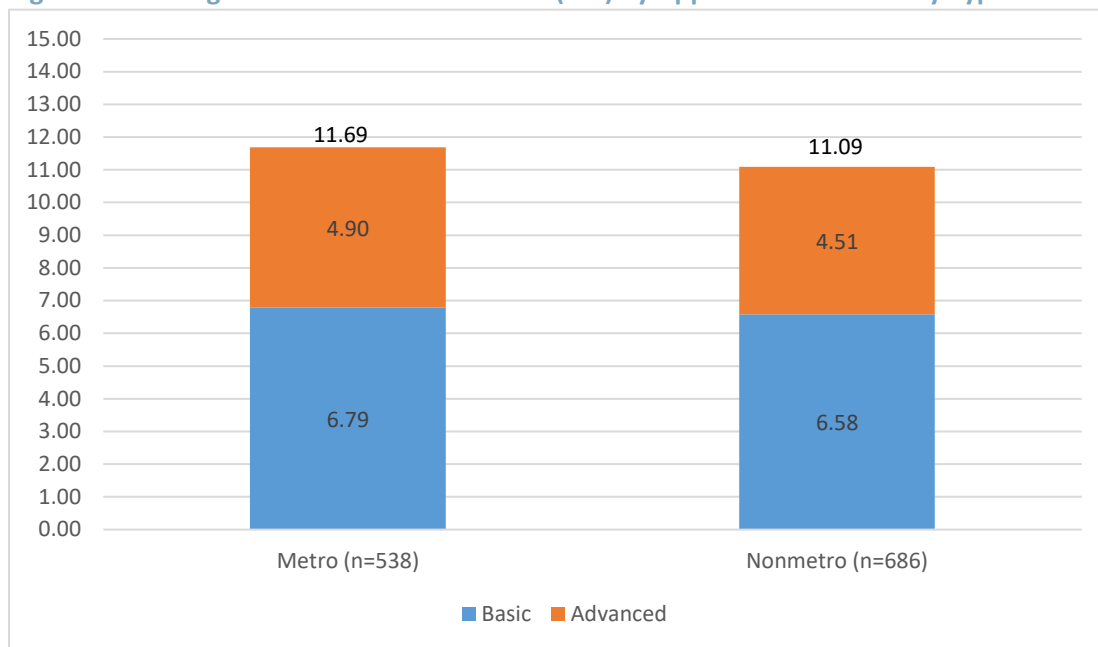


Source: 2018 PCRD Household Internet Utilization Survey

To further gauge internet utilization, an internet utilization score or IUS was calculated ranging from zero to twenty-five. The frequency of use includes at least once daily, weekly, or monthly. A higher score denotes a more diverse use of the technology. Overall, metro respondents used the internet on average 11.7 ways compared to 11 for nonmetro as shown in Figure 16.

The IUS further distinguishes between “basic” (see Figure 17), and “advanced” (see Figure 18). The difference between basic and advanced internet uses was also less than one. However, both county types utilized the internet at less than half its potential—as defined by this study—since both average uses were below the median of 12.5 (remember twenty-five uses were listed).

Figure 16. Average Internet Utilization Score (IUS) by Application and County Type

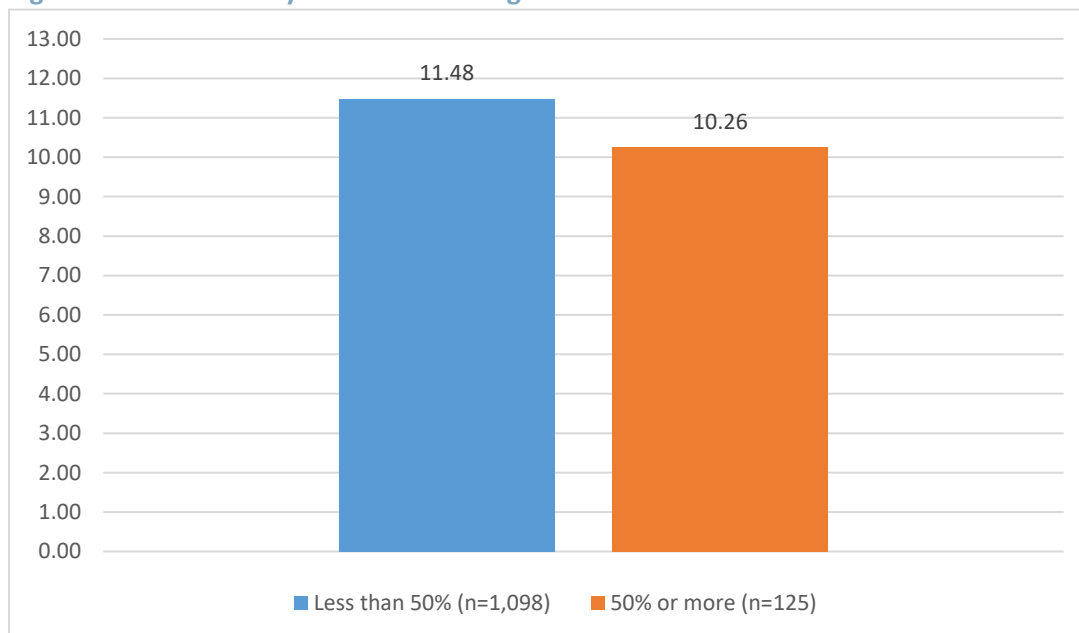


Source: 2018 PCRD Household Internet Utilization Survey

Note: Metro-nonmetro difference between IUS Advanced and IUS is statistically significant at the 0.01 level (ANOVA)

Furthermore, the difference in IUS scores between those that reported using mobile data more than 50 percent of the time over the past year to connect to the internet versus those that did not is statistically significant as shown in Figure 17. This supports the argument that relying mostly on mobile data can result in less usage and therefore undermine the potential of the technology.

Figure 17. IUS Scores by Mobile Data Usage

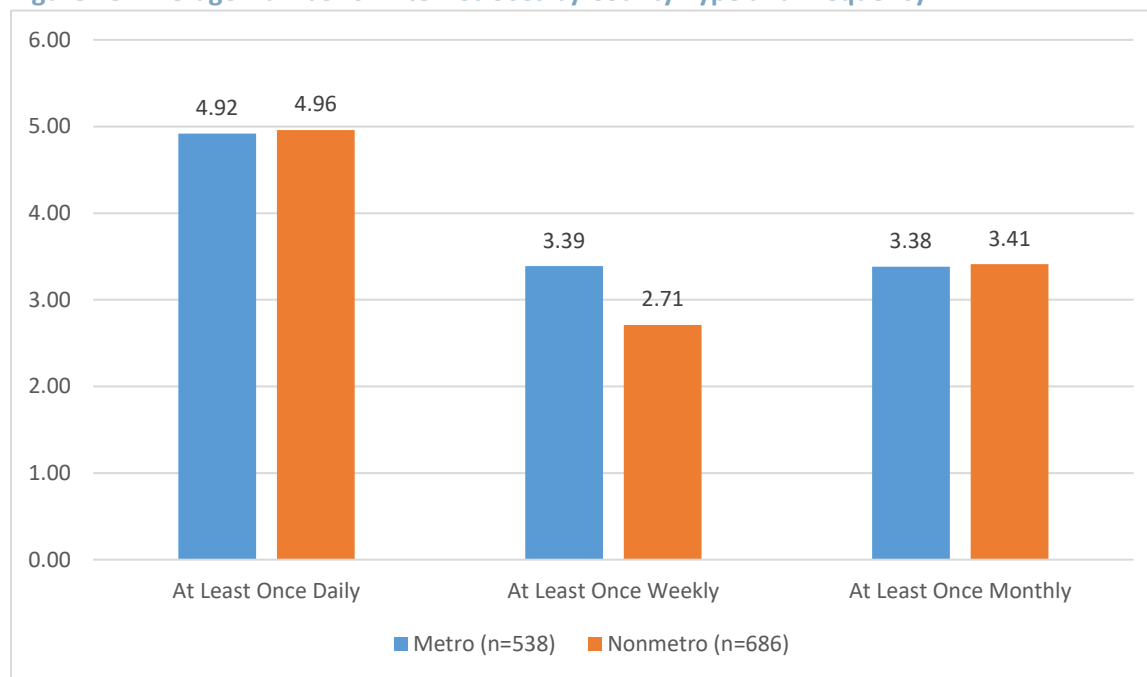


Source: 2018 PCRD Household Internet Utilization Survey

Note: the difference between IUS scores is statistically significant at the 0.01 level (ANOVA)

Regarding internet uses by frequency, Figure 18 shows that both metro and nonmetro used the internet in a similar number of ways at least once daily and at least once monthly. Metro respondents did have a higher average use at least once weekly compared to nonmetro, though the difference was less than one use on average.

Figure 18. Average Number of Internet Uses by County Type and Frequency

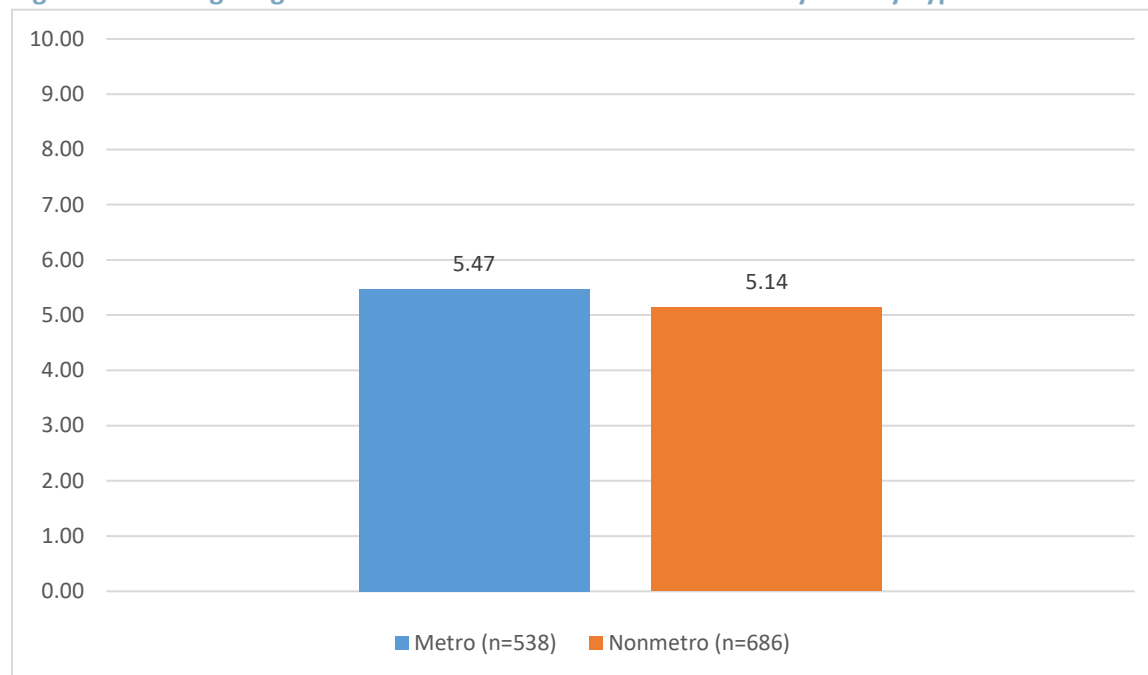


Source: 2018 PCRD Household Internet Utilization Survey

Note: the only average at least once weekly difference was statistically significant at the 0.01 level (ANOVA)

Considering nonmetro respondents were at a slight disadvantage regarding device and internet access, the difference in the digital resourcefulness and utilization score although statistically significant, was less than one as shown in Figure 19. This score took into consideration digital resourcefulness variables, digital interactions with community organizations, and internet use and frequency. However, as pointed out before, both metro and nonmetro were at slightly more than 50 percent of where they could be regarding digital resourcefulness and utilization as measured by this study.

