UNIVERSITY OF WISCONSIN
River Falls
SURVEY RESEARCH CENTER

2022 Dane County Broadband Survey Report

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THE SURVEY RESEARCH CENTER (SRC)

The Survey Research Center (SRC) is a research organization at the University of Wisconsin – River Falls in River Falls, Wisconsin. Since 1990, the SRC has provided statistically sound, low-cost information gathering services for academics, local units of government, non-profit groups, school districts, and other organizations. The SRC conducts surveys on a wide variety of topics including customer satisfaction, resident experience, broadband internet, business climate, equity and inclusion, labor needs, etc. The SRC is directed by Dr. Shaheer Burney and currently employs two staff members, Dr. David Trechter and Sarah Jensen, and seven student assistants.

ACKNOWLEDGEMENTS

We thank Sharon Lezberg, Community Development Educator with UW-Madison Extension Dane County, and the members of the Dane County Broadband Task Force for soliciting the Survey Research Center for this project and for providing important feedback throughout the survey process. We also thank Aaron Krebs and Curt Kodl with the Dane County Planning and Development Department for constructing internet speed maps using survey data. Finally, we thank the residents of Dane County for investing their time to take the survey. The SRC's data collection efforts would not have been possible without their willingness to participate.

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EXECUTIVE SUMMARY

In February 2022, the SRC launched a survey of rural Dane County residents to understand accessibility of broadband internet outside of the greater-Madison area. The area of interest was divided into two parts, the North region (severely underserved) and the South region (marginally underserved). The survey targeted a random sample of residents from the North and South regions. Data collection was concluded in April 2022. The number of responses collected from both regions exceeded the minimum sample size needed to construct statistically valid estimates. From the North region, a total of 409 responses were received (a sample size of 378 was required), and from the South region, a total of 412 responses were received (a sample size of 381 was required).

An open-access survey was also conducted to allow residents outside of the random sample to express their opinions about broadband access. However, given that the open-access survey was conducted only through online format and that those with poor access to the internet likely had greater motivation to take the survey, this sample is likely not representative of the area of interest or of the Dane County population. Consequently, the main report includes the results of the random sample survey only. In the Appendix, we present comparisons between responses of residents in the random sample and of those who took the open-access survey.

The key findings of the random sample survey are as follows:

Current Broadband Accessibility in Dane County

- A large majority of residents (83%) indicated that they access internet at home through a monthly subscription to internet services. About 12% indicated that they have access through a smartphone data plan or hotspot online, and the remaining 5% indicated that they have no access to internet services at all.
- Among those who indicated that they do not have access, about half of the residents stated that they do not need internet services, over one-third (34%) reported that internet service is not affordable, and 15% reported that either internet services are not available in their area or that they have concerns about online privacy. Residents in the South region are much more likely to indicate that services are not available in their area relative to residents in the North region.
- The most common way of accessing the internet at home is through cable service (37% of residents selected this option), followed by a landline or DSL (30%) and a smartphone data plan (19%). Residents of the North region are more likely to access internet through a landline or DSL while residents of the South region are more likely to access it through an antenna/modem or fixed wireless.
- The three most popular internet service providers are Spectrum/Charter (used by 36% of households), TDS (20%), and Frontier (13%). TDS and CenturyLink/Lumen are more prevalent in the North region while Spectrum/Charter and Litewire are more popular in the South region.

Quality of Internet Services

- About 40% of residents reported download speeds of 20 Mbps or less and another 40% reported upload speeds of less than 5 Mbps. It can be inferred that at least 40% of Dane County residents do not have access to broadband internet (defined as download speeds of at least 25 Mbps and upload speeds of 3 Mbps). The actual proportion of residents without broadband access is likely much higher.
- Just under half (49%) of all residents are satisfied with their internet services. Residents in the North region are substantially less satisfied with their internet service relative to residents in the South. Cost of services is the main reason for dissatisfaction, followed by slow speeds and unreliability.
- Over one-third of residents expressed dissatisfaction with using the internet for either telecommuting, home entertainment, distance education, or managing their farm or business during COVID-19.

Demand for Broadband Services

- About 79% of households have at least one daily user in the age group 46 to 64 years, 65% of households have at least one daily user in the age group 26 to 45 years, and 71% of households have at least one senior (65+) who uses the internet daily.
- Most popular uses of internet, in decreasing order, include entertainment, accessing medical information or services, telecommuting, and education.
- About 26% of residents indicated that they would be "somewhat likely" or "very likely" to start, grow or move a business if better internet was available and about 43% stated the same about telecommuting. Residents in the North region are more likely to telecommute if better internet was available relative to residents in the South.
- A large majority (70%) of residents who work in agriculture stated that broadband internet is "valuable" or "very valuable" for agricultural business.

Cost and Willingness to Pay for Internet Services

- About 37% of respondents pay $60 or less for internet, and another 40% pay between $61 and $80 per month. Just under a quarter (23%) of residents pay more than $80 per month.
- The willingness to pay for services is significantly lower than the current cost residents are paying. While about 63% of all respondents pay more than $60 monthly for internet, only 31% have a willingness to pay of greater than $60 per month. That is, residents have no other option but to pay more than what they consider affordable for the internet speeds they get. There are no statistically significant differences between residents in the North and South in their willingness to pay.

Open-Ended Comments

- Slow speeds and unreliable service were two of the most popular topics that residents commented on. Residents feel that the poor quality of services in their area impedes them from using internet for telecommuting, education, streaming, running a business, etc.
- Availability and coverage of internet services were the next most popular topics that residents commented on. About 16% of residents indicated that services are not available in their area, only available through a smartphone data plan, or that they are right on the edge of where coverage ends.
- A substantial proportion of residents indicated that having more options for internet service providers in their area would be beneficial. The general sentiment among these residents was that more options would lead to greater competition and lower cost of services, which they stated are currently too expensive.

BACKGROUND AND SURVEY METHODOLOGY

In September 2021, the SRC was approached by Sharon Lezberg, Community Development Educator with UW-Madison Extension Dane County, and the Dane County Broadband Task Force to conduct a survey of broadband access in rural areas of Dane County, WI. The SRC assisted in determining the target population and the development of the survey questionnaire. All tasks associated with survey implementation, including distribution of the questionnaire, data collection and compilation, analysis, and reporting were completed by the SRC. Maps of internet speed included in this report were generated by the Dane County Department of Planning and Development.

Target Population

The survey targeted areas of Dane County believed to be underserved by internet providers. The City of Madison and surrounding villages and townships with high broadband availability, as identified by American Community Survey (ACS) estimates and Federal Communications Commission (FCC) data, (for example, Village of Waunakee and Town of Verona) were excluded from the target population. The remaining area of Dane County was further subdivided into two populations of interest: the North region and the South region. Demarcation of the North and South regions was done using Census Tract boundaries.

1. North: The North region was considered to be the "severely underserved" population because based on the ACS and FCC data the North area was found to contain several large Census Blocks where broadband internet was not available. This area included all Census Tracts to the north of the Town of Vermont, Town of Springdale, Town of Cottage Grove, Village of Cottage Grove, and Town of Deerfield. In addition to excluding the City of Madison and surrounding high-access areas, the North area also excluded areas where 80% of more households have a broadband internet subscription (such as Village of DeForest).

2. South: The South region was considered to be the "marginally underserved" population. According to the ACS and FCC data, there are a large number of Census Tracts in this area in which less than 75% of households had a broadband internet subscription, but there are very few Census Blocks with no availability of broadband internet. This area includes all Census Tracts to the south of the Town of Black Earth, Town of Cross Plains, Town of Sun Prairie, and Town of Medina. Like the North region, areas where 80% or more households have a broadband internet subscription were excluded, in addition to the City of Madison and surrounding high-access areas.

The Random Sample Survey

The survey was launched in February 2022 and data collection was completed in April 2022. The SRC mailed a paper survey questionnaire and cover letter to a random sample of 1,718 households in the North region and 1,731 households in the South region. The cover letter included a URL and QR code to an identical online version of the survey for respondents who preferred to take the survey in that format. Each survey was assigned a survey ID so that individual responses could be

linked to the households in the random sample. A postcard reminder was sent to non-respondents about three weeks after the initial mailing and a second survey questionnaire was mailed to non-respondents about three weeks after the postcard reminder.

The SRC needed 378 responses from residents of the North region and 381 responses from residents of the South region to construct statistically reliable estimates for each region. For statistical reliability, we used the standard of +/- 5% margin of error and 95% confidence interval. That is, if the survey was repeated 20 times, only once would the average response deviate by greater than 5% from the estimates in this report. The actual number of responses received was 409 responses from the North region and 412 responses from the South region. Therefore, the estimates presented in this report have a smaller margin of error and a much higher validity than the statistical standard of +/- 5% margin of error and 95% confidence interval.

The Open-Access Survey

In addition to collecting data from residents in the random sample, the online version of the survey was made available to other residents of Dane County who wished to take the survey. The survey link was promoted by the Dane County Broadband Task Force through various channels. The purpose of this "open-access survey" was to collect additional responses on internet speeds for creating internet speed maps, and to give residents an equitable opportunity to express their views about their internet service. Since data collected from the open-access survey is not likely to be representative of the study area (the North and South regions) and Dane County as a whole, they are presented separately in the Appendix at the end of this report. In that section, we also discuss the differences between the responses of the two groups of residents.

Analysis and Report

In the following analysis, where appropriate we present responses sorted by ranking (or popularity). For questions that require respondents to indicate their level of agreement, response categories are ranked based on decreasing level of agreement, that is, from the highest level of agreement (for example, "very satisfied" or "strongly agree") to the lowest level of agreement (for example, "very dissatisfied" or "strongly disagree"). For the ranking, we calculated a score for each category by assigning a weight based on the level of agreement. That is, for the question that asks about the level of satisfaction with using the internet during COVID-19, a "very satisfied" response is assigned a weight of 4 (the highest weight possible) and a "very dissatisfied" response is assigned a weight of 1 (the lowest weight possible). The weights are then multiplied by the proportion of respondents who selected that response to calculate the overall score.

In the following analysis, in addition to presenting aggregate responses to survey questions, we also present differences between residents in the North and South regions and the statistical significance of those differences. Given the differences in internet availability between the two regions suggested by ACS and FCC data, it is likely that residents in these two regions have different views on internet access and need. As discussed later in the report, survey results suggest that the two regions do have statistically significant differences across several measures.

Throughout the report, differences are presented in tables as probabilities and statistically significant estimates are indicated in **bold** font. Estimates shown in these tables can be interpreted as the difference between two samples in the proportion of residents who selected a certain

response. Estimates with a positive sign represent a positive difference and those with a negative sign represent a negative difference between residents. For example, for the North versus South region comparisons, a positive estimate indicates that the proportion of North residents that selected that response exceeds the proportion of South residents that selected that response. Similarly, when comparing the responses of the random sample with the responses of the open-ended survey, a positive sign indicates that the proportion of residents in the random sample exceeds the proportion of residents who took the open-access survey.

In the following report, we start by analyzing survey questions that show the current state of internet availability in Dane County, including the proportion of residents with no internet, types of internet access, etc. The next section presents survey responses that show the quality of internet services available to Dane County residents, such as download and upload speeds. This section also includes internet speed maps of Dane County. The subsequent section considers the demand for broadband services in the county, given by the number of daily internet users, activities that residents use the internet for, and the impact of internet availability on business and telecommuting. In the next section, we show the monthly cost of internet that residents pay and compare that to residents' willingness to pay for internet services. We then summarize the common themes that emerged from responses to the open-ended questions, followed by a conclusion section. In the Appendix, we discuss the responses to the open-access survey and provide a comparison with the results of the random sample.

CURRENT BROADBAND ACCESSIBILITY

Types of Dwellings

Figure 1 shows the proportion of respondents that live in different types of dwellings. An overwhelming majority of respondents (91%) reported living in owned single-family homes. Only a handful (about 3%) of respondents selected each of the other options. This is not surprising since the study area included mostly rural parts of Dane County and excluded the greater-Madison area where rental units are more prevalent. Respondents were allowed to select an "Other" option and provide a type-written response to this question. The 8 comments received included "farm," "owned mobile home," "elderly housing," "condo," etc.

