

BROADBAND

OCT 2023

WILLINGNESS TO PAY FOR BROADBAND INTERNET

A Case Study of Wisconsin

AUTHORS

**MCKENZIE BOYCE
STEVEN C. DELLER
KRISTIN K. RUNGE**

Study Series No. 8



ACKNOWLEDGEMENTS

THANK YOU

We are especially grateful for the survey design and analysis feedback from Daniel Phaneuf, the Henry C. Taylor Professor at UW-Madison, and discrete choice experiment insight from Matthew Interis, Associate Dean for Academic Affairs at Clemson University. We also extend our gratitude to Brian Whitacre, Professor at Oklahoma State University, Ayoung Kim, Assistant Professor at Mississippi State University, and Roberto Gallardo, Associate Professor at Purdue University, for their feedback on the survey instrument and report. Tessa Conroy and Matt Kures provided invaluable comments on the report itself and Chris Stark and Gail Huycke helped with survey design and interpretation of basic survey results.

FUNDING

This work was supported by a grant from the United States Department of Commerce Economic Development Administration in support of Economic Development Authority University Center (Award No. ED21CHI3030029 and CARES Act award no. ED20CHI30700477). Any opinions, findings, conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the U.S. Department of Commerce Economic Development Administration.

1	INTRODUCTION
2	UNDERSTANDING WILLINGNESS AND ABILITY TO PAY
3	THE WISCONSIN BROADBAND WILLINGNESS TO PAY SURVEY
6	ANALYSIS: COSTS AND DIFFICULTY PAYING
14	WILLINGNESS TO PAY FOR BROADBAND IN WISCONSIN
22	HOW CAN THIS ANALYSIS BE USED?
23	REFERENCES
24	APPENDIX

EXECUTIVE SUMMARY

In the fall/winter of 2022, the UW-Madison EDA University Center conducted a statewide survey of Wisconsin residents on broadband access and affordability, with the goal of estimating the willingness to pay for broadband. As the state makes significant investments in broadband infrastructure, attention is shifting to the willingness, or ability, of people, particularly lower income people, to pay for broadband subscriptions.

Higher income households pay more for monthly internet subscriptions. This may be due to choosing to purchase a higher quality internet package when one has the financial means of doing so. Households also indicate they have an easier time fitting broadband into their monthly budget as their income level rises.

There is no clear pattern of rural or urban households paying more for their internet services. Rural households tend to have a greater difficulty paying for broadband and report higher levels of disruption to their current internet service.

The typical household is willing to pay (WTP) \$77.25 to move from no internet services to 25 Mbps and \$124.99 for 50 Mbps and \$154.24 for 1200 Mbps but increases in willingness to pay plateaus for higher speeds.

Lower income households (<\$35,000) are willing to pay \$46.72 for 25 Mbps services whereas higher income households (>\$150,000) are willing to pay \$165.76 for 25 Mbps services.

Households are willing to pay \$17.94 per month on average for greater reliability (fewer outages). The lowest income households (<\$35,000) are willing to pay \$10.85 and higher income households (>\$150,000) are willing to pay \$38.48 for more reliable services. While reliability has value to consumers, speed appears to impact their WTP most.

Rural residents want broadband. In the survey choice experiment, rural residents chose to not purchase internet services less frequently than urban residents. Rural residents experience a 22% greater loss in utility (satisfaction/happiness) when they are forced out of the market for broadband.

INTRODUCTION

In 2023, the Biden Administration announced that Wisconsin is receiving \$1.055 billion in federal funds from the Broadband Equity Access and Deployment (BEAD) program to support the expansion of broadband infrastructure with the goal that all state residents have access to reliable and affordable internet at a minimum download speed of 100 Mbps and upload speed of 20 Mbps. This is in addition to \$40 million in American Rescue Plan Act (ARPA) funding to increase high-speed internet access across the state, and a \$129 million allocation in the Wisconsin 2021–2023 biennial budget supporting the State Broadband Expansion Grants.