Figure 19. Average Digital Resourcefulness & Utilization Scores by County Type



Source: 2018 PCRD Household Internet Utilization Survey

Note: Metro-nonmetro difference is statistically significant at the 0.01 level (ANOVA)

In conclusion, there is a statistically significant difference in digital resourcefulness and utilization between metro and nonmetro respondents with metro respondents having a slightly higher score. However, given that this difference was very low, it indicates that both metro and nonmetro respondents had similar levels of digital resourcefulness and are utilizing the technology in the same number of ways and frequency. This is interesting considering that nonmetro respondents tended to rely more on mobile devices and data to access the internet and had more device performance issues.

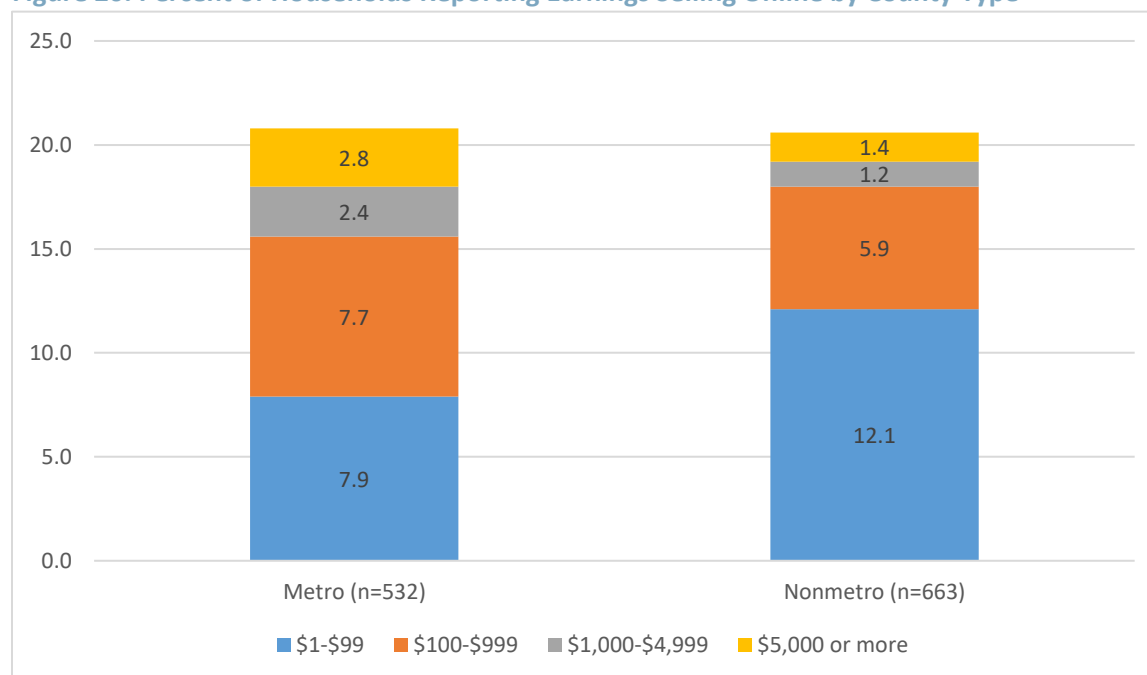
To improve the level of digital readiness, educational and training efforts need to focus on helping households better judge the trustworthiness and consume a variety of online information as well as provide technical assistance regarding new devices. Likewise, training needs to focus on teaching households more diverse internet applications. Home businesses also need to diversify their online presence and diversify the use of internet applications.

Internet Benefits & Impacts

The previous sections found that on digital resourcefulness and utilization, metro respondents had a slightly higher and statistically significant score but overall had similar digital resourcefulness levels as well as number and frequency of internet uses. This section analyzes the internet benefits and impact including saving or earning money online as well as securing promotions or jobs due to online educational resources.

Figure 20 shows the percent of respondents that earned money by selling online. Overall, about one-fifth earned money by selling online. A higher share of metro respondents made more money online compared to nonmetro. Almost 13 percent of metro made \$100 or more compared to 8.5 percent of nonmetro. In fact, the share of metro respondents earning \$5,000 or more was twice the share of nonmetro, but less than three percent overall. On the other hand, 12 percent of nonmetro respondents earned between \$1 and \$99 compared to less than eight percent for metro respondents.

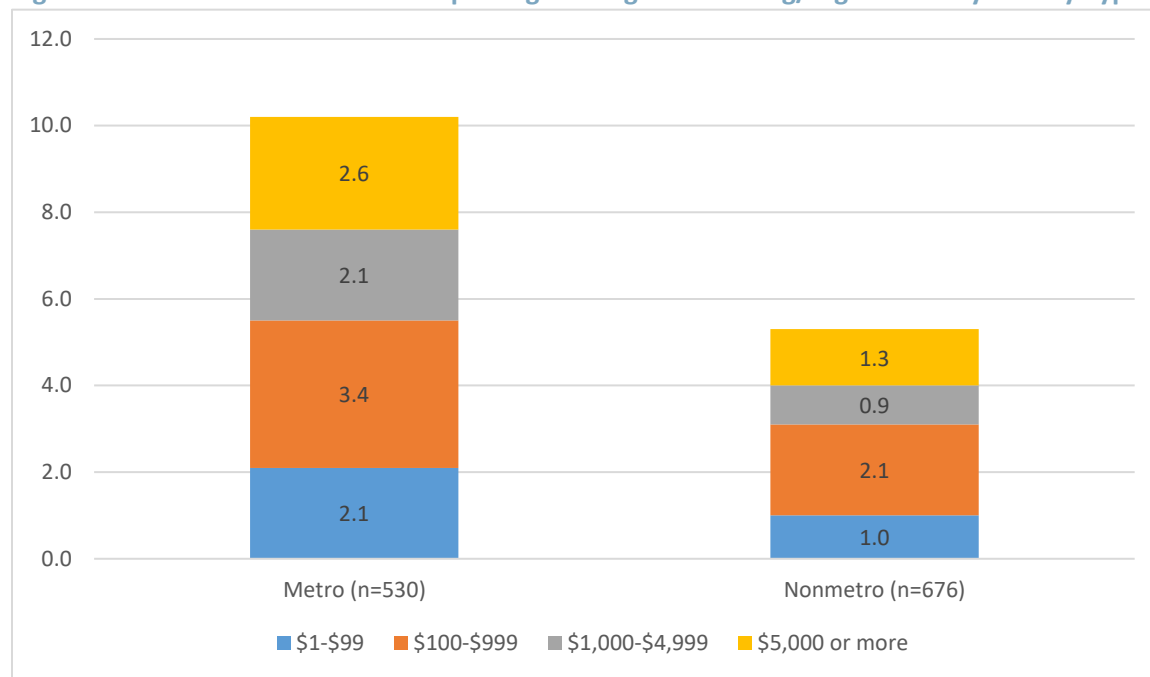
Figure 20. Percent of Households Reporting Earnings Selling Online by County Type



Source: 2018 PCRD Household Internet Utilization Survey

About 10 percent of metro respondents reported earning money online by freelancing or other online gigs as shown in Figure 21. Of these, 2.6 percent made \$5,000 or more. On the other hand, less than six percent of nonmetro respondents earned money online through freelancing or other online gigs, with the most significant share making between \$100 and \$999 over the past year.

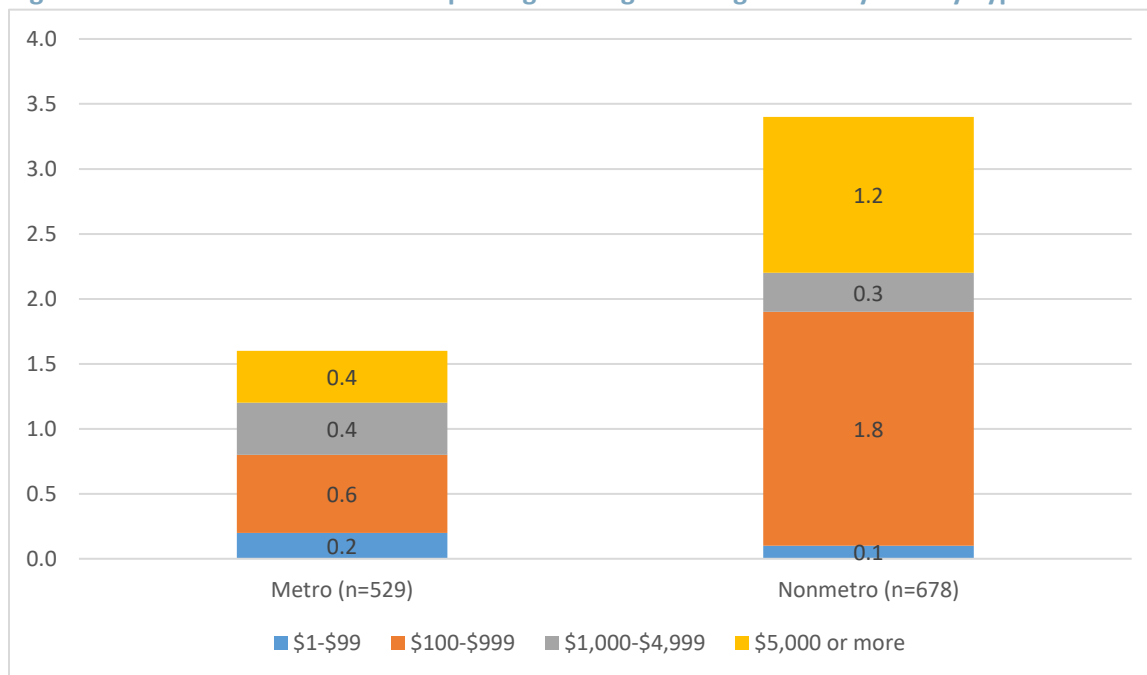
Figure 21. Percent of Households Reporting Earnings Freelancing/Gigs Online by County Type



Source: 2018 PCRD Household Internet Utilization Survey

Regarding renting through platforms like Airbnb and VRBO, an even lower share of respondents earned money as shown in Figure 22 compared to selling online or freelancing. However, the percentage of nonmetro respondents was higher than the portion of metro. About 3.5 percent of nonmetro respondents said they earned money online by renting compared to a little over 1.5 percent of metro. Moreover, almost 2 percent of nonmetro earned between \$100 and \$999 over the past year.