Figure 1. Current Place of Residence of Respondents

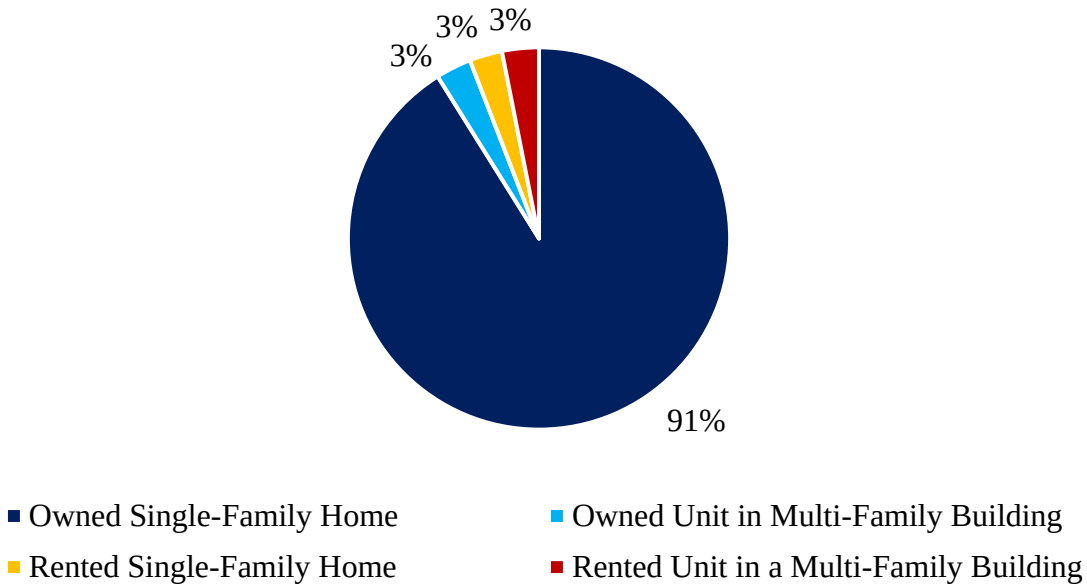


Table 1 shows the differences between the North and South regions in the proportion of respondents who live in each type of dwelling. Note that throughout the report, statistically significant differences are shown as **bold** numbers in the Difference column. Figure 1 shows that similar proportions of respondents live in each type of dwelling. There are no statistically significant differences between the two regions.

Table 1. Current Place of Residence by Region

	North	South	Difference
Owned Single-Family Home	91%	92%	-1%
Owned Unit in Multi-Family Building	3%	3%	-1%
Rented Single-Family Home	3%	3%	0%
Rented Unit in a Multi-Family Building	4%	2%	2%

Internet Access at Home

Respondents were asked to describe how they access internet services at home. Figure 2 summarizes their responses. As shown in the figure, about 83% of respondents stated they have access through a monthly internet subscription (for example, DSL and fiber optic). About 12% of respondents stated they have internet access through their smartphone data plan or hotspot only. The remaining 5% of respondents indicated that they do not have access to internet at all at their residence.

Figure 2. Internet Access at Home

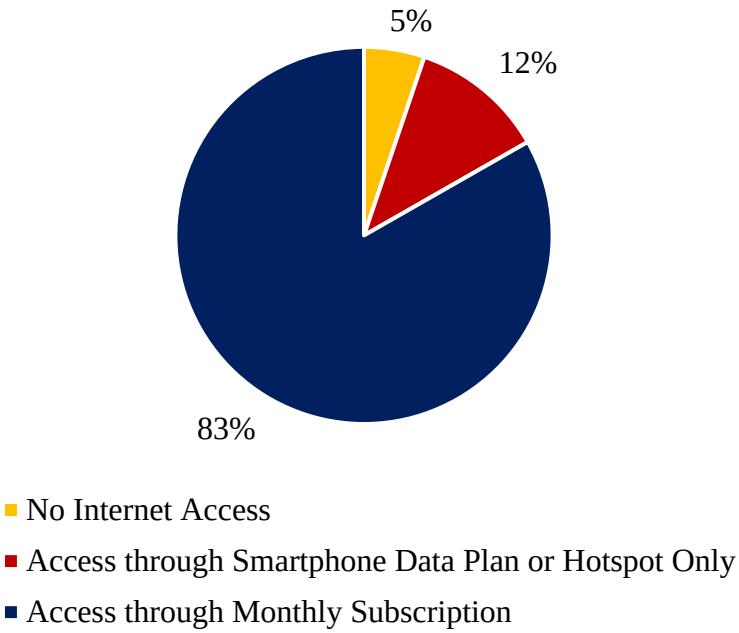


Table 2 shows that a slightly larger proportion of residents in the North region have no internet access and a slightly smaller proportion of residents in the North region have access only through a smartphone data plan or hotspot relative to the South region. However, none of the differences between the two regions are statistically significant.

Table 2. Internet Access at Home by Region

	North	South	Difference
No Internet Access	6%	4%	2%
Access through Data Plan or Hotspot Only	10%	13%	-2%
Access through Monthly Subscription	83%	83%	0%

Reasons for No Internet Access at Home

Residents who reported not having any internet access at home were asked to provide reasons for their lack of access. Respondents were allowed to select multiple reasons. Figure 3 summarizes their responses. The number one reason, as reported by just under half of all respondents, was that they do not need internet. The second most popular reason, selected by about one-third of respondents, was that internet services are too expensive. Lack of availability and concerns about online privacy were the next two major impediments for respondents.

Less than 10% of respondents indicated that unreliable service and lack of speed prevent them from having internet at home. Interestingly, while lack of speed is not an impediment for purchasing internet services, it is an important source of dissatisfaction among those who do have internet at home. As shown in Figure 11 later in the report, about one-third (32%) of respondents indicated that they are dissatisfied with the speed of their internet services.

Figure 3. Reasons for Not Having Internet Access

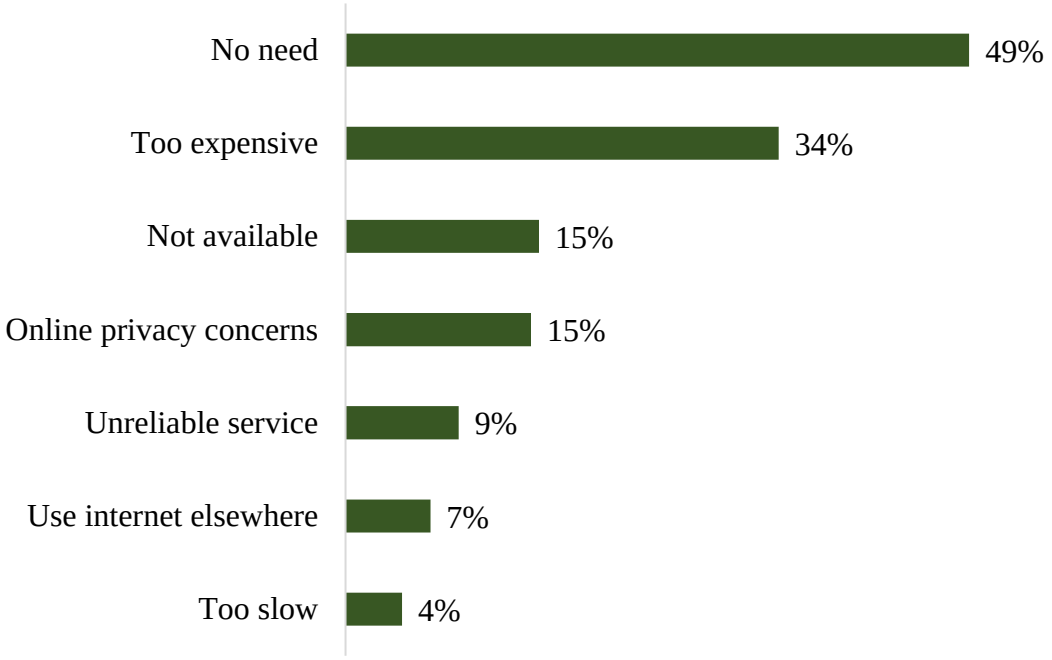


Table 3 (on the next page) shows the differences between the North and South regions in the proportion of residents who selected each reason listed in Figure 3. Note that only residents who indicated not having internet access at home were asked this question. The only statistically significant result is that residents in the North region are 24% less likely to indicate that services are not available where they live relative to South residents. Interestingly, while North residents have reported slower internet speeds and lower overall satisfaction with internet services, lack of availability is not an impediment for this population relative to residents in the South region. Instead, among those who do have a need for internet, the primary reason for lack of access seems to be cost, as also evidenced by the results of Figure 3.

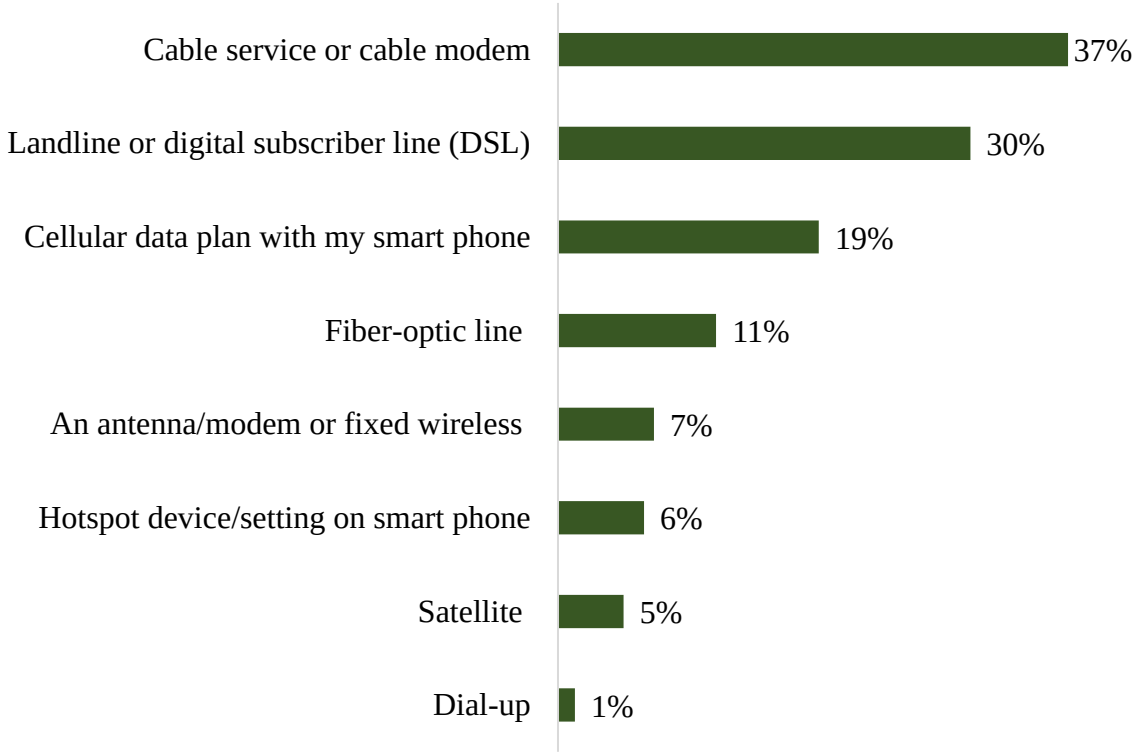
Table 3. Reasons for Not Having Internet Access by Region			
	North	South	Difference
I have no need	40%	60%	-20%
Service is too expensive	26%	39%	-13%
Service is not available where I live	4%	28%	**-24%**
Concerns about online privacy	11%	6%	6%
Service is inconsistent or unreliable	7%	11%	-4%
I use the internet somewhere else	4%	11%	-7%
Service is too slow	4%	6%	-2%

How Residents Access Internet at Home

Figure 4 shows the proportion of residents that selected each method of accessing the internet at home. Respondents were allowed to select multiple methods. Cable service (or cable modem) is the most popular method. Well over one-third of all respondents selected this option. The second most popular method is DSL (or landline) as this option was selected by close to one-third of all respondents.

About one-fifth (19%) of respondents indicated that they use their smartphone data plan to access the internet at home. It is noteworthy that about two-thirds (67%) of respondents who selected this option also indicated that they have a monthly internet subscription at home (Figure 2). Moreover,..

Figure 4. How Residents Access Internet at Home



…about one-third of the respondents who selected hotspot device/smartphone setting in Figure 4 also indicated having a monthly internet subscription at home. These results imply that for these residents the monthly internet subscription does not adequately fulfill their demand for internet services, which may be due to lack of reliable services or sufficient bandwidth to support all members of the household, leading them to supplement subscription-based internet with a cellular data plan or hotspot.

Table 4 shows differences in types of internet access between residents of the North and South regions. Among statistically significant differences, North residents are 17% more likely to have access through a landline (or DSL) and 8% less likely to have access through an antenna/modem or fixed wireless. A possible explanation is that the North region's terrain is less conducive to fixed wireless.

Table 4. How Residents Access Internet at Home by Region

	North	South	Difference
Cable service or cable modem	35%	40%	-5%
Landline or digital subscriber line (DSL)	38%	22%	**17%**
Cellular data plan with my smart phone	19%	19%	-1%
Fiber-optic line	11%	12%	-1%
An antenna/modem or fixed wireless	3%	11%	**-8%**
Hotspot device/setting on smart phone	6%	7%	-1%
Satellite	4%	5%	-1%
Dial-up	1%	1%	0%

Internet Providers Used by Respondents

Figure 5 (on the next page) shows the internet service providers that serve households in the study area. By a wide margin, Spectrum/Charter is the most common internet service provider. Well over two-thirds (36%) of all respondents selected this provider. One-fifth (20%) of all respondents selected the second most popular internet service provider TDS. In addition, Frontier provides internet services to about 13% of households in the study area, making it the third most popular service, followed by US Cellular which serves 8% of all households.