To better understand broadband access and affordability in the state, the UW-Madison Division of Extension's Economic Development Administration University Center fielded a survey during the fall/winter of 2022. The survey included questions to both gain insight on the current landscape of broadband in Wisconsin households and an experiment portion to learn what households are willing to pay for differing quality of internet services. In this study we used a method referred to as conjoint analysis, or a discrete choice experiment, to assess the willingness to pay for broadband for a sample of Wisconsin residents. This method is commonly used to assess the value consumers place on certain product attributes. For example, how much are consumers willing to pay for a certain feature on a new car. Armed with such information, car manufacturers can compare the cost to add the feature to the increase in price that can be added to the car. Other researchers have used similar methods to obtain their estimates for willingness to pay for broadband attributes (Lai et al., 2020; Liu et al., 2018; Lee and Whitacre, 2017).

This report begins with a discussion on the survey instrument and state trends in current home internet subscriptions. We then provide an explanation of willingness to pay (WTP) methods and walk through how we arrived at willingness to pay estimates for broadband in Wisconsin. We provide additional insight on who is willing to pay these various prices for broadband and who would rather not purchase internet at all. Finally, we leave you with some general guidance on how willingness to pay for broadband estimates can be used.

UNDERSTANDING WILLINGNESS AND ABILITY TO PAY

The level of investment in broadband expansion represents a once in a generation opportunity. Yet state policy makers and internet industry leaders acknowledge that expansion alone will not close the gap in access and concerns are being expressed about the ability of Wisconsin residents and businesses to afford subscriptions to broadband services. In its 2023 report, the Governor's Task Force on Broadband noted, "It is not enough to build the infrastructure if residents cannot afford or access the internet for bettering themselves and their communities" (Governor's Task Force on Broadband Access, 2023).

A recent University of Wisconsin-Madison, Division of Extension study found that even in the most urban areas of the U.S., 44% of households earning less than \$20,000 have no internet and 56% of these low-income households in rural areas have no internet (Conroy et al., 2021). While part of this low connectivity for lower income households can be attributed to inadequate infrastructure, a more common cause is that internet subscription costs are too high. The Public Service Commission (PSC) of Wisconsin estimated that average minimum monthly internet costs (in 2020) ranged from a low of \$50.11 in Green County to a high of \$167.35 in Kewaunee. For low-income households, such costs often make subscriptions to broadband unaffordable.

The Wisconsin Department of Public Instruction in their Digital Equity studies found that affordability was a major reason Wisconsin K-12 students did not have access to broadband in the home. For example, in the Manitowoc School District 15.8% of students did not have access to internet in the home and 52.1% reported that affordability was the primary factor. In the Elkhorn area 1.9% of students did not have internet in their home and affordability was cited as the primary reason by 42.6%. In the 2021 National Telecommunications and Information Administration Internet Use Survey, the NTIA found that households that do not have home internet are willing to pay only \$10 a month for services. More importantly, they find three in four respondents indicate that any cost for internet is too much.

This raises a question: if Wisconsin is successful in building out the broadband infrastructure, will households be willing and able to pay the costs of a subscription? In other words, what is the willingness and ability of people to pay for internet or broadband subscriptions in Wisconsin? This question is important as evidence suggests willingness to pay varies across regions and consumers (Lai et al., 2020; Liu et al., 2018; Jeffcoat et al., 2012) and the limits of what Wisconsin residents are willing and able to pay will affect the extent to which broadband expansion is successful.

THE WISCONSIN BROADBAND WILLINGNESS TO PAY SURVEY

METHOD

The Wisconsin Broadband Willingness to Pay Survey was administered by the University of Wisconsin-River Falls Survey Center using an address-based sample of Wisconsin primary residences. A total of 4,000 addresses were selected. Three hundred of the addresses were considered an oversample of apartment buildings and rural residences. The oversample was included so that the final collection more closely represented the U.S. Census distribution of homeowners, renters, rural, and urban residents. Within that framework, we were interested in the opinions of state residents involved in purchasing decisions for their households. An invitation letter accompanying the survey asked that the respondent be “an adult in your household who is familiar with your household budget and purchasing decisions.” As a result, respondents are not representative of the general state population.