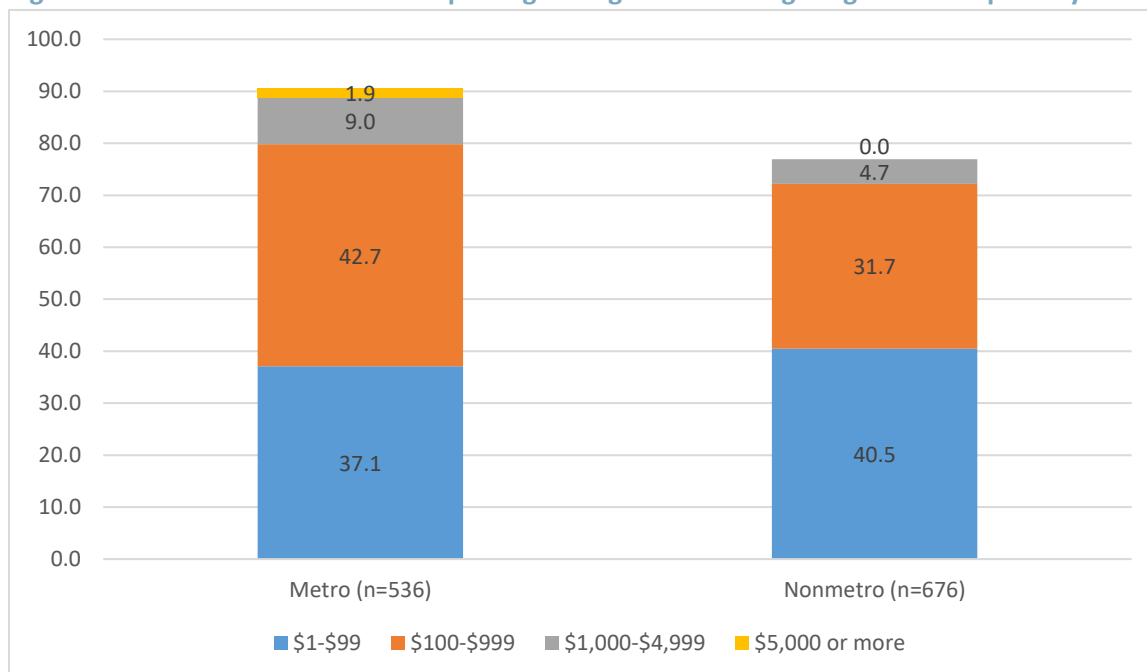
Figure 22. Percent of Households Reporting Earnings Renting Online by County Type



Source: 2018 PCRD Household Internet Utilization Survey

When it comes to saving money online, a significantly higher share of respondents benefited compared to earning money online. Figure 23 shows that about 90 percent of metro respondents saved money compared to a little less than 70 percent of nonmetro respondents. A higher share of metro respondents saved more than \$100 online through bargains and coupons compared to nonmetro.

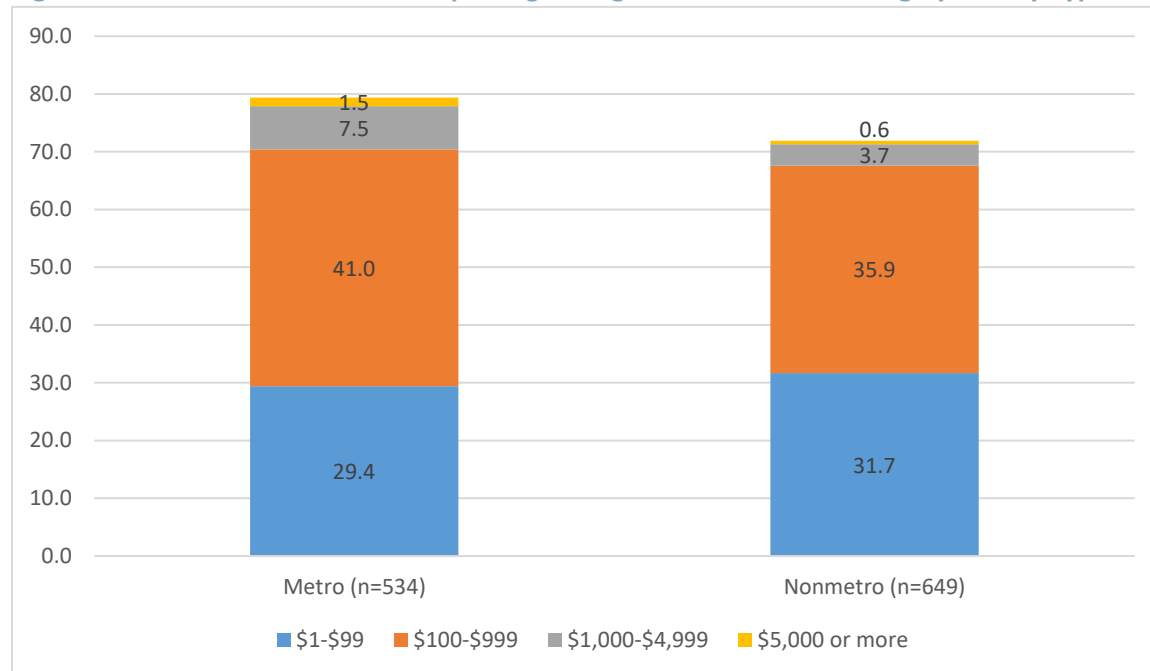
Figure 23. Percent of Households Reporting Savings Online Using Bargains & Coupons by County Type



Source: 2018 PCRD Household Internet Utilization Survey

Similar trends are seen in Figure 24 showing that about 80 percent of metro respondents saved money online through price matching compared to a little more than 70 percent of nonmetro. Again, a higher share of metro respondents saved \$100 or more compared to nonmetro.

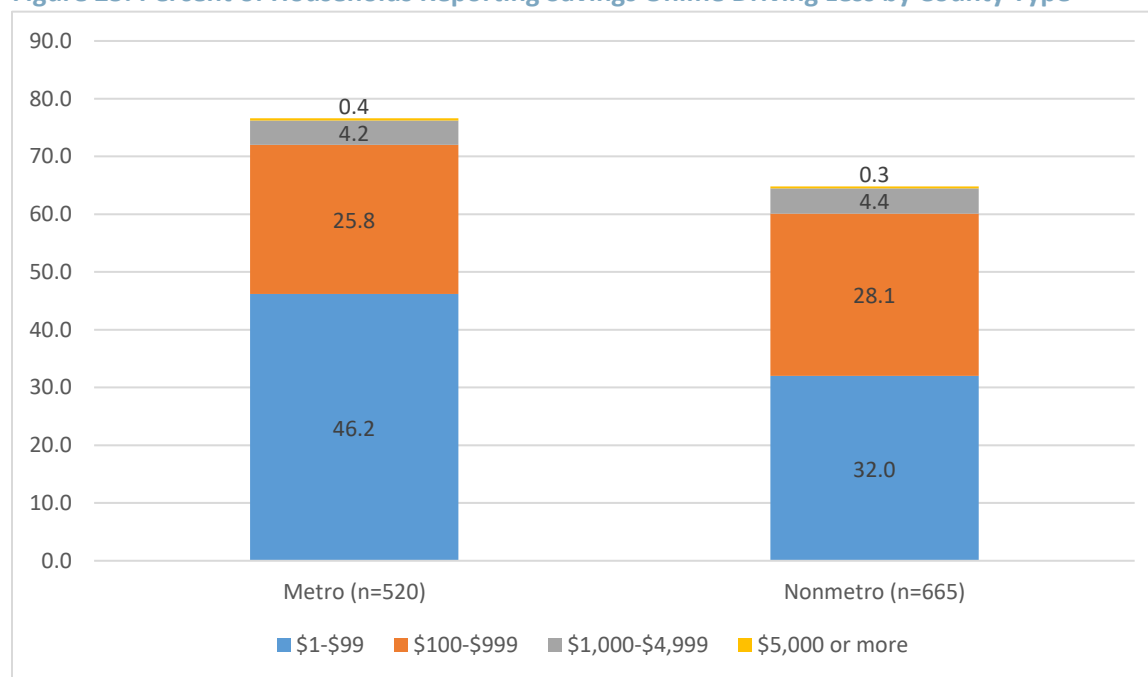
Figure 24. Percent of Households Reporting Savings Online Price Matching by County Type



Source: 2018 PCRD Household Internet Utilization Survey

Figure 25 shows that a higher share of metro respondents saved between \$1 and \$99 by driving less compared to nonmetro. Overall, about two-thirds of nonmetro respondents saved money by driving less thanks to the internet compared to about three-quarters of metro respondents.