Small proportions (less than 10%) of respondents selected any of the other options shown in Figure 5. The Other category includes, in addition to text-written comments provided by respondents, providers that 1% or less of all respondents selected such as Netwurx, Viasat, and Earthlink.

Table 5 (on the next page) shows differences between the proportion of residents in the North and South regions who utilize the internet providers listed. Among statistically significant differences, North residents are 8% less likely to use Spectrum/Charter and 6% less likely to use Litewire relative to South residents. Similarly, North residents are 14% more likely to use TDS and 9% more likely to use CenturyLink/Lumen. Note that no North resident reported using Litewire and no South resident reported using CenturyLink/Lumen.

Figure 5. Internet Providers Used by Residents

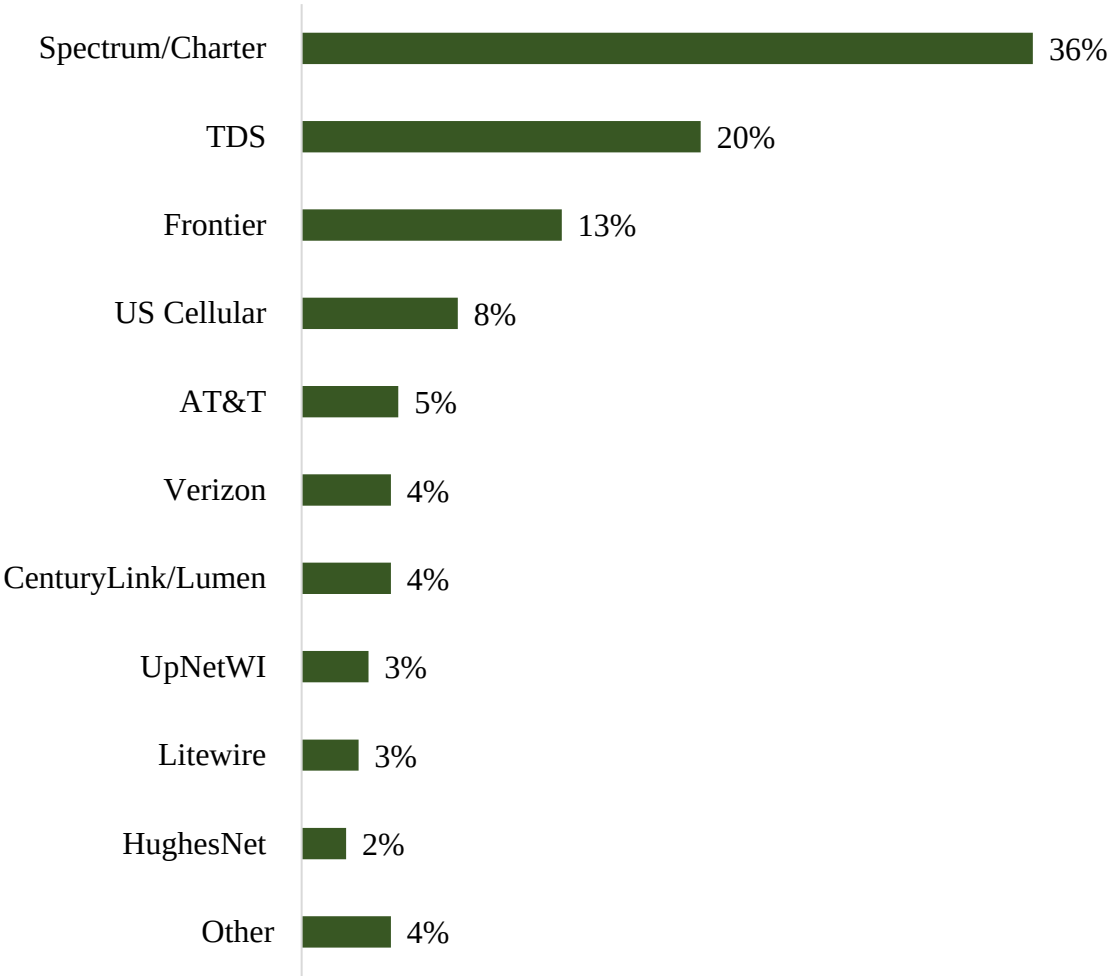


Table 5. Internet Providers by Region

	North	South	Difference
Spectrum/Charter	32%	40%	**-8%**
TDS	26%	13%	**14%**
Frontier	13%	12%	1%
US Cellular	8%	8%	0%
AT&T	3%	6%	-3%
Verizon	4%	4%	0%
CenturyLink/Lumen	9%	0%	**9%**
UpNetWI	2%	4%	-2%
Litewire	0%	6%	**-6%**
HughesNet	2%	2%	1%

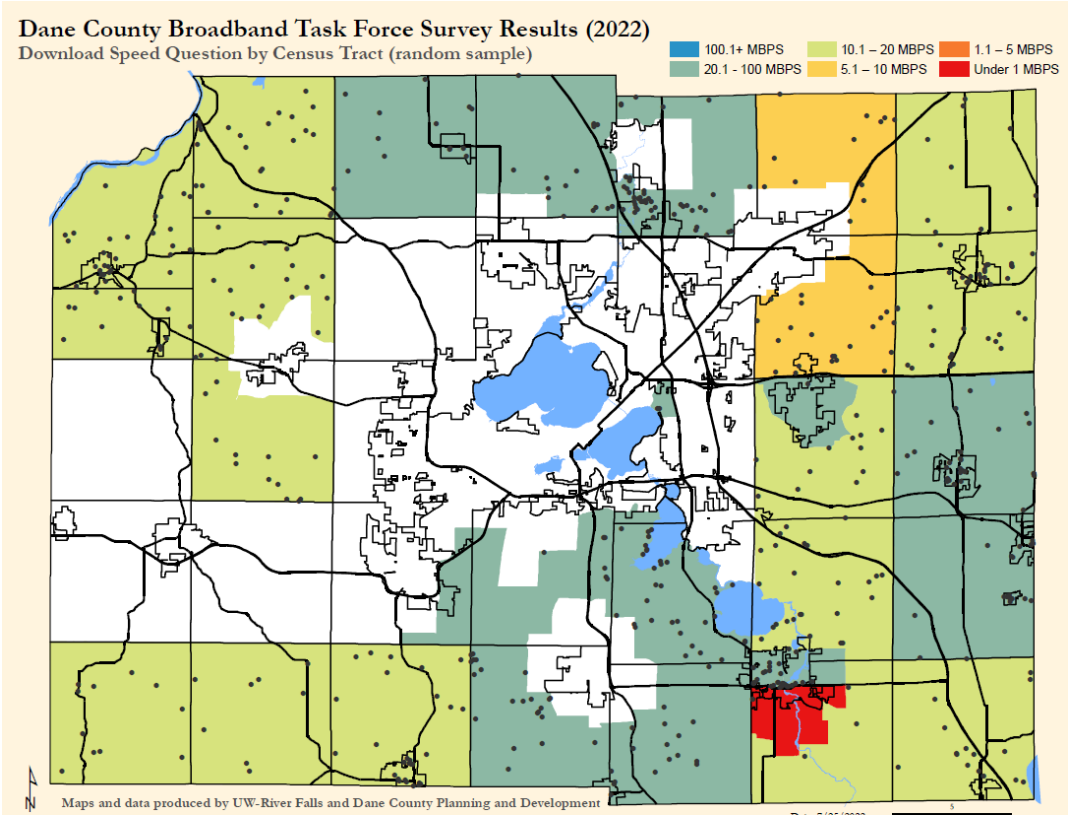
QUALITY OF INTERNET SERVICES

Average Internet Speeds

Respondents were asked to conduct a speed test on their internet browser and provide an estimate of their download and upload speeds. Only those respondents who indicated having internet services were routed to this question. Figures 6 and 7 depict download speeds by Census Tract and the distribution of download speeds across respondents, respectively. Figures 8 and 9 show upload speeds by Census Tract and the distribution of upload speeds across respondents, respectively.

Figure 6 shows download speeds in Dane County by Census Tracts. Census Tract colors represent different download speeds and the Census Tracts colored white represent areas for which data is not available. Recall that cities and towns outside of the greater-Madison area that were known to have high proportions of residents with access to internet services were excluded from the study region. Individual households that provided data on download speeds are shown using black dots. The map was created by calculating the average speed for all respondents within a Census Tract. For example, in the top-right corner of the map, the light-green shaded Census Tract shows that the average download speed among all respondents who reside in that Census Tract was in the range of 10.1 to 20 Mbps. With the exception of a portion of the City of Stoughton, it seems that the South region has faster download speeds in a larger geographic area than the North region.

Figure 6. Download Speeds by Census Tract[1]



[1] This map was created by Aaron Krebs and Curt Kodl at the Dane County Department of Planning and Development using survey data provided by the SRC.

Figure 7 shows the distribution of download speeds and the proportion of residents that reported them. Results show that about 40% of all respondents who have internet services at home receive download speeds of 20 Mbps or less. Note that the FCC defines broadband internet as having download speeds of 25 Mbps or more. Therefore, Figure 7 shows that at least 40% of households in the study area do not have access to broadband internet services.

Figure 7. Download Speeds Reported Using Speed Test

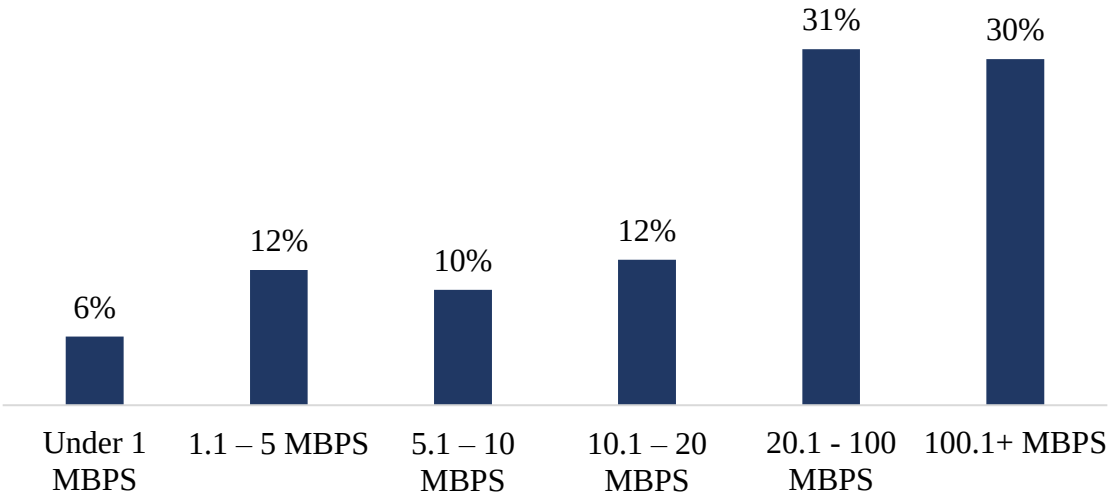


Table 6 shows differences in download speeds between residents in the North and South regions. It can be inferred from the table that, on average, residents in the South region have higher download speeds relative to residents in the North region. A greater proportion of North residents have speeds lower than 10 Mbps and a greater proportion of South residents have speeds higher than 20 Mbps. Among statistically significant differences, North residents are 8% more likely to have download speeds between 1.1 and 5 Mbps and 8% less likely to have download speeds in the 20.1 to 100 Mbps range relative to South residents. These results are consistent with our supposition that the North region is "severely underserved" and the South region is "marginally underserved."