Since most expansion efforts are concerned with providing access to home residences in Wisconsin, as opposed to public access or mobile access, our questions focused on access to the internet at respondent homes. The first portion of the survey asked respondents questions about their access to the internet at home, how they use their home internet, experience with their current home internet service, along with demographics. All respondents answered an identical version of the first portion. The second portion of the survey contained a choice experiment. Three versions of the choice experiment were created. Addresses were then assigned to one of the three survey versions. The initial mailing occurred on October 19, 2022, and 1,333 copies of each version of the survey were mailed, with 1,233 sent to the primary sample and 100 sent to the oversample addresses. A reminder postcard was sent on November 11, 2022, and a second copy of the survey was sent to non-responding addresses in early January. Response collection ended on January 30, 2023. A total of 745 responses were received. Forty-two responses were excluded for insufficient data, thus the final sample consisted of 703 responses for a 17.5% response rate.

RESPONDENT DEMOGRAPHICS

Respondents were more likely to be male (59.4%), older (46.4% are 65 or older), retired (43.2%), highly educated (48.2% have at least a bachelor's degree), and have no children in the home (68.3%). In total, 38.3% of respondents live in rural zip codes and 61.7% are in urban zip codes. Median household income fell between \$50,000 and \$74,999, which is consistent with state median income of \$67,080 (Census, 2022). It is important to note that the following analysis and discussion is limited to the survey data collected from this sample.

RESPONDENT ACCESS AND COSTS

Respondents were asked how they access the internet at their home. In total, 95.9% of respondents reported that they accessed the internet at home, and 3.1% reported that they did not. Comparatively, the U.S. Census Bureau American Community Survey estimates 86.9% of Wisconsin residents have a home internet subscription and 13.1% do not.

Among those with access at home, 52.1% reported accessing the internet through cable service or cable modem, 19.6% reported using a cellular plan, 18.8% reported landline or digital subscriber line (DSL), 11.9% reported fiber-optic, 6.7% reported satellite, 6.4% reported a cellular hotspot, 4.9% reported antenna, and 3.4% reported other. Respondents were asked to check all the modes that they used in their home, and 19.7% report accessing the internet through more than one mode while they were at home. Roughly two-thirds of respondents (64.1%) use fixed connections such as DSL, cable/modem, or fiber-optic. These fixed connections are considered more reliable than satellite or cellular plans, so it is promising that most respondents already have these connection types. According to U.S. Census Bureau American Community Survey estimates, 81.2% of current internet subscribers in Wisconsin have a fixed internet connection such as DSL, cable, or fiber optic.

We asked respondents to report the monthly cost of the internet subscription that they use at home. Median costs fell between \$61 and \$80 per month, with 1.1% reporting the internet was included in their rent, 6.9% reporting a cost between \$1 and \$40 per month, 23.7% reporting \$41 to \$60 per month, 35.0% reporting \$61 to \$80 per month, 16.7% reporting \$81 to \$100 per month, and 16.6% reporting more than \$100 per month. Consumer Reports (2022) indicates the median cost of internet in the U.S. is \$74.99 per month, with most households paying between \$60 and \$90 monthly.

In total 4.4% reported that they participated in the Affordable Connectivity Program (ACP), a federal program that reduces costs to access the internet for lower income households. However, when considering just respondents who are likely income eligible for the ACP (households with an income below \$35,000), there is an approximately 18.5% reported participation rate.

In total, 39.5% of respondents reported that their internet service at home is part of a bundle, 59.3% of respondents reported that their service was not bundled, and 1.2% were not sure. Respondents whose subscriptions were bundled with other services reported higher monthly costs than those without bundles. 6.9% of respondents without bundles reported monthly costs above \$100 as compared to 32.1% of those with bundles reporting the same.

RESPONDENT USE OF INTERNET AT HOME

Many households in the state are using broadband for both work/school and entertainment, making it both a necessity and a convenience. We find 30.6% of respondents use home internet to run a business, 49.9% use it for work, school/classes (learning opportunities), 85.5% use it for gaming or streaming video, and 97.7% use it for checking email, paying bills, social media, or reading news.

Households that reported more of these activities, e.g., running a business using home internet plus attending class online, were more likely to have cable/cable modem or fiber optic subscriptions. It is not clear if the presence of a superior connection fosters more internet activity, or if the need to do many activities online causes households to seek faster or more reliable connections. Regardless, the association exists and as state residents gain greater access to fast and reliable connections, we could see continued growth in rates at which historically offline activities, such as running businesses or attending classes, become internet-enabled activities.