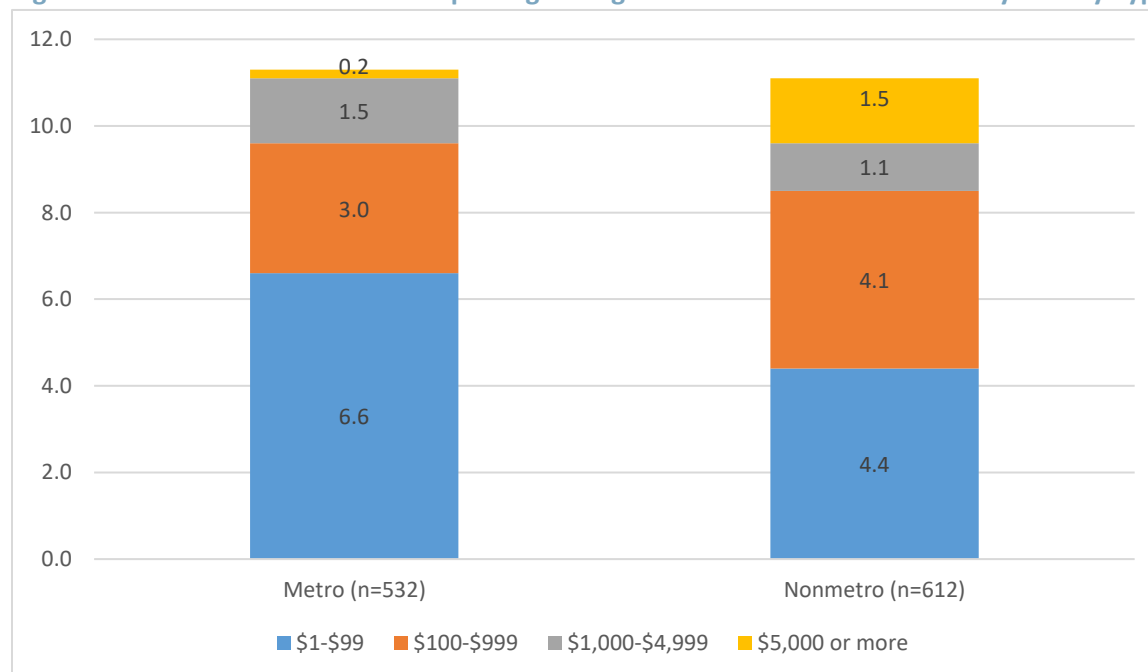
Figure 25. Percent of Households Reporting Savings Online Driving Less by County Type



Source: 2018 PCRD Household Internet Utilization Survey

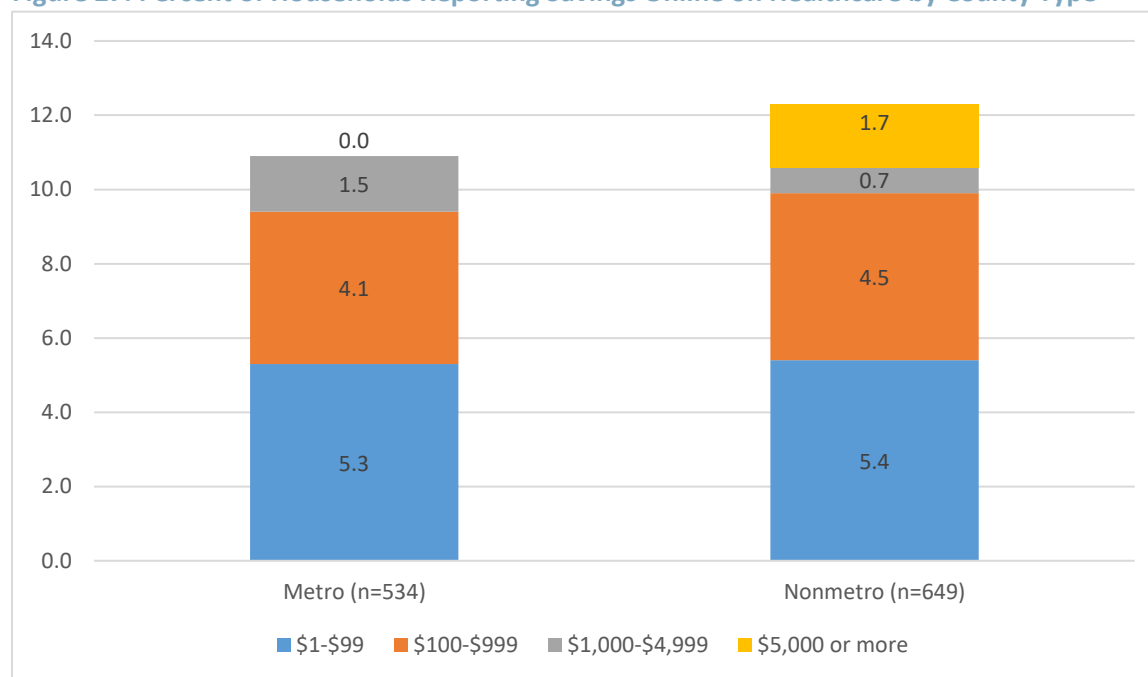
Figures 26 and 27 show that about the same share of metro and nonmetro respondents saved money online on health insurance and healthcare. Note that the percentage of nonmetro saving \$5,000 or more on both health insurance and health care was higher compared to the portion of metro. Overall, about 11 percent of respondents saved money on health insurance and healthcare.

Figure 26. Percent of Households Reporting Savings Online on Health Insurance by County Type



Source: 2018 PCRD Household Internet Utilization Survey

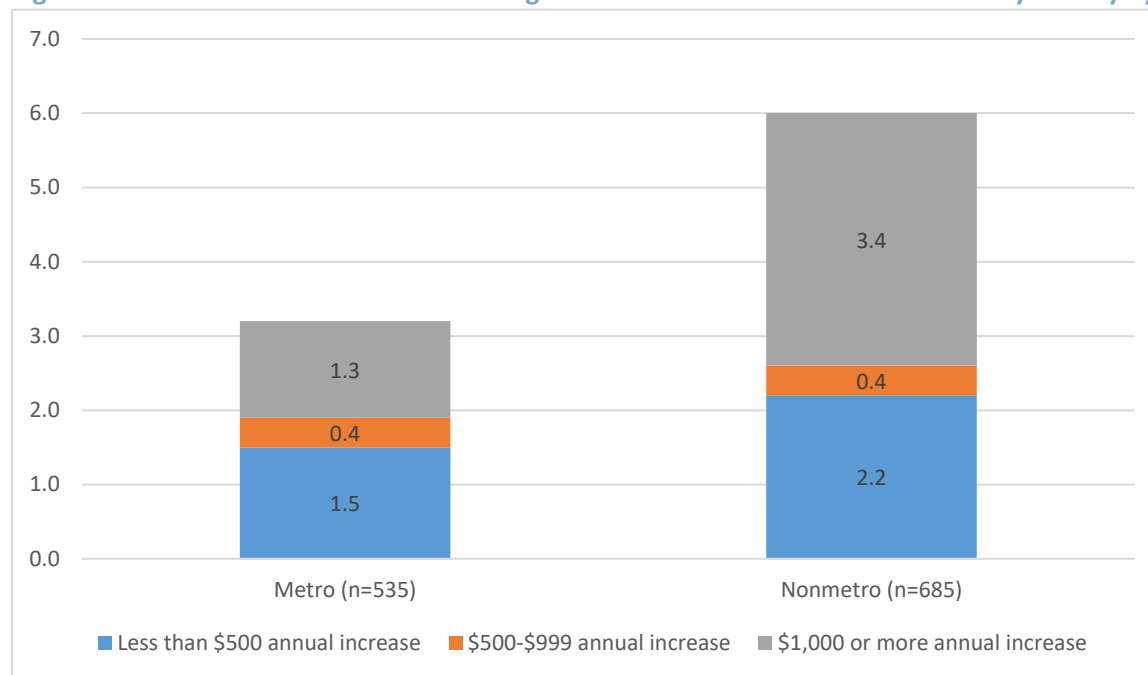
Figure 27. Percent of Households Reporting Savings Online on Healthcare by County Type



Source: 2018 PCRD Household Internet Utilization Survey

Beyond saving or earning money online, the survey asked participants if the internet helped them secure promotions or jobs. Figures 28 and 29 show that respondents did indeed secure promotions or jobs thanks to the internet. Regarding promotions, Figure 28 shows that about six percent of nonmetro respondents obtained promotions due to completing educational credentials online. In fact, the share of nonmetro respondents was double compared to metro respondents. More than half of nonmetro respondents obtaining a promotion resulted in salary increases of more than \$1,000 per year.

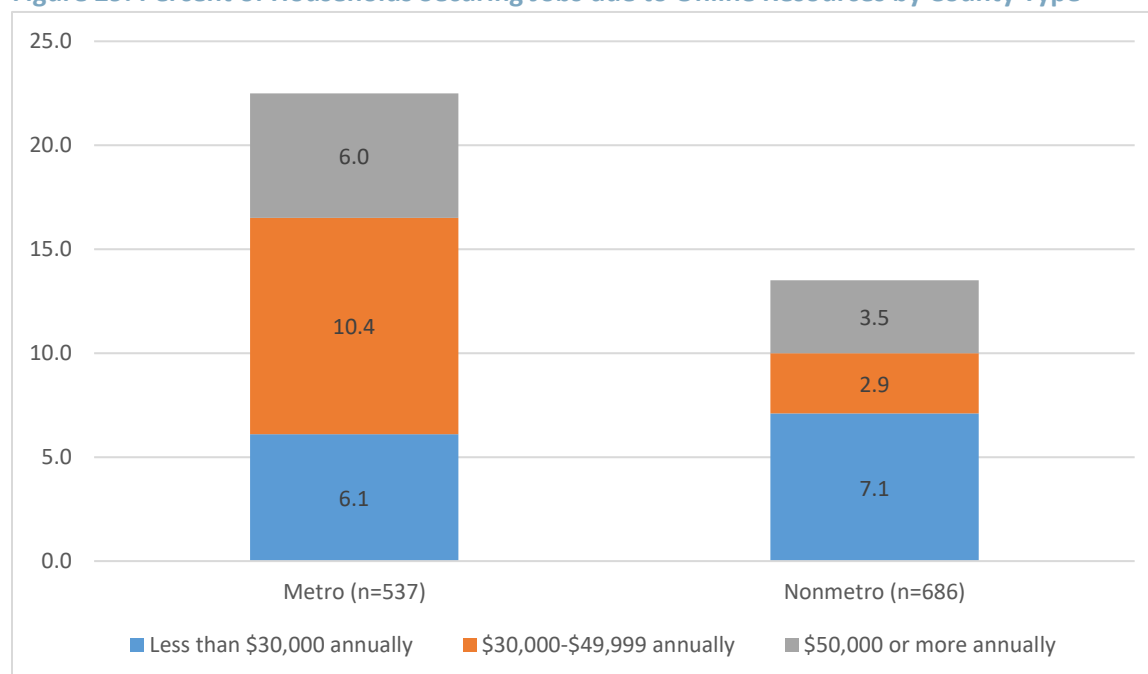
Figure 28. Percent of Households Obtaining Promotions due to Online Resources by County Type



Source: 2018 PCRD Household Internet Utilization Survey

Regarding jobs, the story is flipped as shown in Figure 29. A little more than one-fifth of metro respondents said they secured a job online compared to less than 14 percent of nonmetro respondents. About 16 percent of metro respondents said they acquired jobs paying more than \$30,000 per year online compared to little more than six percent of nonmetro respondents.