Table 6. Download Speeds Reported Using Speed Test by Region

	North	South	Difference
Under 1 Mbps	8%	4%	3%
1.1 – 5 Mbps	15%	8%	**8%**
5.1 – 10 Mbps	11%	8%	3%
10.1 – 20 Mbps	13%	12%	0%
20.1 – 100 Mbps	27%	35%	**-8%**
100.1+ Mbps	27%	33%	-6%

Figure 8. Upload Speeds by Census Tract[2]

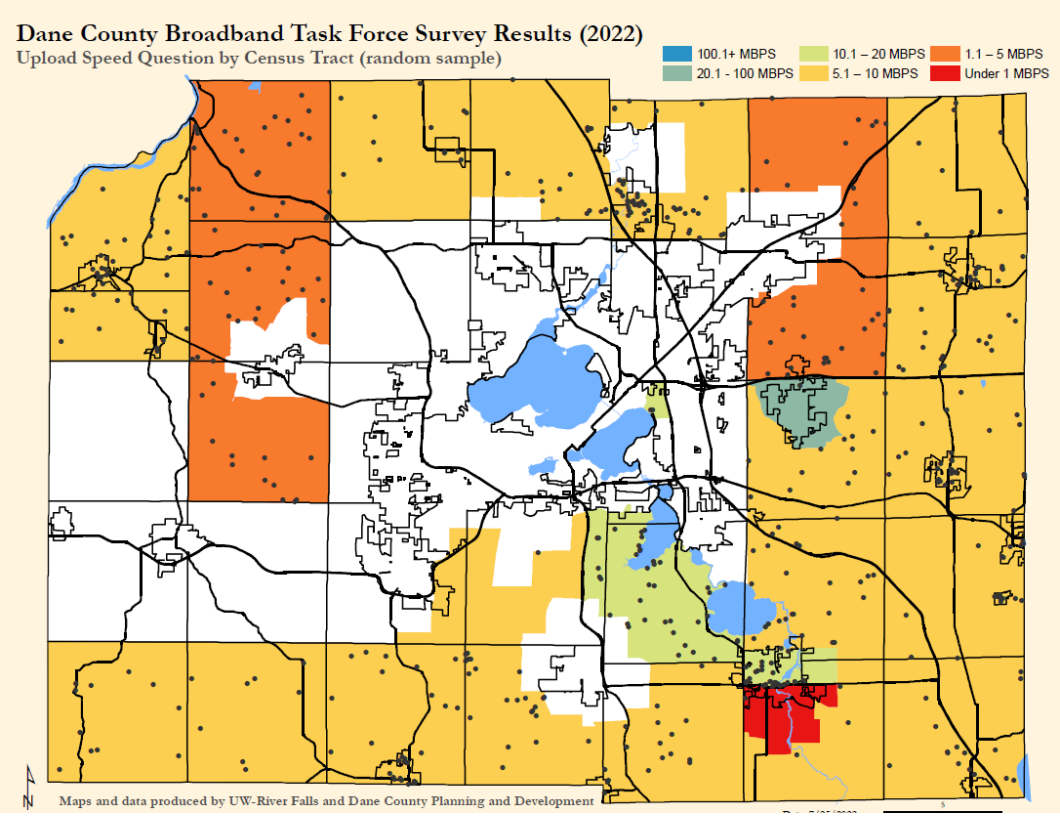


Figure 8 (above) shows upload speeds in Dane County by Census Tracts. Figure 8 was created using the same averaging method and depicts the same color scheme for upload speeds as for download speeds used in Figure 6. Note that the North region starts above Highway 94 on the east side of Dane County and the Village of Cottage Grove is included in the South region. Figure 8 shows that residents of the North region receive, on average, slower upload speeds relative to residents of the South region. No Census Tract in the North region has average upload speeds of greater than 5 Mbps. These results are largely consistent with those of Figure 6 and other survey data discussed in this report that the quality of internet services is generally poorer in the North region.

Figure 9 (on the next page) shows the distribution of upload speeds and the proportion of residents that reported them. About one-fifth (19%) of all respondents reported having upload speeds of less than 1 Mbps. Given that the FCC definition of broadband internet is based on upload speeds of 3 Mbps or less, households who selected this option do not meet the criteria for broadband access. In addition, about 21% of households who reported having greater than 1 Mbps upload speeds also reported having less than 20 Mbps download speeds. This implies that, similar to what we inferred from Figure 5, at least 40% of households (19% with less than 1 Mbps upload speeds and 21% with upload speeds of 1 Mbps or more) do not have broadband internet at home.

[2] This map was created by Aaron Krebs and Curt Kodl at the Dane County Department of Planning and Development using survey data provided by the SRC.

Figure 9. Upload Speeds Reported Using Speed Test

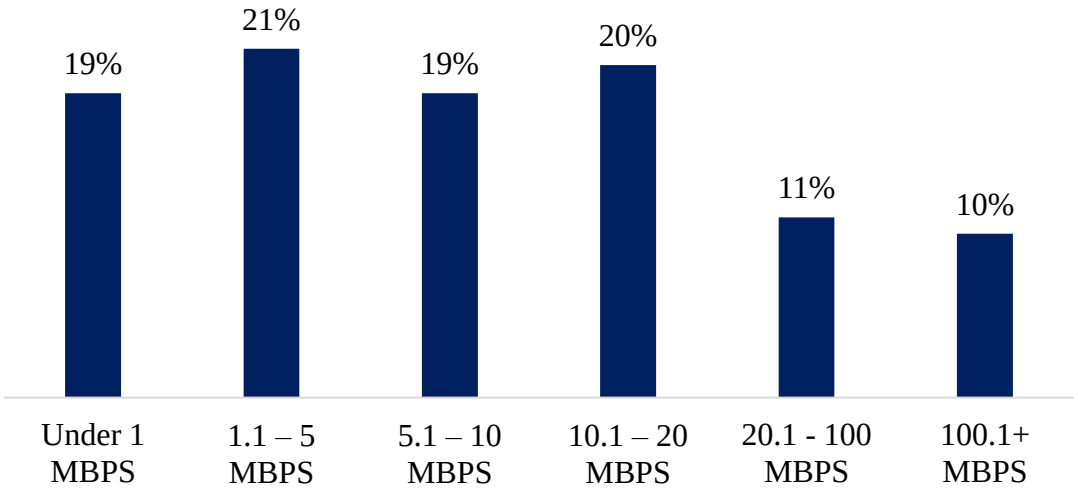


Table 7 shows differences in upload speeds between residents in the North and South regions. Similar to Table 5, it can be inferred from Table 6 that residents in the South region have higher upload speeds on average than residents in the North region. Among statistically significant results, residents in the North region are 11% more likely to have upload speeds less than 1 Mbps and 9% and 7% less likely, respectively, to have upload speeds in the 5.1 to 10 Mbps and 10.1 to 20 Mbps range. With one exception, greater proportions of South residents selected higher upload speeds relative to North residents.

Table 7. Upload Speeds Reported Using Speed Test by Region

	North	South	Difference
Under 1 Mbps	24%	13%	**11%**
1.1 – 5 Mbps	22%	20%	2%
5.1 – 10 Mbps	14%	23%	**-9%**
10.1 – 20 Mbps	17%	24%	**-7%**
20.1 - 100 Mbps	13%	9%	4%
100.1+ Mbps	9%	11%	-2%

Overall Satisfaction with Internet Service

Respondents who indicated having internet access at home were asked how satisfied they are with their services. Figure 10 (on the next page) summarizes their responses. About one-third (34%) of respondents selected “very dissatisfied” or “somewhat dissatisfied.” Half (49%) of all respondents indicated that they were “very satisfied” or “somewhat satisfied” with their services. That is, out of all households in the study area who stated they have internet access, only about half are satisfied with their service and about one-third (30%) are only somewhat satisfied.

Figure 10. Overall Satisfaction with Internet Service

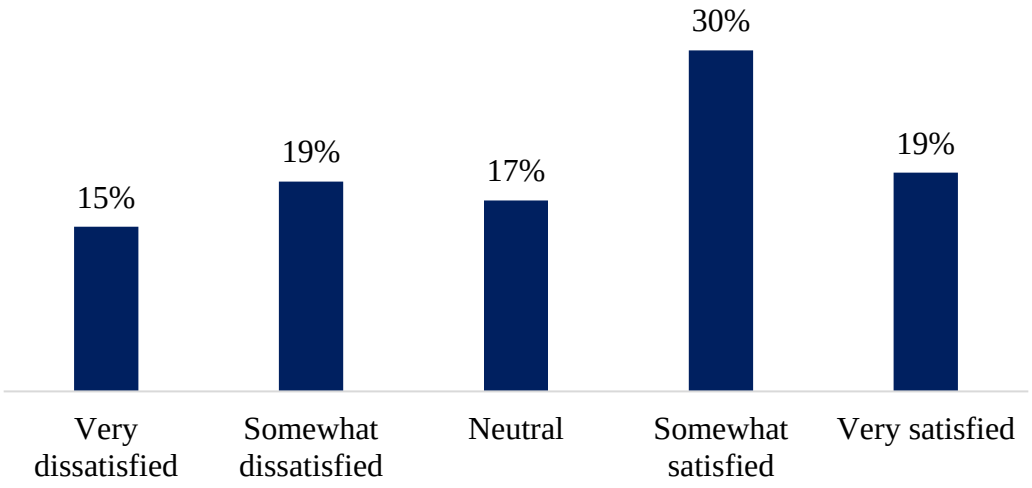


Table 8 shows differences between the proportion of residents in the North and South regions who selected each level of satisfaction with their internet service. Consistent with the results shown in Tables 6 and 7, the estimates in Table 8 show that residents of the North region have an overall lower level of satisfaction with internet services relative to residents of the South region. North residents are statistically significantly less likely to select "very satisfied" or "somewhat satisfied" and statistically significantly more likely to select "very dissatisfied" or "somewhat dissatisfied" than South residents. This is an expected result as North residents reported having lower download and upload speeds.

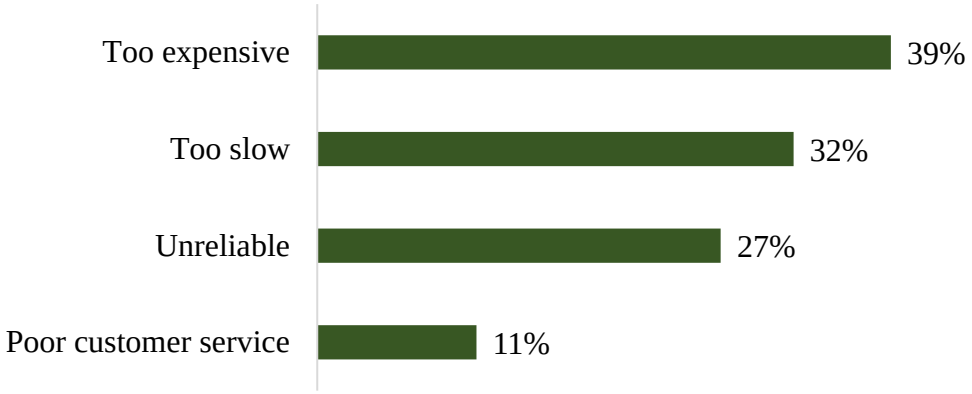
Table 8. Level of Satisfaction with Internet Service by Region

	North	South	Difference
Very satisfied	16%	22%	**-6%**
Somewhat satisfied	27%	34%	**-7%**
Neutral	16%	18%	-2%
Somewhat dissatisfied	22%	16%	**6%**
Very dissatisfied	19%	11%	**8%**

Reasons for Dissatisfaction with Internet Services

Figure 11 (on the next page) shows the reasons respondents are at all dissatisfied with their internet services. All those with internet access were asked this question. Respondents were allowed to select multiple reasons for their dissatisfaction. Respondents were also given an option to provide text-entry responses to an "Other" option. A total of 39 text-entry responses were received and these responses have been incorporated into the data shown in Figure 8. Only negligible proportions of respondents identified reasons other than the ones listed in the figure below.

Figure 11. Reasons for Dissatisfaction with Internet Services



The primary reason (selected by 39%) of all respondents was that their services are too expensive. Note that one-third (33%) of even those respondents who indicated being "very satisfied" with their services (Figure 10) selected this option. More than 50% of respondents who indicated being "somewhat satisfied" or less than somewhat satisfied stated that their services are too expensive. Clearly, cost is a major cause of dissatisfaction among residents.

The second most common reason for dissatisfaction was that internet services are too slow. Notably, this was the primary reason among those respondents who selected "very dissatisfied" or "somewhat dissatisfied" to the question regarding overall satisfaction in Figure 10. About 82% of respondents who selected "very dissatisfied" and about 62% of respondents who selected "somewhat dissatisfied" indicated that their internet services are too slow. The reliability of services was selected by over a quarter (27%) of all respondents and only 11% of respondents indicated being dissatisfied with customer service.

Table 9 shows differences in the reasons for dissatisfaction between the North and South residents. The only statistically significant result is that North residents are 14% more likely than South residents to state that their internet services are "too slow." This is not surprising given that North residents reported having slower download and upload speeds. Among other results, South residents are less likely to indicate, albeit not statistically significantly, that their internet services are "too expensive."

Table 9. Reasons for Dissatisfaction with Internet Service by Region

	North	South	Difference
Too expensive	37%	41%	-4%
Unreliable	25%	27%	-2%
Too slow	38%	24%	**14%**
Poor customer service	12%	10%	2%

Satisfaction with Internet Services During COVID-19

The survey asked respondents to rank their level of satisfaction with using their home internet services for various activities during the COVID-19 pandemic. Figure 12 summarizes the responses. Generally, residents are satisfied with using their internet for paying bills (such as rent, mortgage, and car) and for telemedicine. Less than one-third of respondents indicated being "somewhat dissatisfied" or "very dissatisfied" with paying bills (21%) and telemedicine (29%). However, residents have much lower satisfaction with tasks that are conducted on a more regular basis such as telecommuting, home entertainment (e.g. streaming), and distance education. One-third or more of all respondents indicated being "somewhat dissatisfied" or "very dissatisfied" with using the internet for these tasks. In addition, about 39% of respondents expressed dissatisfaction with using the internet to manage their farm or business.

Respondents were also allowed to specify through text entry an activity not listed in the question and indicate their level of satisfaction. Several residents expressed dissatisfaction with using the internet for teleconferencing, primarily for communicating with friends and family. Others indicated that entertainment activities, such as gaming, streaming, and online shopping were challenging during COVID-19. Slow speeds, unreliable service, and cost were listed as reasons for dissatisfaction by several residents.