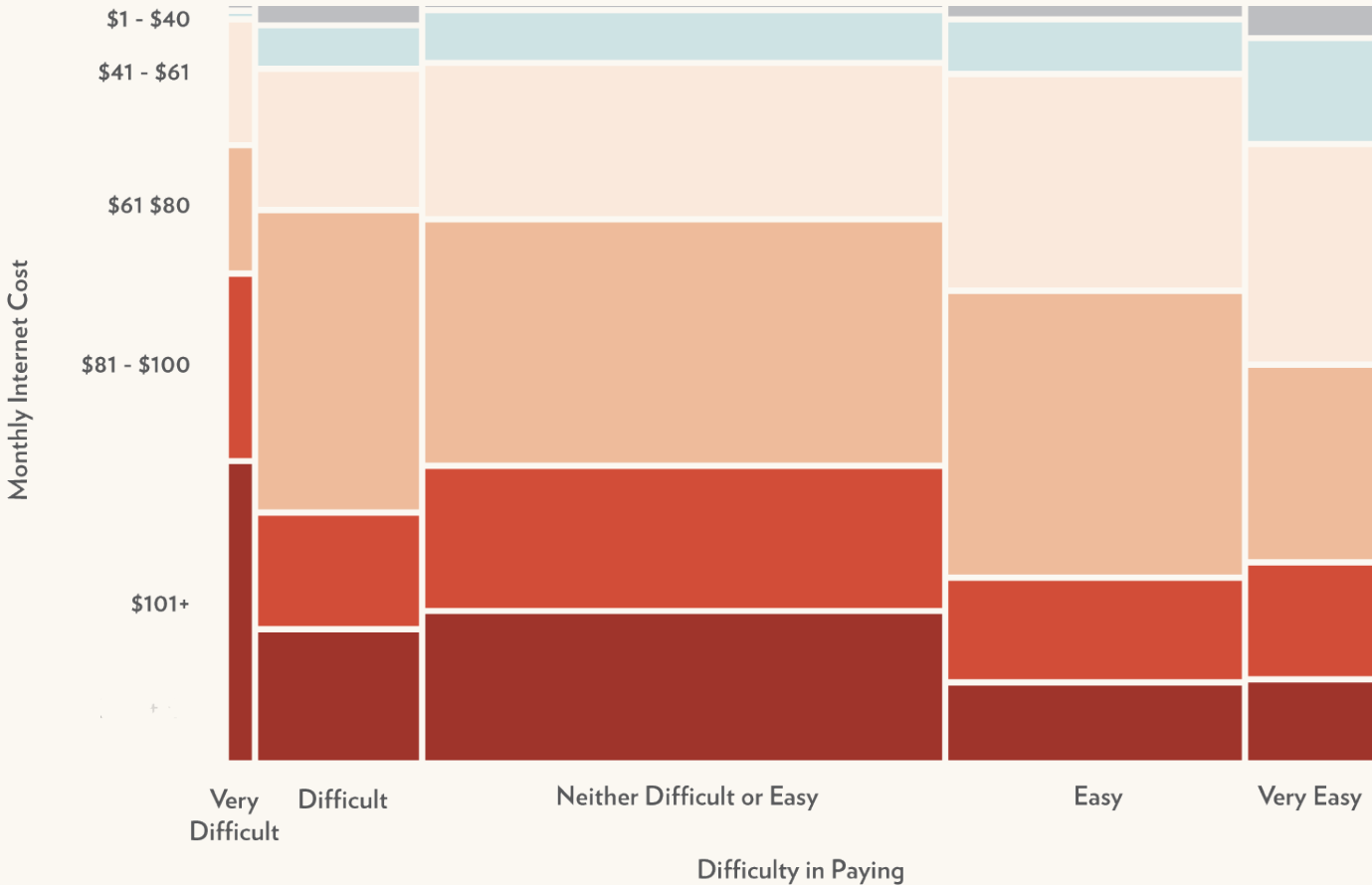
When considering household composition and the likelihood of subscribing to the internet via cable/cable modem or fiber optic and household composition, the presence of children in the household is associated with fixed internet connections. 68.8% of households with children reported a cable/cable modem or fiber optic subscription as compared to 58.0% of households without children.

ANALYSIS: COSTS AND DIFFICULTY PAYING

Using the survey data, we conducted an analysis considering current monthly internet costs, difficulty paying for internet, and frequency of experiencing disruptions. The purpose of this descriptive analysis is to recognize patterns in how internet subscribers make tradeoffs between different broadband attributes depending on their household characteristics. Most of these patterns are best visualized in charts and graphs. All corresponding tables are included in the appendix.