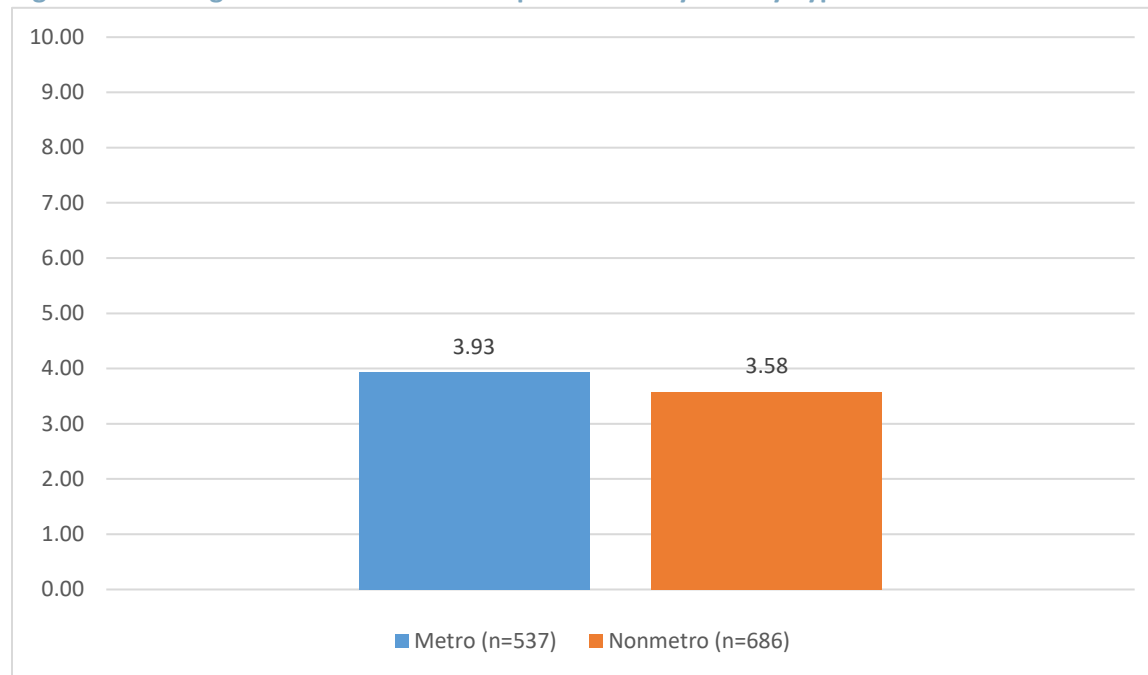
Figure 29. Percent of Households Securing Jobs due to Online Resources by County Type



Source: 2018 PCRD Household Internet Utilization Survey

An internet benefits and impact (IBI) score was calculated that included earnings, savings, promotions, and jobs related to the internet. The score was normalized from zero to ten for better comprehension and comparison. Figure 30 shows the IBI score by county type. Although the difference between metro and nonmetro is less than one, it is statistically significant. Metro respondents benefitted slightly more from the internet compared to their nonmetro counterparts. However, both were at less than 40 percent of the potential of the benefits and impact of the technology as measured by this study.

Figure 30. Average Internet Benefits & Impact Scores by County Type



Source: 2018 PCRD Household Internet Utilization Survey

Note: Metro-nonmetro difference is statistically significant at the 0.01 level (ANOVA)

In conclusion, while some participants in the survey benefitted from the internet, there is still room for improvement. Consider that a higher share of respondents saved money online compared to earning money online. More than four-fifths of respondents did not make money online gauged by the three activities listed. Also, while the share of respondents was significantly higher when saving online assessed by the activities listed compared to earnings, the proportion of more savings—\$1,000 or more—can be improved.

Similarly, regarding promotions and jobs, a little more than three-quarters of respondents did not obtain promotions or secured jobs online. Efforts need to be done to ensure households maximize the potential of the technology. Of course, the device & internet access dimension, as well as the digital resourcefulness and utilization, may be undermining the technology's benefits and impacts measured by earnings, savings, promotions, and jobs.



Digital Readiness Index

Findings from this 1,200 household nonrepresentative survey discussed three dimensions—device and internet access, digital resourcefulness and utilization and internet benefits and impact. This section discusses an overall digital readiness index score and its relationship with each of the dimensions as well as specific socioeconomic characteristics.

Figure 31 shows the average scores for each of the dimensions discussed as well as the metro-nonmetro difference plus an overall digital readiness index (DRI) score¹¹. This DRI includes all three aspects and is a robust measure of digital readiness. Remember, all scores were normalized from zero to ten for easier comprehension and comparison. All metro-nonmetro differences were statistically significant. However, all differences were less than one or ten percent, based on the scale used, with the device & internet access having the largest (0.93) and the digital resourcefulness and utilization (0.33) the smallest.

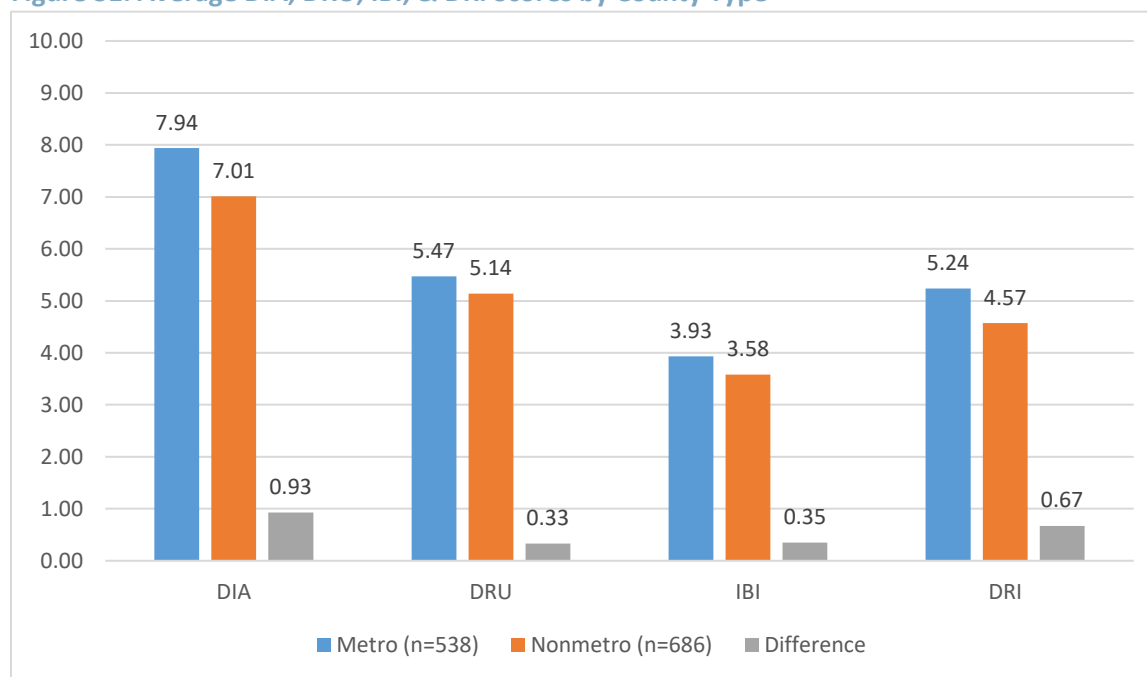
Several implications are worth discussing. First, the largest gap is on the device and internet access. Efforts should be made to make this difference disappear and ideally, both county types reach the maximum score of ten. This will affect the other two dimensions—DRU and IBI—as well as the overall digital readiness index (DRI) score. Note that among all dimensions analyzed, the DIA is the closest to the maximum score (ten) as quantified by this study. This is not surprising given the efforts over the past years on improving device quality and ownership as well as internet connectivity. However, more work remains to be done.

Second, note how the scores for the resourcefulness & utilization and impacts of the technology are lower. This means that efforts also need to focus on digital literacy, capacity, and skills as well as providing more incentives and reasons for households to utilize the technology. In other words, DRU and IBI can significantly benefit from robust digital inclusion strategies that not only improve the device and internet access dimension but also add value to it.

Lastly, the digital readiness index score among the metro households surveyed was 5.24 or slightly over the median of five. Rural or nonmetro households, on the other hand, had a DRI score of 4.57, below the median value of five. In other words, the digital readiness level of these households was at 50 percent of its capacity, as measured by this study. Digital readiness among households, individuals, and communities need to increase for them to prosper in this digital age.

¹¹ Please refer to Appendix B for digital readiness dimension scores differences among other characteristics such as income, educational attainment, etc.

Figure 31. Average DIA, DRU, IBI, & DRI Scores by County Type



Source: 2018 PCRD Household Internet Utilization Survey

Note: Metro-nonmetro differences across all scores are statistically significant at the 0.01 level (ANOVA)

How do socioeconomic characteristics as well as county type affect these digital readiness dimensions? Is there a particular characteristic that affects digital ready the most? To answer these questions, a series of bivariate crosstab gamma analyses were conducted. The Gamma coefficient (γ) ranges from -1 to +1 where a value closer to zero indicates a weaker relationship among ordinal level variables.

To conduct this analysis, county type and socioeconomic characteristics were divided into groups (values are shown in parenthesis). County type included metropolitan counties (1), small city or micropolitan counties (2) and rural or noncore counties (3). Household income included income less than \$35,000 (1), income between \$35,000 and \$74,999 (2) and income of \$75,000 or greater (3). Age groups included those younger than 35 years (1), ages 35 to 64 (2) and those ages 65 or older (3). Educational attainment included those with a high school degree or less (1), some college including an associate's degree (2) and a bachelor's degree or higher (3). Occupation groups included all other occupations (1), sales or office support (2) and management, professional, or educational occupations (3). Note that a higher occupational category denotes a higher likelihood work could be done remotely or more telework-friendly requiring above average digital skills. Lastly, the digital readiness dimensions were divided into three groups as well ranging from lowest to highest.

As shown in Table 4, as a county becomes more rural, digital readiness dimension scores decrease. The largest county type impact was on device & internet access (-0.321). In other words, the more rural the county, the more device and internet access issues as well as a higher reliance on mobile devices to connect to the internet. This supports existing research finding a digital divide between urban and rural. However, coefficients regarding resourcefulness & utilization and impact are also negative, but weaker. This means that the metro-nonmetro gaps are smaller.

The strongest gamma coefficient regarding the digital readiness index (DRI) score was with household income ($\gamma=+0.620$), followed by occupation ($\gamma=+0.380$) and county type ($\gamma=-0.316$). The weakest was age groups ($\gamma=-0.216$) followed by educational attainment ($\gamma=+0.270$). In other words, when it comes to digital readiness—as measured in this study—a metro-nonmetro divide was not as large and surpassed by income and occupation differences.