Figure 12. Satisfaction with Internet Service During COVID-19

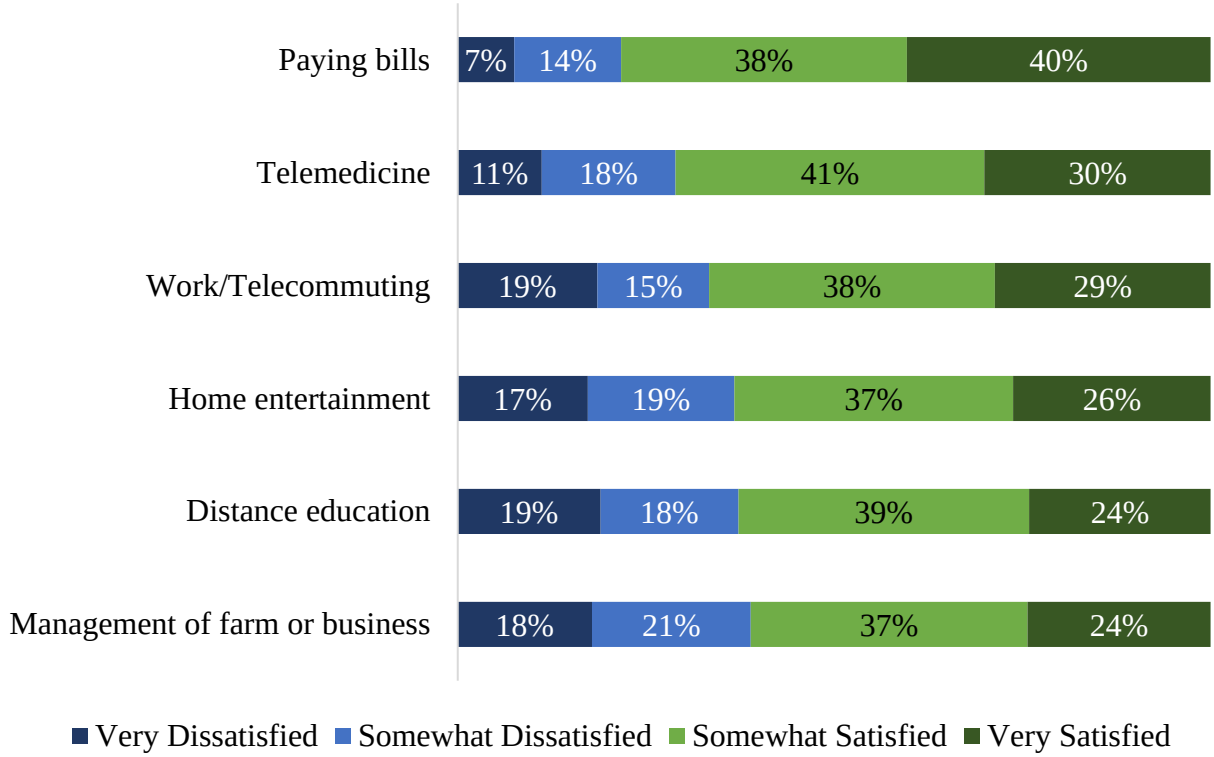


Table 10 shows differences between the North and South region in the proportion of residents who selected “very satisfied” or “somewhat satisfied” with each task listed in Figure 12. A noteworthy result is that North residents reported lower satisfaction with every task listed. In addition, with the exception of work/telecommuting, all differences are large and statistically significant. While lower satisfaction among North residents is also shown in Table 8, the estimates in Table 10 are substantially larger, which implies that the digital divide between the North and South regions was exacerbated during the COVID-19 pandemic.

Table 10. Satisfaction with Internet Services During COVID-19 by Region

	North	South	Difference
Paying bills	75%	82%	**-7%**
Telemedicine	65%	78%	**-12%**
Work/Telecommuting	65%	68%	-3%
Home entertainment	58%	69%	**-11%**
Distance education	56%	70%	**-14%**
Management of farm or business	55%	69%	**-14%**

DEMAND FOR BROADBAND SERVICES

Number of Daily Users of Internet by Age Group

Figure 13 (on the next page) shows the number of household members, by age group, that use the internet on a daily basis. The blue bars in Figure 13 represent households in which no member of that age group uses internet that frequently and the green bars depict the number of members that use the internet daily, with darker shades of green representing a greater number of household members.

To determine a relative ranking for factors, the SRC used a weighting system, which entailed assigning four points to each household that has 4+ members, three points to each household that has 3 members, two points to each household that has 2 members, and one point to each household that has only one member in that age group. For example, for Older Adults (46 -64),

- 3 households had 4+ members who used internet daily, or 12 weighted votes (3 × 4)
- 6 households had 3 members who used internet daily, or 18 weighted votes (6 × 3)
- 240 households had 2 members who used internet daily, 480 weighted votes (240 × 2)
- 145 households had 1 member who used internet daily, or 145 total votes (145 × 1)
- Thus, the point total for older adults was 655 (12 + 18 + 480 + 145), which is the highest score among all age groups.

Figure 13 shows that older adults (age 46 to 64) are the largest group of daily users of internet services. About 4 out of 5 households have at least 1 older adult who uses internet daily. Adults (age 26 to 45) are the next largest group of daily internet users. It is not surprising that these age groups are the two largest groups of internet users as they also comprise the largest proportion of the Wisconsin population. Given that the study area excludes the City of Madison and surrounding urban areas, which tend to have a younger population, these two age groups likely comprise a greater proportion of the study area than of the state of Wisconsin. Another possible reason is that these two age groups include individuals who are most likely to have transitioned to working from home during the COVID-19 pandemic.

Seniors (age 65 and over) are the third largest group of daily internet users, with around two-thirds of all households having at least 1 senior member who uses the internet daily. Not surprisingly, well under half of all households have children (age 1 to 12), teens (age 13 to 17), and young adults (age 18 to 25) who use their home internet services daily. These age groups are generally outnumbered in size by residents in other age groups.

Table 11 (on the next page) shows the difference between the North and South regions in the proportion of households that have at least 1 daily user of internet services (or potential user if internet was available) in each age group. The results suggest that there is very little (if any) difference between the two regions in the age profile of daily users. Not only are all the differences small, but none are statistically significant.

Figure 13. Number of Household Members by Age Group that Use Internet Daily

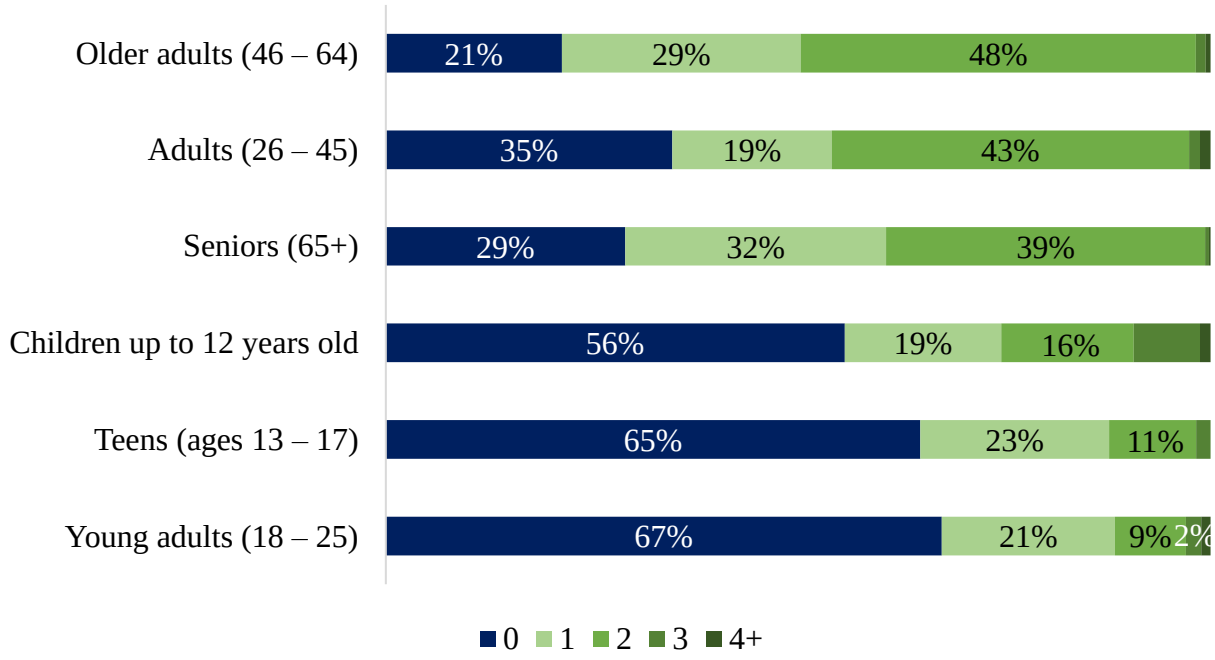


Table 11. Number of Daily Internet Users by Region

	North	South	Difference
Older adults (46 – 64)	79%	78%	1%
Adults (26 – 45)	64%	66%	-2%
Seniors (65+)	72%	70%	2%
Children up to 12 years old	43%	46%	-2%
Teens (ages 13 – 17)	35%	36%	-1%
Young adults (18 – 25)	32%	33%	-1%

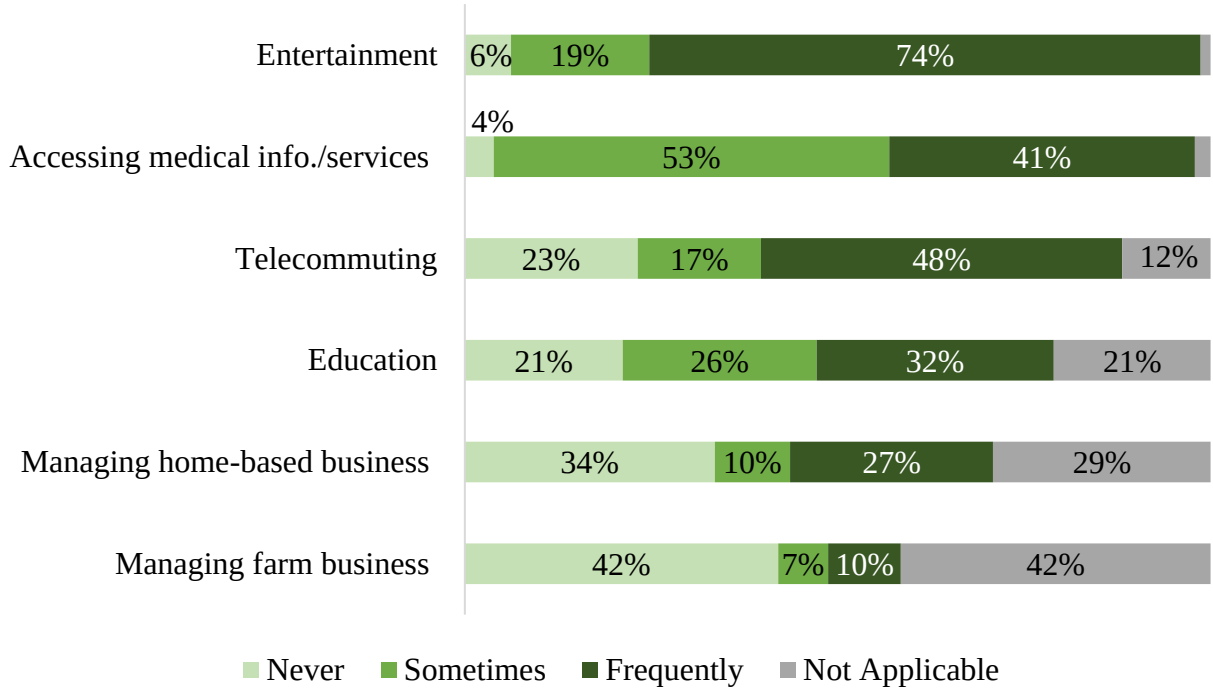
What Households Use Internet Services For

Figure 14 (on the next page) shows the various uses for which households currently utilize internet services, or would utilize services if internet was available. The uses are sorted by popularity using a weighting scheme similar to the one used for Figure 13, with the option "frequently" being assigned the largest weight. The gray bar shows the proportion of respondents who selected "not applicable" to each use, indicating that they do not utilize their home internet for that purpose.

Figure 14 shows that the most popular use of internet services is for entertainment (for example, for streaming movies). Incidentally, in Figure 12 we showed that about 37% of residents in the study area are "somewhat dissatisfied" or "very dissatisfied" with using their home internet services for entertainment purposes. Accessing medical information and services is the second…

Continued on the next page.

Figure 14. What Households Use Internet Services For



… most popular use, although much fewer households use internet as frequently for this purpose as entertainment. Telecommuting (that is, work from home) and education (e.g., attending classes or doing homework) are the next two most popular uses, with about half (48%) of households indicating that they use their home internet for telecommuting "frequently" and about one-third (32%) indicating the same for education. The smallest proportion of households stated they use their home internet for managing a home-based business or a farm business.

Table 12 shows differences between the North and South regions in the proportion of households that use the internet "frequently" for each activity listed in Figure 14. Except for telecommuting, the proportion of households in the two regions is quite similar for all activities. It is notable that while residents in the North and South regions use internet services in a very similar way, the quality of and satisfaction with internet services is much lower among residents of the North region.

Table 12. What Households Use Internet for by Region

	North	South	Difference
Entertainment	74%	74%	0%
Accessing medical information/services	41%	41%	0%
Telecommuting	51%	45%	6%
Education	32%	32%	0%
Managing my home-based business	29%	26%	3%
Managing my farm business	11%	9%	2%

How Better Internet Would Impact Business and Telecommuting

Respondents were asked about their likelihood of starting, moving, or growing a home-based business and of telecommuting to a job if faster and more reliable internet services were available to them. In other words, these questions determine how large of an impediment lack of fast and reliable internet services are for business and telecommuting. Figures 15 and 16 summarize the responses to the two questions.

Figure 15 shows the likelihood that the respondent would start, move, or grow a home-based business if they had access to improved internet services. About a quarter (26%) of respondents selected "somewhat likely" or “very likely.” In other words, lack of access to better internet services poses an impediment for about a quarter of households in the study area. Given that only about 10% of the U.S. population is categorized as self-employed (Bureau of Labor Statistics, 2015), the 26% proportion of respondents who consider lack of fast and reliable internet an impediment to business growth represents a significant economic loss for the Wisconsin economy.

Similarly, Figure 16 (on the next page) shows the likelihood of respondents telecommuting to a job if better internet was available. A staggering 32% of respondents selected “very likely” and another 11% selected “somewhat likely” in response to this question. The lack of fast and reliable internet is clearly a substantial hurdle for residents of the study area. These results imply that better internet services would allow residents to gain more flexibility in their job or potentially switch to occupations that better match their work-life needs. Again, the lack of job mobility resulting from less-than-optimal internet services is an important economic loss.

Table 13 (on the next page) shows differences between the North and South regions in the likelihood of starting, moving, or growing a business and telecommuting to a job if better internet was available. There are no statistically significant differences between the two regions in the likelihood of starting, moving, or growing a business. Regarding telecommuting, residents in the North region are 8% more likely to select very likely relative to residents of the South region. This result, paired with results shown in Table 12, implies that the North region has a higher proportion of residents who consider poor internet services to be an impediment for telecommuting.

Figure 15. Likelihood of Starting, Moving, or Growing a Business if Better Internet was Available

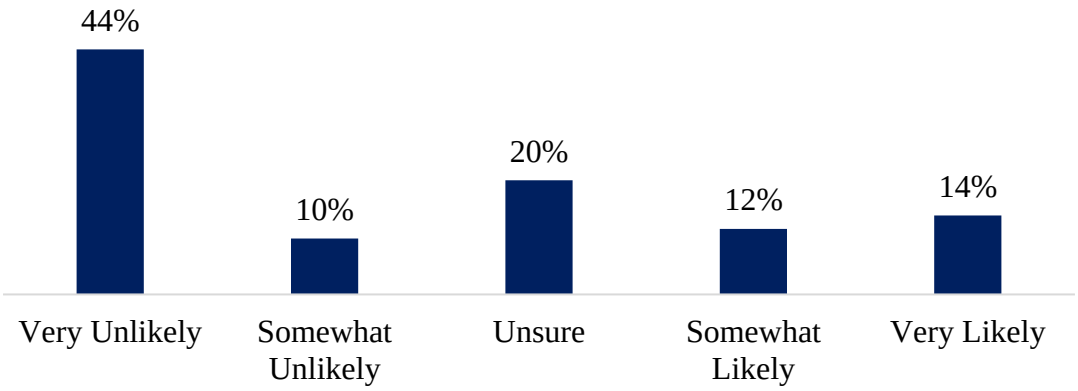


Figure 16. Likelihood of Telecommuting to a Job if Better Internet was Available

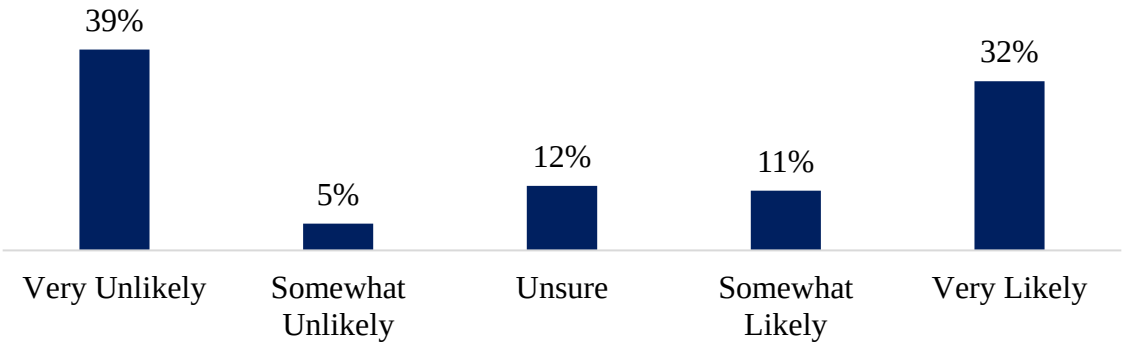


Table 13. Impact of Better Internet on Business and Telecommuting by Region

	North	South	Difference
Starting, Moving, or Growing a Business			
Very Likely	16%	12%	4%
Somewhat Likely	12%	12%	0%
Unsure	20%	21%	-1%
Somewhat Unlikely	11%	9%	2%
Very Unlikely	42%	46%	-4%
Telecommuting to a Job			
Very Likely	36%	28%	**8%**
Somewhat Likely	11%	12%	-1%
Unsure	12%	13%	-1%
Somewhat Unlikely	5%	5%	0%
Very Unlikely	36%	40%	-4%

Importance of Broadband Internet for Agricultural Businesses

Figure 17 shows how valuable owners of agricultural businesses consider broadband internet to be for their business. About 70% of respondents stated that broadband internet is "valuable" or "very valuable." Only about 8% indicated that broadband internet is "not at all valuable."

Table 14 (on the next page) shows the difference between the North and South regions in how valuable residents in the agriculture industry consider broadband internet to be for their agricultural business. While estimates are not statistically significant, they imply that South residents consider broadband internet to be more valuable relative to North residents, as a greater proportion of South residents selected "very valuable" and "valuable" and a greater proportion of North residents selected "slightly valuable." Note that even large differences can lack statistical significance when sample sizes are small. In this case, only 77 residents in the South region and 88 residents in the North region indicated that they are in the agriculture industry and responded to this question.

Figure 17. Value of Broadband Internet for Agricultural Business

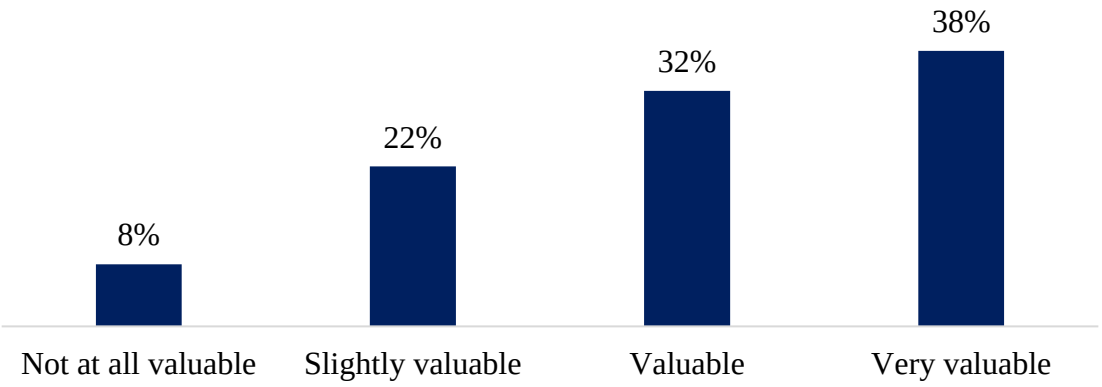


Table 14. Value of Broadband Internet for Agricultural Business by Region

	North	South	Difference
Not at all valuable	9%	8%	1%
Slightly valuable	26%	17%	9%
Valuable	31%	34%	-3%
Very valuable	34%	42%	-7%

COST AND WILLINGNESS TO PAY FOR INTERNET SERVICES

Monthly Cost of Internet Services

Figure 18 shows the average monthly cost of internet services that residents currently face. Note that Figure 18 shows the monthly cost of internet only, and not the cost of internet bundled with landline or television services. About 32% of respondents who answered this question reported having bundled services and were excluded from the data shown in Figure 18.

About 37% of all respondents indicated that they pay less than $60 per month for internet services. About 40% of respondents pay between $61 and $80 per month and about a quarter (23%) pay more than $80 per month. It is noteworthy that about 34% of those households who pay more than $60 a month for internet reported having download speeds of less than 20 Mbps, which is less than the FCC standard for broadband internet. In other words, almost one-third of respondents who pay more than $60 a month do not have broadband internet.

Figure 18. Monthly Cost of Internet Service

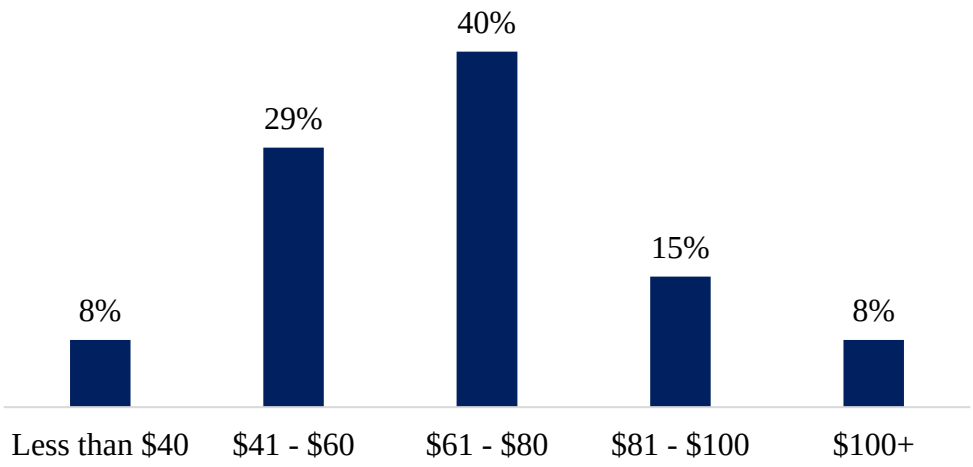


Table 15 shows differences between the North and South region in the monthly cost of internet services reported by residents. The only statistically significant result is that residents in the North region are 11% more likely to pay in the range of $41 to $60 for internet relative to residents in the South region.

Table 15. Monthly Cost of Internet Service by Region

	North	South	Difference
Less than $40	5%	10%	-5%
$41 - $60	35%	24%	**11%**
$61 - $80	39%	42%	-4%
$81 - $100	14%	16%	-2%
$100+	7%	8%	-1%

Willingness to Pay for Internet Services

Figure 19 shows how much respondents are willing to pay monthly for internet services. While the desire for lower-priced internet may impose a downward bias on the willingness to pay reported by a household, the estimates shown in Figure 19 are quite striking, especially when compared to those shown in Figure 18. Figure 18 shows that about 63% of all respondents currently pay $61 or more per month for internet. However, as shown in Figure 19, only 31% of all respondents have a willingness to pay of $61 or more per month. That is, only about half of the respondents who are currently paying $61 or more per month value their internet services at that price. This discrepancy further corroborates the result shown in Figure 11 that the cost of services is the primary reason for dissatisfaction with internet among residents.

Figure 19. Monthly Willingness to Pay for Broadband Internet

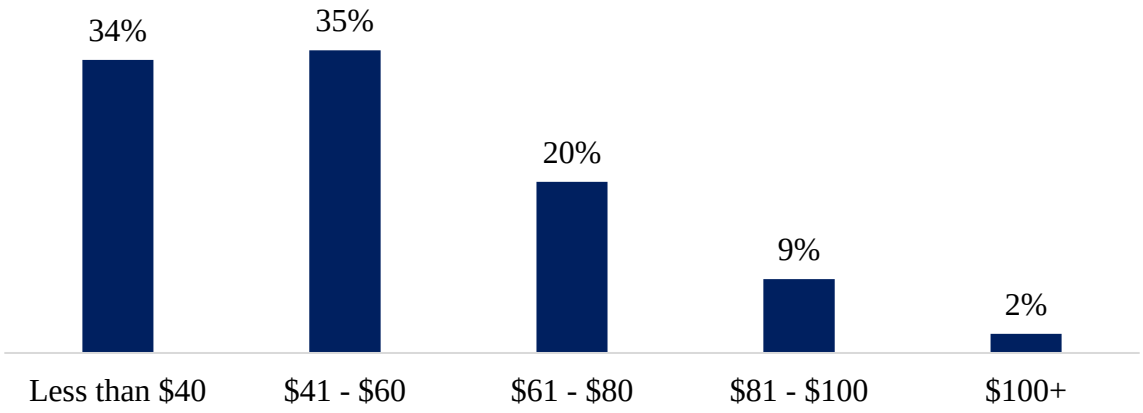


Table 16 shows the differences between the North and South region in the willingness to pay of residents for broadband internet. Interestingly, there are no statistically significant differences between the two regions. Despite the other results discussed in this report that indicate that residents of the North region receive slower internet speeds and are less satisfied with the internet services in their area, their willingness to pay for services is similar to residents in the South region.