Table 4. Ordinal Bivariate Crosstab Results

Gamma Coefficients	County Type	Household Income	Age Groups	Occupation	Ed. Attainment
Device & Internet Access (DIA)	-0.321*** (n=1,224)	+0.436*** (n=1,128)	-0.011 (n=1,207)	+0.339*** (n=1,219)	+0.211*** (n=1,217)
Digital Resourcefulness & Utilization (DRU)	-0.090** (n=1,223)	+0.447*** (n=1,126)	-0.452*** (n=1,207)	+0.245*** (n=1,218)	+0.161*** (n=1,217)
Internet Benefits & Impact (IBI)	-0.122*** (n=1,224)	+0.479*** (n=1,126)	-0.148*** (n=1,207)	+0.084** (n=1,218)	+0.122*** (n=1,218)
Digital Readiness Index (DRI)	-0.316*** (n=1,224)	+0.620*** (n=1,125)	-0.216*** (n=1,207)	+0.380*** (n=1,218)	+0.270*** (n=1,219)

Note: *** significant at 0.01 level; ** significant at 0.05 level

However, do these findings hold when looking at multiple, rather than bivariate, relationships controlling for county type and socioeconomic characteristics? Moreover, which digital readiness dimension has the largest impact on the digital readiness index score?

To answer these questions, multiple ordinary least squares (OLS) regressions were completed where the dependent variable was the digital readiness index score. All models included county type, household income, age groups, educational attainment and occupations as control variables. In addition, one of the three digital readiness dimensions were included as control variables as was the internet utilization score (IUS). Only one dimension at a time was used to avoid multicollinearity, given that the dependent variables (DRI) was built using these dimensions. Remember that the IUS is included in the DRU score. However, the impact of it on its own on the DRI was warranted. Table 5 provides a statistical summary of the variables utilized in the four OLS regressions.

Table 5. Statistical Summary of Socioeconomic and Digital Readiness Variables.

	n	Minimum	Maximum	Mean	Std. Deviation
County Type	1,224	1	3	1.93	0.897
Income	1,126	1	3	2.21	0.816
Age Groups	1,208	1	3	1.89	0.670
Ed. Attainment	1,218	1	3	2.10	0.816
Occupation	1,218	1	3	2.14	0.920
IUS	1,224	0	25	11.35	4.340
DIA	1,224	0	10	7.42	1.959
DRU	1,224	0	10	5.28	1.223
IBI	1,223	0	10	3.73	1.012
DRI	1,224	0	10	5.77	1.392

Source: 2018 PCRD Household Internet Utilization Survey

Table 6 shows the results of the four models conducted (standardized beta coefficients). All models were statistically significant ($p < 0.01$) and the digital resourcefulness & utilization (model 3) had the highest adjusted r square, meaning it explained a higher share of the DRI score variance when controlling by other factors. Likewise, of the three digital readiness dimensions analyzed, digital resourcefulness & utilization or model 3 had the highest coefficient (+0.660) followed closely by device & internet access or model 2 (+0.654). In other words, addressing the digital resourcefulness & utilization dimension has the biggest bang for the buck when it comes to digital readiness.

Among the socioeconomic characteristics, household income was significant across all digital readiness dimensions and had the highest coefficients. This means household income has a larger impact on digital readiness than all other characteristics, including county type (metro versus nonmetro). Occupation type, age, educational attainment, and county type did not affect digital readiness equally when controlling for specific dimensions. For example, when trying to improve digital readiness by focusing on the device & internet access dimension, efforts should also be made to mitigate differences in income, age, and educational attainment. On the other hand, county type and occupations do not affect (not statistically significant) digital readiness when coupled with device & internet access.

Table 6. Ordinary Least Squares (OLS) Regression Results, Standardized Beta Coefficients

	Model 1	Model 2	Model 3	Model 4
County Type	-0.123***	-0.015	-0.073***	-0.082***
Household Income	+0.286***	+0.186***	+0.232***	+0.220***
Age Groups	-0.006	-0.132***	+0.022	-0.162***
Ed. Attainment	+0.020	+0.058***	+0.028	-0.039**
Occupation	+0.115***	+0.019	+0.076***	+0.112***
IUS	+0.508***	-----	-----	-----
DIA	-----	+0.654***	-----	-----
DRU	-----	-----	+0.660***	-----
IBI	-----	-----	-----	+0.612***
F-score	212.502***	351.280***	368.732***	332.620***
Adj. R^2	0.531	0.652	0.663	0.639
n	1,122	1,123	1,123	1,123

Source: 2018 PCRD Household Internet Utilization Survey

Note: *** significant at 0.01 level; ** significant at 0.05 level

Similarly, when looking at digital readiness by including internet utilization, efforts need to be made to mitigate metro-nonmetro differences as well as income and occupation, but not age groups and educational attainment. Lastly, when looking at digital readiness by including internet benefits & impact, all socioeconomic differences were significant. This means that to increase digital readiness by improving internet benefits & impact, differences in county type, income, age, educational attainment, and occupation need to be mitigated.

The main conclusion from this analysis is that digital readiness has multiple dimensions that in turn are affected unequally by multiple socioeconomic variables. In other words, addressing digital readiness should not include cookie-cutter approaches. Instead, strategic and customized efforts need to be made to improve digital readiness among households within a robust digital inclusion program that focuses on both digital access as well as digital literacy and skills.

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Appendix A

- (1) Device & Internet Access (DIA): includes device ownership & performance, duration of device & internet downtime, connecting more from home than other locations (including using mobile data), and variety of devices and frequency when connecting to the internet. A higher score denotes a more diverse and frequency device use, connecting more from home, less device performance issues, and shorter periods without access to devices or internet. This score had a minimum value of 4 and a maximum of 64.

Q2: Which of the following devices do you own and how well did they work over the past year?

Categories: desktop, laptop, tablet, smartphone

Non-response = 0

Do not own = 1

Poorly/Very poorly = 2

Sufficient = 3

Well/Very well = 4

Q3: How often have you been without a device or the internet over the past year due to unpaid bills, broken devices, running out of minutes/data, or other problems?

Categories: internet, desktop, laptop, tablet, smartphone

Non-response = 0

More than 30 days a year = 1

8-30 days a year = 2

5-7 days a year = 3

1-4 days a year = 4

Never had problems = 5

Q4: Over the past year, roughly what percent of the time did you use the following to connect to the internet:

Categories: HomeWiFi

<25% = 0

25%<50% = 1

50%<75% = 2

75% or higher = 3

Q5: How often did you or anybody in your household use the following devices to access the internet over the past year?

Categories: desktop, laptop, tablet, smartphone

Non-response = 0

Never = 1

Once or several times per year = 2
Several times monthly/once monthly = 3
Several times weekly/once weekly = 4
Several times daily/once daily = 5

- (2) Digital Resourcefulness & Utilization (DRU): includes help with new electronic devices, the perception of productivity due to electronic devices, the trustworthiness of online information, consumption of a variety of online information, frequency and diversity of online interactions with multiple community organizations and diverse internet use and frequency. A higher score denotes higher digital resourcefulness and utilization. This score had a minimum value of 10 and a maximum of 174.

Q6: How often did you or anybody in your household access online information or interact digitally with the following community actors over the past year?

Categories: all (8) but other

Non-response = 0

Never/not interested = 1

Would love to but need to learn = 1

Once or several times per year = 2

Several times monthly/once monthly = 3

Several times weekly/once weekly = 4

Several times daily/once daily = 5

Q7: Over the past year, how well did these statements describe you ...

Categories: all (3)

Non-response/don't know = 0

Not too well/not well at all = 1

Very well/somewhat well = 2

Q8: When looking for news or political information online, how often over the past year did you ...

Categories: all (3)

Non-response = 0

Rarely/never = 1

Sometimes = 2

Very often/often = 3

Q9: How often and which applications did you use your internet connection for over the past year? Consider anybody in your household.

Categories: all (25)

Non-response = 0

Never/not interested = 1

Would love to but need to learn = 1

Once or several times per year = 2

Several times monthly/once monthly = 3

Several times weekly/once weekly = 4

Several times daily/once daily = 5

- (3) Internet Benefits & Impact (IBI): includes type and level of earnings and savings due to specific online activities as well as promotions and jobs secured with an impact on income. A higher score denotes higher internet benefits and impact. This score had a minimum value of 1 and a maximum score of 42.

Q10: Did you or anybody in your household earn money thanks to your internet connection over the past year?

Categories: all (3) but other

Non-response = 0

Did not earn money = 1

\$1-\$99 = 2

\$100-\$999 = 3

\$1,000-\$4,999 = 4

\$5,000 or more = 5

Q11: Did you or anybody in your household save money thanks to your internet connection over the past year?

Categories: all (6) but other

Non-response = 0

Did not earn money = 1

\$1-\$99 = 2

\$100-\$999 = 3

\$1,000-\$4,999 = 4

\$5,000 or more = 5

Q12: Over the past year, did you or anybody in your household obtain a promotion thanks to educational courses completed online?

Non-response = 0

No promotions obtained = 1

Yes, promotion resulted in less than \$500 increase per year in salary = 2

Yes, promotion resulted in \$500 to \$999 increase per year in salary = 3

Yes, promotion resulted in \$1,000 or more increase per year in salary = 4

Q13: Over the past year, did you or anybody in your household secure a job found and applied online?

Non-response = 0

No jobs secured = 1

Yes, got a job paying less than \$30,000 per year = 2

Yes, got a job paying \$30,000 - \$49,999 per year = 3

Yes, got a job paying \$50,000 or more per year = 4

- (4) Digital Readiness Index (DRI): all DIA, DRU, and IBI factors were included. A higher score denotes a higher level of digital readiness considering all factors discussed previously. This measure of digital readiness is the key contribution of this study. This score had a minimum value of 44 and a maximum value of 250.

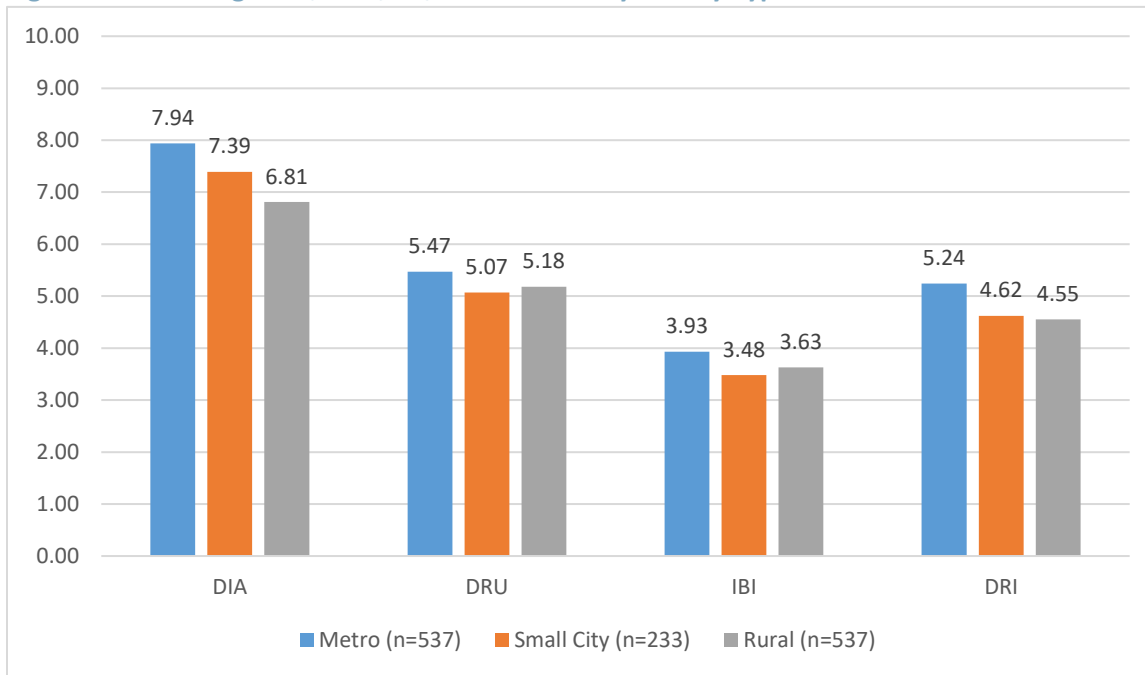
Since the scales, mean, and standard deviations of each of the three dimensions used to calculate the DRI were different, z-scores for each dimension were calculated and added up given equal weight using formula number four below. This z-score metric was then normalized to a 0-10 range for easier comprehension, discussion, and comparison.

Careful attention was placed to assign a higher value to responses that improved digital readiness. For example, if there were performance issues with internet or a particular device (Q3), the longer the time period, the lower the value while the shorter the time period, the higher the value.

- (1) Device & internet access (DIA) Score = $Q2+Q3+Q4+Q5$
- (2) Digital readiness & utilization (DRU) Score: $Q6+Q7+Q8+Q9$
- (3) Internet Benefits & Impacts (IBI) Score = $Q10+Q11+Q12+Q13$
- (4) Digital Readiness Index (DRI) Score: $DIA + DRU + IBI$

Appendix B

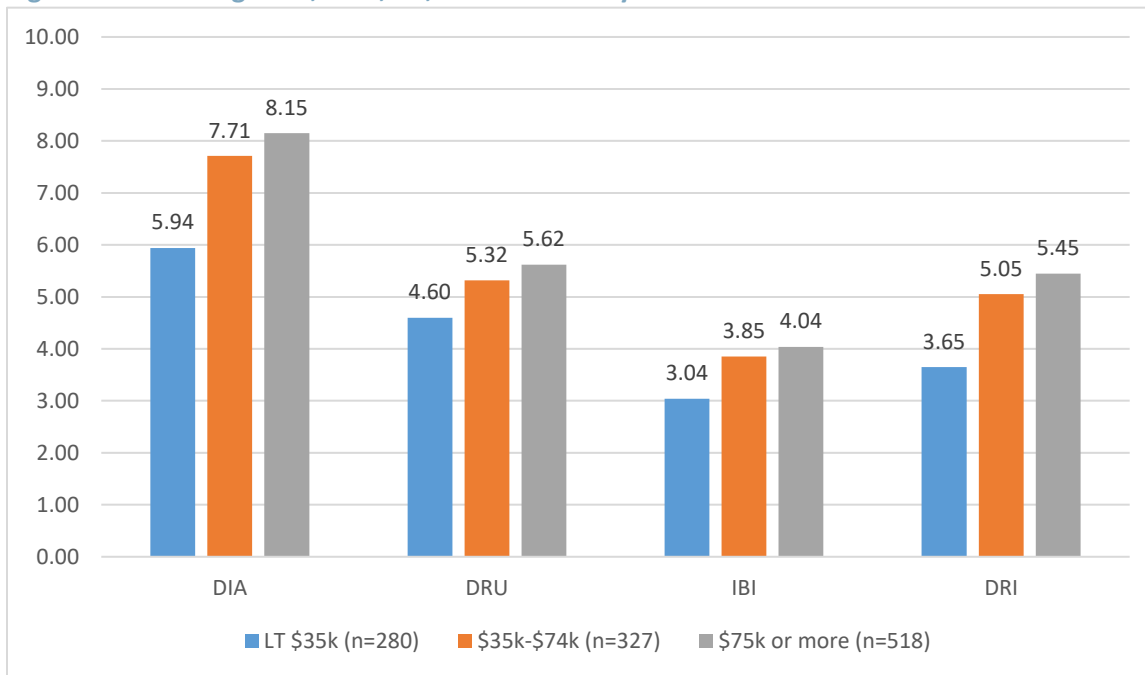
Figure AB.1. Average DIA, DRU, IBI, & DRI Scores by County Type



Source: 2018 PCRD Household Internet Utilization Survey

Note: Differences between groups were statistically significant at the 0.01 level (One-way ANOVA, Tukey)

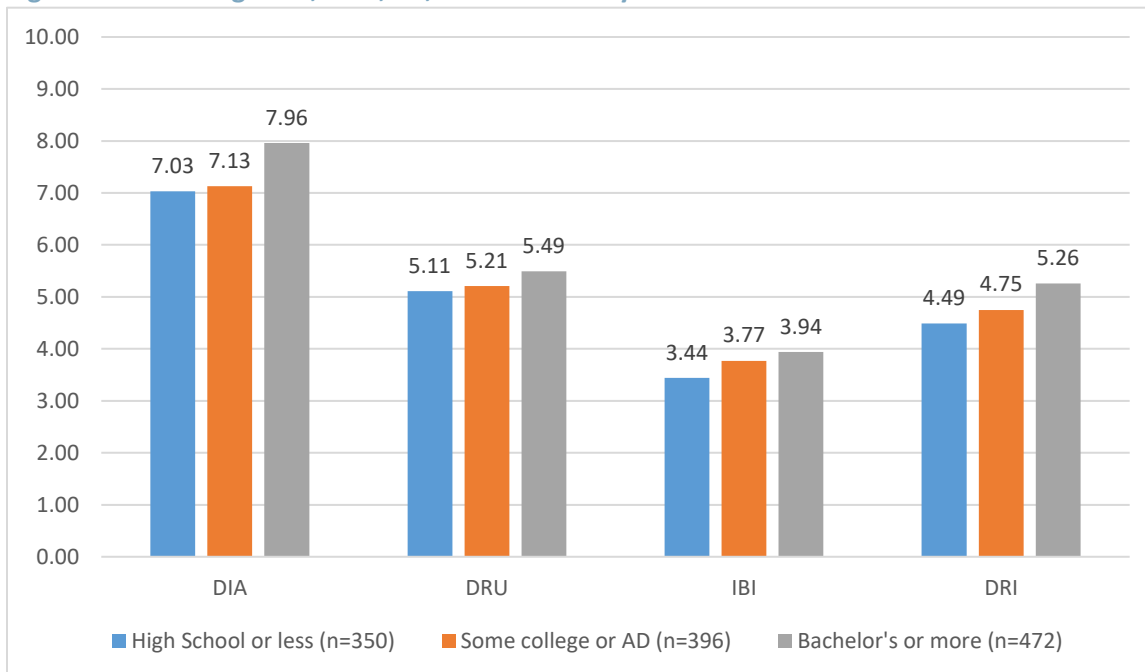
Figure AB.2. Average DIA, DRU, IBI, & DRI Scores by Household Income



Source: 2018 PCRD Household Internet Utilization Survey

Note: Differences between and within groups were statistically significant at the 0.01 level (One-way ANOVA, Tukey)

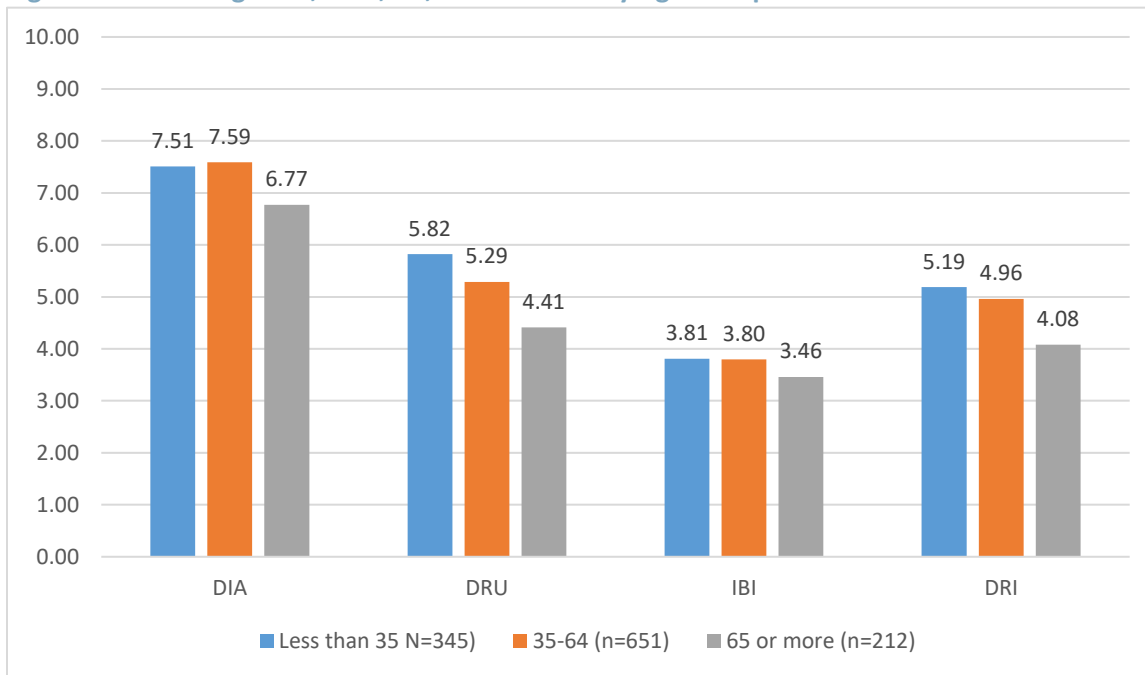
Figure AB.3. Average DIA, DRU, IBI, & DRI Scores by Educational Attainment



Source: 2018 PCRD Household Internet Utilization Survey

Note: Differences between groups were statistically significant at the 0.01 level (One-way ANOVA, Tukey)