Table 16. Willingness to Pay for Broadband Internet by Region

	North	South	Difference
Less than $40	32%	36%	-4%
$41 - $60	36%	34%	2%
$61 - $80	21%	19%	2%
$81 - $100	8%	9%	0%
$100+	2%	2%	0%

OPEN-ENDED COMMENTS

A total of 273 responses were received to the open-ended question that asked respondents about any additional comments they may have about internet access in Dane County. With a handful of exceptions, virtually all residents who provided comments expressed dissatisfaction with internet services in their area due to either high cost, lack of availability or coverage, unreliability, slow speeds, and overall poor service. Below we expand on the major themes that emerged from the comments. A full set of categorized comments is available in a supplemental document provided with this report. Note that only comments from residents in the random sample are analyzed in this section. To present an unbiased and representative set of opinions of residents in our study area, we have intentionally excluded the comments received from the open-access survey and instead, discuss those in the Appendix.

Internet Speed and Reliability

The most common complaint among those who provided comments was about slow speed and lack of reliability of their internet service. About 15% of all comments (or 40 comments) mentioned internet speed and about 11% (or 31 comments) mentioned lack of reliability. Almost all comments on speed indicated that they would like faster internet at their residence. Residents mentioned that slow internet speeds prevent them from using their services regularly for activities such as telecommuting, education, streaming, or running a business. Many of these comments were paired with complaints about reliability of the service. Residents indicated that service is inconsistent and internet speeds vary significantly throughout the day. This issue was generally worse for residents with multiple internet users in the household, such as telecommuting parents with children in the house who use it for educational purposes. Some residents mentioned being unable to conduct teleconferencing (e.g. Zoom calls) at home due to the poor quality of service.

Availability and Coverage

About 16% of comments (or 43 comments) were about the lack of availability and/or coverage in the area. Some residents reported having no availability at all, except through a smartphone data plan or a hot spot, which they described as inadequate for day-to-day activities. Others indicated that even though internet is available in their area, they reside right on the edge of where coverage ends. A proportion of these residents also indicated that providers refuse to extend the coverage area to their residence or will only do so at a prohibitive cost. These comments imply that there is substantial variation in the availability of internet services, even within the same neighborhood.

A large proportion of residents who commented on availability and coverage expressed the belief that everyone in Dane County should have access to high-speed internet. A few residents mentioned that even though they have access to dependable internet, their rural neighbors do not. Some commenters stated that internet service should be a public good. Interestingly, while residents of the North region had more comments on availability and coverage relative to residents of the South region, those additional comments were mostly about the importance of making internet services available throughout the county, especially in rural areas, rather than complaints about lack of service at their residence.

Number of Internet Providers in the Area

About 13% of all comments (or 35 comments) were about the lack of options for internet services. Residents feel, in general, that their options are very limited and many indicated that they are forced to settle for subpar internet services at a high cost because there is only one provider in their area. The general sentiment among these residents is that having more options would lead to greater competition among providers which may result in better quality of services and lower prices. There were more comments about lack of options in the area from residents of the North region (14%) relative to residents of the South region (10%).

Cost of Internet

Comments about cost of internet totaled about 11% of all comments (or 31 comments). The prevailing view among these residents was that internet services in their area are excessively costly, especially relative to the poor quality of service (reliability, speed, customer service, etc.) they receive. Some residents complained that they do not receive the download or upload speeds that are advertised in the package they pay for. Even residents who reported having adequate internet speeds and reliable service stated that their cost of internet is too high. As mentioned above, some residents attributed the high cost to lack of competition between internet service providers. Residents of the South region (15%) were more likely to comment on the cost of internet relative to residents of the North region (9%). Although the difference is not statistically significant, this result is consistent with the estimates shown in Table 9 that suggest that South residents are more likely to indicate that internet services are too expensive.

Fiber-Optic

There is a substantial demand for fiber-optic internet in Dane County. About 8% of all commenters (or 22 comments) indicated that they would like to have fiber-optic services available at their household. A few of these residents mentioned that they have been waiting for the infrastructure for fiber-optic internet to be developed in their area. Those who reported switching to fiber-optic indicated that they are very satisfied with their services.

CONCLUSION

A large majority of Dane County residents have access to internet services, either through a monthly subscription or through a cellular data plan. About two-thirds of the 5% of residents who do not have internet services at home choose not to have it, either because they do not need it or because they are concerned about online privacy. Therefore, for the vast majority of Dane County residents lack of access to the internet is the result of poor quality of available services rather than unavailability in their area.

Most residents who have internet available at their residence are dissatisfied with speed and reliability. From the survey results, it can be inferred that at least 40% of Dane County residents who have internet services at home do not have access to the broadband standard of upload and download speeds. The actual proportion is likely much higher. Even those who report having reasonable upload and download speeds indicate that speeds vary throughout the day and often the poor quality of internet services make basic activities such as teleconferencing and streaming very challenging. What makes this result even more significant is the fact that three-fourths of all residents report using the internet frequently for entertainment and about half report using it frequently for telecommuting.

In addition, residents are deeply dissatisfied with the cost of services. About 63% of residents who have internet at home pay more than $60 per month for services. However, less than half of those residents (31%) are willing to pay that amount. The prevailing sentiment among residents it that prices are unreasonably high for mediocre speeds and unreliable internet service and many attribute this to having only one internet service provider operating in their area. According to residents, lack of options leaves them with no other choice but to incur a large monthly cost for services that do not fulfill their needs.

It is not surprising then that less than half of all respondents indicate that they are satisfied with their services. Among those who are satisfied, about 30% are only "somewhat satisfied." Dissatisfaction was particularly pronounced with using the internet during COVID-19 for day-to-day activities such as telecommuting, home entertainment, and distance education.

There are salient differences between the North and South regions of Dane County. The results of the survey largely corroborate the demarcation of the North region as "severely underserved" and the South region as "marginally underserved." Residents in the North region report much slower download and upload speeds, greater dissatisfaction with their internet speeds, lower satisfaction with using the internet during COVID-19 for almost all activities the survey asked about, and have lower overall satisfaction with their internet services relative to residents in the South region. County maps of internet speeds largely support this demarcation as well.

In conclusion, the main challenge with internet that an overwhelming majority of residents face is poor quality. While this survey focused on the rural population of the county, even residents within proximity of urban areas report not having access to fast and reliable internet services. Some results imply that coverage, speed, and reliability vary even within the same neighborhood at times. Finally, there is clearly a high demand for quality internet services throughout the county and large proportions of residents support the county's effort to achieve this goal.

APPENDIX

In this section, we compare the responses received from residents in the random sample survey and those from the open-access survey. As noted in the methodology section, the online version of the survey was opened to residents of Dane County who were not included in the random sample. The survey link was promoted to residents by the Broadband Task Force through various media. Using the survey ID assigned to each household in the random sample, the SRC was able to separate responses from the two groups. A total of 821 responses were received from the random sample and 1,319 responses were received from the open-access survey.

Table A1 shows the responses of the random sample and the open-access survey for each survey question and the difference between the two groups. As before, differences that are statistically significant are presented in **bold** font. In addition, Figures A1 and A2 show average download and upload speeds, respectively, reported by all residents who responded to either the random sample or the open-access survey. Similar maps created using data from the random sample only were shown previously in the section "Quality of Internet Services."

The responses of residents in the random sample are starkly different from those of residents in the open-access survey. There are three major reasons for this result. First, while the random sample includes households from the North and South regions only, the open-access survey may include residents from any location in Dane County, including the City of Madison and surrounding towns and villages that were excluded from the random sample. Secondly, as is usually the case, residents who feel strongly about a particular issue (in this case, broadband internet), are much more likely to express their opinion by responding to surveys. As a result, it is likely that more residents with poor access and low satisfaction with internet services responded to the open-access survey relative to those who are satisfied with their internet. Third, because the open-access survey was online-only and promoted through online media, those with no internet access had a much lower likelihood of receiving the survey link.

For these reasons, the results of the open-access survey are probably not representative of the study area (North and South regions) or of Dane County as a whole and are likely to overstate the lack of internet availability and quality of service in the county. They do, however, depict the level of dissatisfaction and the challenges in accessing the internet faced by Dane County residents who took the open-access survey.

Table A1 shows several notable differences between residents in the random sample and those who took the open-access survey. These differences are summarized below.

Current Broadband Accessibility

- Residents in the random sample are more likely to reside in single-family homes and respondents of the open-access survey are more likely to reside in rented apartments. This is not surprising since residents in the random sample reside mostly in the rural parts of Dane County where rental housing is less common.
- Residents in the random sample are more likely to have no internet access. As mentioned above, since the open-access survey was conducted exclusively online, those with no internet

access are likely underrepresented in the open-access survey. In addition, residents of the random sample are more likely to access the internet through a smartphone data plan or hot spot and less likely to have a monthly internet subscription.

- Among residents who do not have access at home, residents in the random sample are more likely to indicate that they have no need for internet services while residents who took the open-access survey are more likely to indicate that service is not available where they live and that their service is too slow.
- Residents in the random sample are more likely to access the internet through a landline or DSL and less likely to have cable service (or cable modem) or a fiber-optic line relative to residents who took the open-access survey.
- Frontier, Verizon, UpNet WI, and HughesNet have a greater market share among random sample residents while Spectrum/Charter and AT&T have greater market share of residents who took the open-access survey.

Quality of Internet Services

- The random sample residents are more likely to receive download speeds between 20.1 and 100 Mbps while those in the open-access survey are much more likely to have both, download and upload speeds, over 100 Mbps.
- Residents in the random sample are less likely to be "somewhat dissatisfied" or "very dissatisfied" with their internet service relative to those who took the open-access survey. This result is consistent with the bias discussed above that residents who are less satisfied are more likely to take the open-access survey. In addition, residents who took the open-access survey were more likely to select all four reasons listed for dissatisfaction with internet services: too expensive, unreliable, too slow, and poor customer service.
- Interestingly, there are no statistically significant differences between the two samples in terms of satisfaction with internet services during COVID-19. Similar proportions were satisfied with using the internet for paying bills, telemedicine, telecommuting, entertainment, education, and management of farm or business during COVID-19.

Demand for Broadband Services

- Residents of the open-access survey are more likely to have at least 1 daily user of internet at home across all age groups except adults in the age range 26 to 45 relative to those in the random sample.
- Random sample residents were less likely to use internet for entertainment, telecommuting, and education, and more likely to use it for managing a farm business. The last result is as expected because the random sample focused mostly on rural parts of Dane County.

- In general, results indicate that random sample residents are less likely to start, move, or grow a business and to telecommute to a job if better internet was available relative to residents who took the open-access survey.
- Not surprisingly, a greater proportion of random sample residents reported working in the agriculture industry relative to residents from the open-access survey.

Cost and Willingness to Pay for Internet Services

- On average, residents of the random sample are somewhat more likely to have lower monthly cost of internet relative to their counterparts. On the other hand, residents who took the open-access survey are more likely to have a willingness to pay of less than $40 per month. This is likely because residents in the open-access survey who want more affordable internet services have a stronger motivation to seek out and take the survey. However, the open-access survey residents are also somewhat more likely to have a willingness to pay of greater than $100 per month.

Open-Ended Comments

From residents who took the open-access survey, a total of 621 responses were received to the open-ended question that asked residents about any additional comments they may have about internet access in Dane County. These residents addressed largely similar issues as the residents in the random sample, albeit in different proportions. In addition, there were some important differences in the sentiment of residents between the two populations. Below we discuss the highlights of the comments provided by residents who took the open-ended survey and, where possible, compare with the comments received from the random sample. A full list of categorized comments is provided in the accompanying document.

- The most popular issue included in comments was regarding the lack of options respondents have in selecting internet services. About 22% of all comments (or 135 comments) mentioned the need for more options, compared to 13% of the same comments received from the random sample. Like residents in the random sample, open-access survey respondents indicated that having only one provider in their area and limited types of internet access available (e.g., satellite, dial-up, DSL) leaves them with no other choice but to pay high prices for slow and unreliable services. They feel that increasing the number of providers in an area will lead to greater competition and subsequently faster and more dependable services for a lower price.
- About 19% of residents (or 116 comments) who provided comments in the open-access survey commented on the high cost of internet services. Almost all these residents indicated that the cost of their internet is too high. However, a large proportion of respondents (including the handful of those who stated that they are satisfied with their cost of internet) expressed the desire for more affordable internet for everyone in Dane County. Similarly, about 9% of these

residents stated that they believe that high-speed internet should be a public utility (similar to water and electricity) with universal access provided by municipalities.

- About 14% of residents (or 89 comments) either expressed the desire to have access to fiber-optic internet services or reported having switched to fiber-optic internet and being very satisfied with it. Fiber-optic services are popular among residents of Dane County and many residents have received glowing reviews about fiber-optic internet from their neighbors or acquaintances who currently have access. In general, residents feel that fiber-optic services should be made available county-wide. For comparison, only 8% of residents in the random sample mentioned fiber-optic internet services.
- About 14% of residents in the open-access survey complained about slow internet speeds, especially for the price. This is a similar proportion to the 15% of residents in the random sample who had the same complaint. The same is true for residents who complained about reliability of their internet services. About 12% of residents in the open-access survey mentioned having unreliable internet relative to the 11% of residents in the random sample.
- Another 14% of residents in the open-access survey expressed dissatisfaction with lack of availability (8%) and/or coverage (6%) of internet services in their area. In several cases, residents reported not having access to dependable internet services at their home even while living within close proximity of the state capitol. Similarly, many residents indicated that they live in neighborhoods where some households are serviced by a particular provider while others are not due to issues of jurisdiction. Some of these residents reported that despite reaching out to these providers, they were unable to receive service from them. For comparison, about 8% of residents in the random sample indicated that lack of availability was an issue and another 8% stated the same about lack of coverage.

Table A1. Differences Between Respondents from the Random Sample and the Open-Access Survey (part 1 of 4)

	Random-Sample	Open-Access	Difference
Current Place of Residence			
Owned Single-Family Home	91%	82%	**9%**
Owned Unit in Multi-Family Building	3%	5%	**-2%**
Rented Single-Family Home	3%	3%	0%
Rented Unit in a Multi-Family Building	3%	9%	**-6%**
Internet Access at Home			
No Internet Access	5%	1%	**4%**
Access through Data Plan or Hotspot Only	12%	8%	**3%**
Access through Monthly Subscription	83%	90%	**-7%**
How Residents Access Internet at Home			
Cable service or cable modem	37%	42%	**-5%**
Landline or digital subscriber line (DSL)	30%	26%	**4%**
Cellular data plan with smartphone	19%	19%	0%
Fiber-optic line	11%	18%	**-6%**
An antenna/modem or fixed wireless	7%	7%	0%
Hotspot device/setting on smartphone	6%	0%	6%
Satellite	5%	4%	1%
Dial-up	1%	1%	1%
Reasons for No Access			
I have no need	49%	0%	**49%**
Service is too expensive	34%	16%	18%
Service is not available where I live	15%	68%	**-53%**
Concerns about online privacy	15%	5%	10%
Service is inconsistent or unreliable	9%	21%	-12%
I use the internet somewhere else	7%	11%	-4%
Service is too slow	4%	21%	**-17%**
Internet Providers			
Spectrum/Charter	36%	44%	**-8%**
TDS	20%	22%	-2%
Frontier	13%	6%	**6%**
US Cellular	8%	6%	2%
AT&T	5%	10%	**-5%**
Verizon	4%	3%	**2%**
CenturyLink/Lumen	4%	6%	-2%
UpNetWI	3%	1%	**2%**
Litewire	3%	2%	1%
HughesNet	2%	1%	**1%**

Table A1. Differences Between Respondents from the Random Sample and the Open-Access Survey (part 2 of 4)

	Random-Sample	Open-Access	Difference
Average Download Speed (Mbps)			
Under 1	6%	4%	2%
1.1 – 5	12%	10%	2%
5.1 – 10	10%	10%	0%
10.1 – 20	12%	13%	-1%
20.1 - 100	31%	26%	**5%**
100.1+	30%	37%	**-7%**
Average Upload Speed (Mbps)			
Under 1	19%	16%	3%
1.1 – 5	21%	20%	1%
5.1 – 10	19%	19%	0%
10.1 – 20	20%	20%	0%
20.1 - 100	11%	11%	0%
100.1+	10%	14%	**-4%**
Satisfaction with Internet Service			
Very satisfied	19%	18%	1%
Somewhat satisfied	30%	28%	2%
Neutral	17%	12%	**5%**
Somewhat dissatisfied	19%	22%	**-4%**
Very dissatisfied	15%	20%	**-5%**
Reasons for Dissatisfaction			
Too expensive	39%	65%	**-26%**
Unreliable	26%	42%	**-15%**
Too slow	32%	50%	**-18%**
Poor customer service	11%	25%	**-14%**
Satisfaction with Internet During COVID-19			
Paying bills (rent, mortgage, car, etc.)	79%	82%	-4%
Telemedicine	72%	73%	-2%
Work/Telecommuting	67%	64%	3%
Home entertainment (e.g. streaming)	64%	66%	-2%
Distance education	64%	65%	-1%
Management of your farm or business	63%	61%	2%

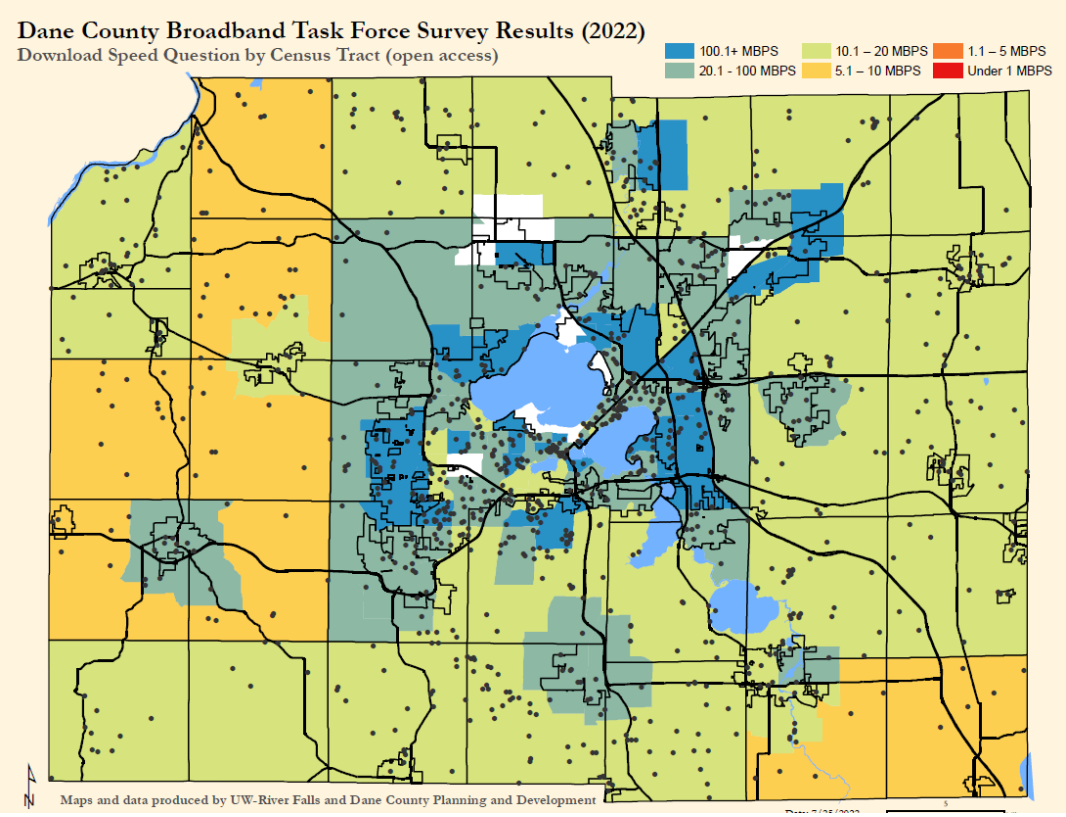
Table A1. Differences Between Respondents from the Random Sample and the Open-Access Survey (part 3 of 4)

	Random-Sample	Open-Access	Difference
Daily Users by Age Group			
Older adults (46 – 64)	79%	52%	**27%**
Adults (26 – 45)	66%	62%	3%
Seniors (65+)	72%	35%	**38%**
Children up to 12 years old	45%	37%	**8%**
Teens (ages 13 – 17)	35%	18%	**17%**
Young adults (18 – 25)	33%	16%	**17%**
What Households Use Internet For			
Entertainment	75%	86%	**-10%**
Accessing medical information/services	41%	43%	-2%
Telecommuting	50%	71%	**-21%**
Education	32%	39%	**-7%**
Managing my home-based business	28%	32%	-4%
Managing my farm business	9%	6%	**3%**
How Better Internet Would Impact:			
Starting, Moving, or Growing a Business			
Very Likely	14%	16%	-2%
Somewhat Likely	12%	19%	-7%
Unsure	21%	25%	-4%
Somewhat Unlikely	10%	12%	-2%
Very Unlikely	43%	28%	**15%**
Telecommuting to a Job			
Very Likely	33%	54%	**-21%**
Somewhat Likely	12%	16%	**-4%**
Unsure	13%	10%	3%
Somewhat Unlikely	5%	4%	1%
Very Unlikely	37%	16%	**22%**
Importance of Internet for Ag. Business			
N/A not in ag.	82%	86%	**-4%**
Not at all valuable	1%	0%	1%
Slightly valuable	4%	2%	**2%**
Valuable	6%	4%	**2%**
Very valuable	7%	8%	-1%

Table A1. Differences Between Respondents from the Random Sample and the Open-Access Survey (part 4 of 4)

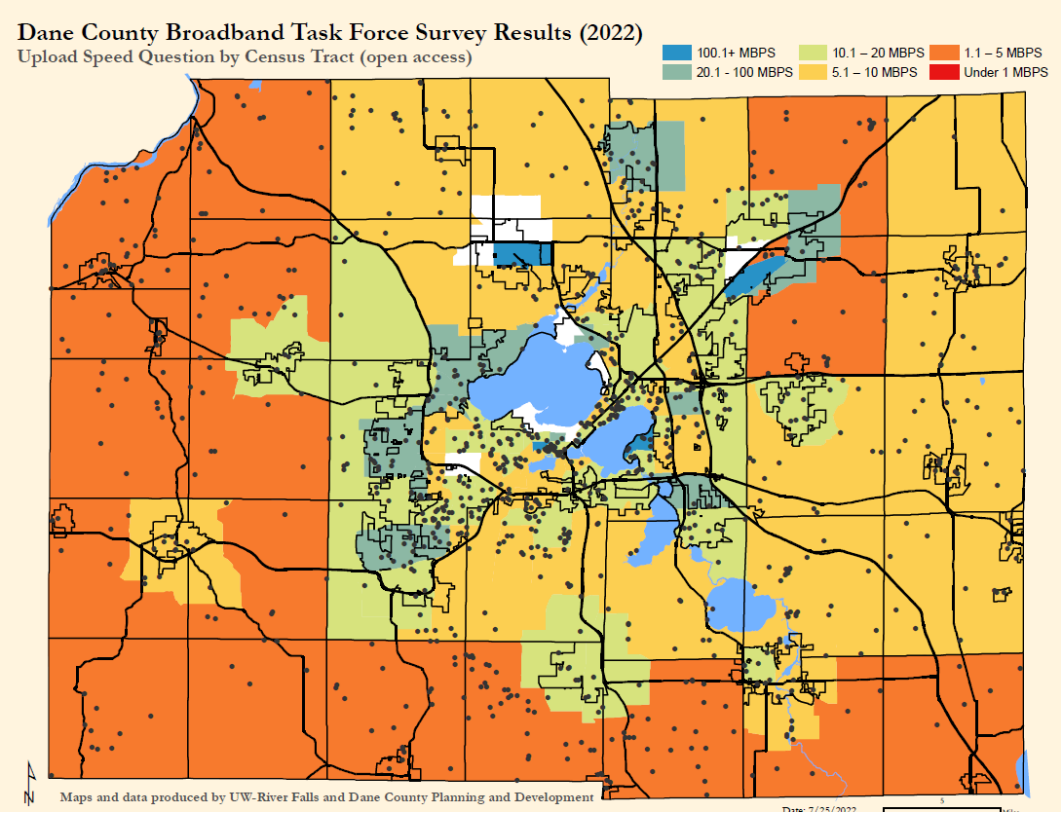
	Random-Sample	Open-Access	Difference
Monthly Cost of Service			
Less than $40	8%	5%	2%
$41 - $60	29%	24%	**6%**
$61 - $80	40%	39%	2%
$81 - $100	15%	22%	**-7%**
$100+	8%	11%	-3%
Willingness to Pay for Service			
Less than $40	33%	38%	**-6%**
$41 - $60	36%	31%	**5%**
$61 - $80	21%	18%	2%
$81 - $100	9%	8%	1%
$100+	2%	4%	**-2%**

Figure A1. Download Speeds by Census Tract[3]



[3] This map was created by Aaron Krebs and Curt Kodl at the Dane County Department of Planning and Development using survey data provided by the SRC.

Figure A2. Upload Speeds by Census Tract[4]



[4] This map was created by Aaron Krebs and Curt Kodl at the Dane County Department of Planning and Development using survey data provided by the SRC.