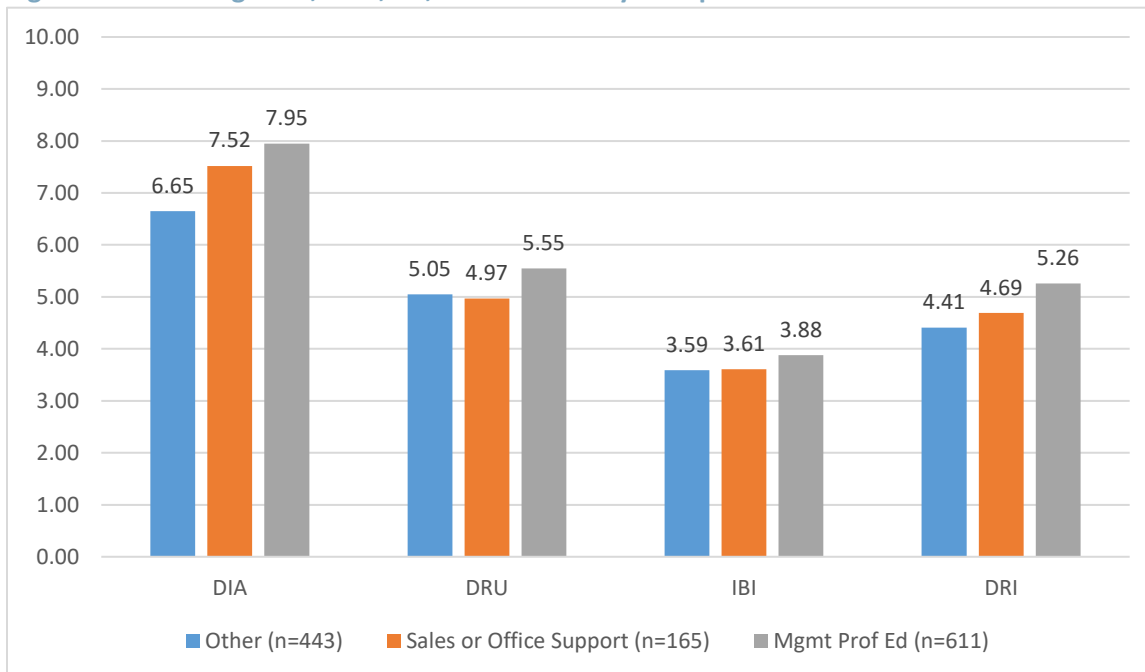
Figure AB.4. Average DIA, DRU, IBI, & DRI Scores by Age Groups



Source: 2018 PCRD Household Internet Utilization Survey

Note: Differences between groups were statistically significant at the 0.01 level (One-way ANOVA, Tukey)

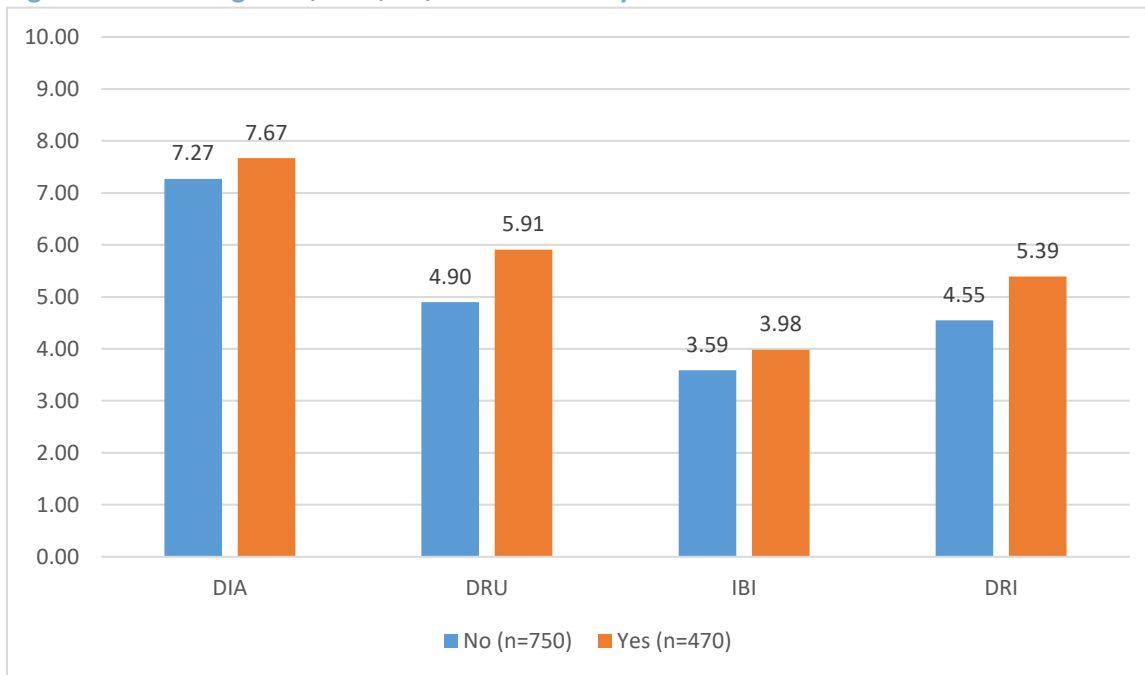
Figure AB.5. Average DIA, DRU, IBI, & DRI Scores by Occupation



Source: 2018 PCRD Household Internet Utilization Survey

Note: Differences between groups were statistically significant at the 0.01 level (One-way ANOVA, Tukey)

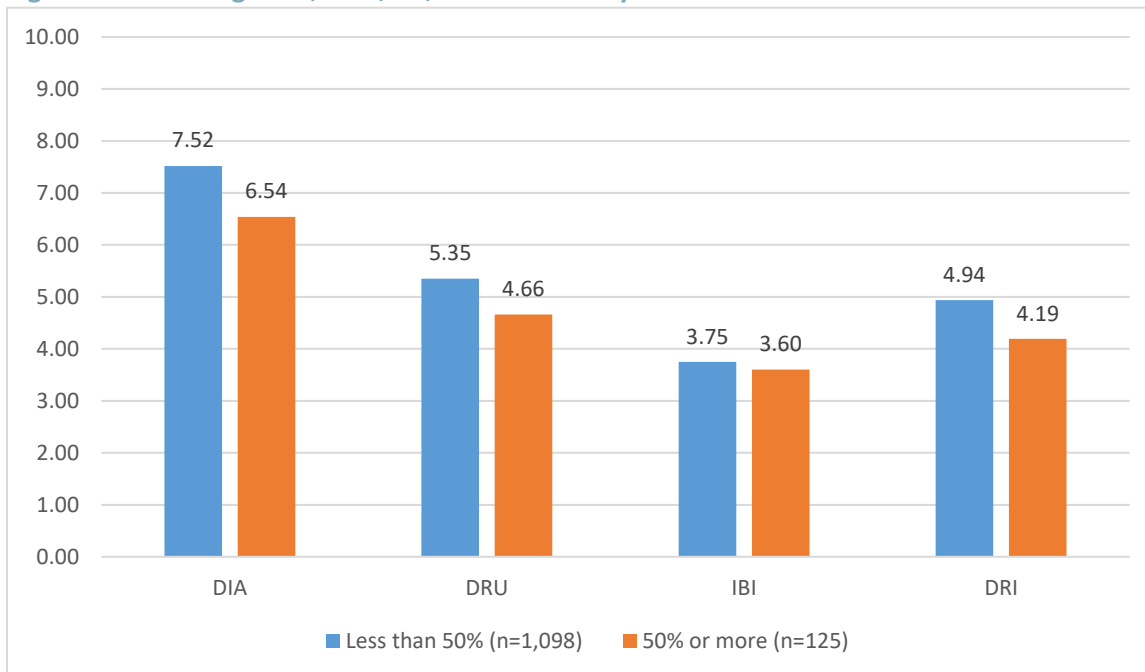
Figure AB.6. Average DIA, DRU, IBI, & DRI Scores by Households with Children



Source: 2018 PCRD Household Internet Utilization Survey

Note: Differences were statistically significant at the 0.01 level (ANOVA)

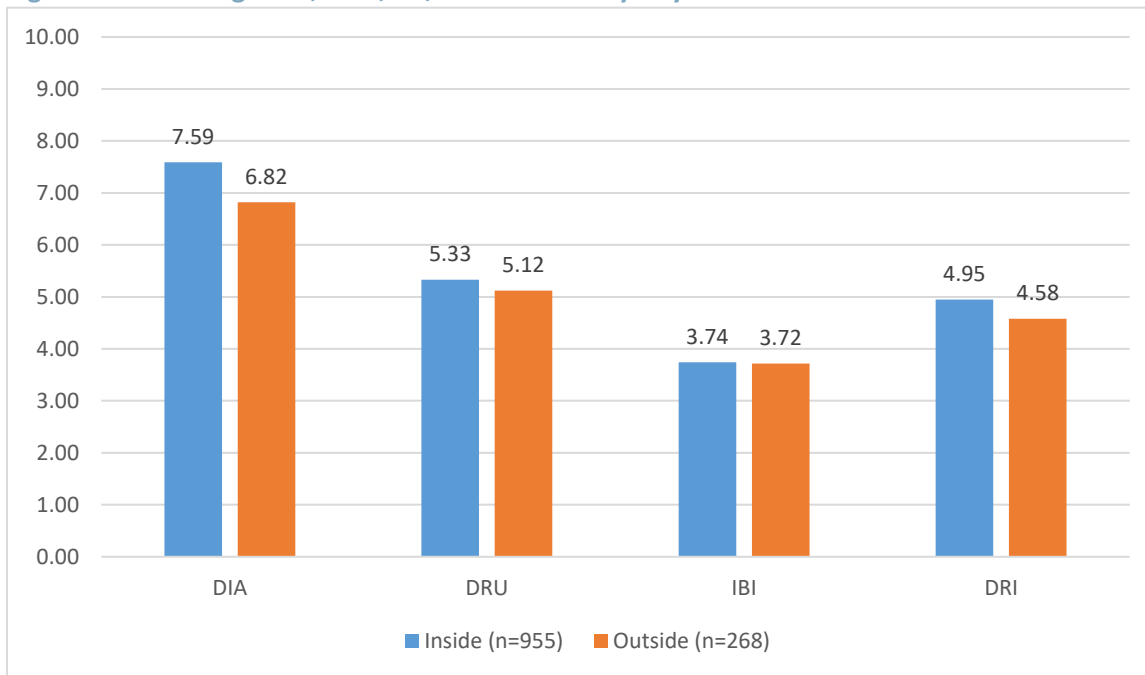
Figure AB.7. Average DIA, DRU, IBI, & DRI Scores by Mobile Data Use



Source: 2018 PCRD Household Internet Utilization Survey

Note: Differences were statistically significant at the 0.01 level (ANOVA) (Except for IBI)

Figure AB.8. Average DIA, DRU, IBI, & DRI Scores by City Limit Status



Source: 2018 PCRD Household Internet Utilization Survey

Note: Differences were statistically significant at the 0.01 level (ANOVA) (Except for DRU & IBI)

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