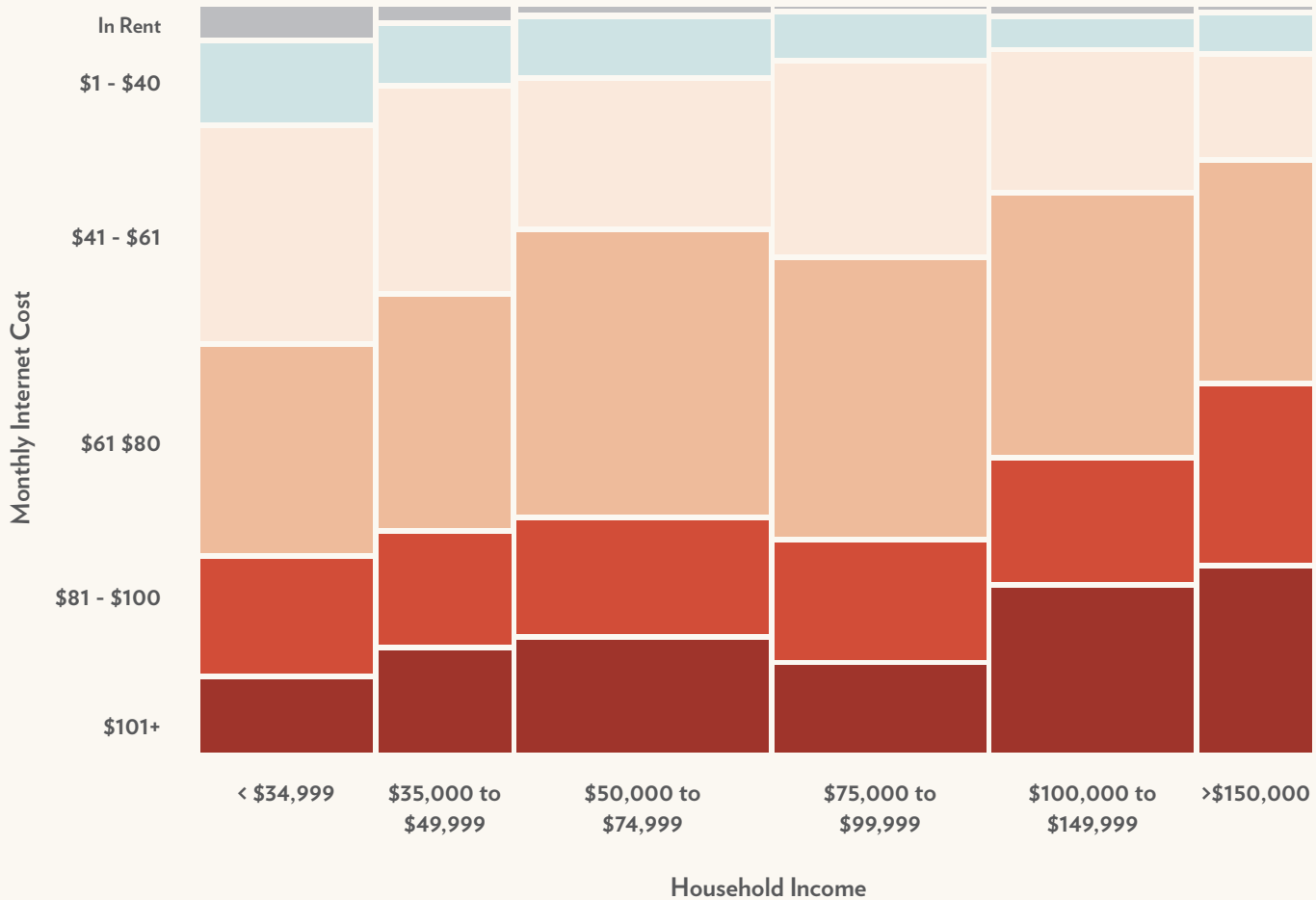
We first consider the relationship between the monthly cost the survey respondent pays for their home internet service and their stated difficulty paying for broadband, their household income level, and whether they live in a rural or urban area.

Figure 1 | DIFFICULTY PAYING AND MONTHLY COST



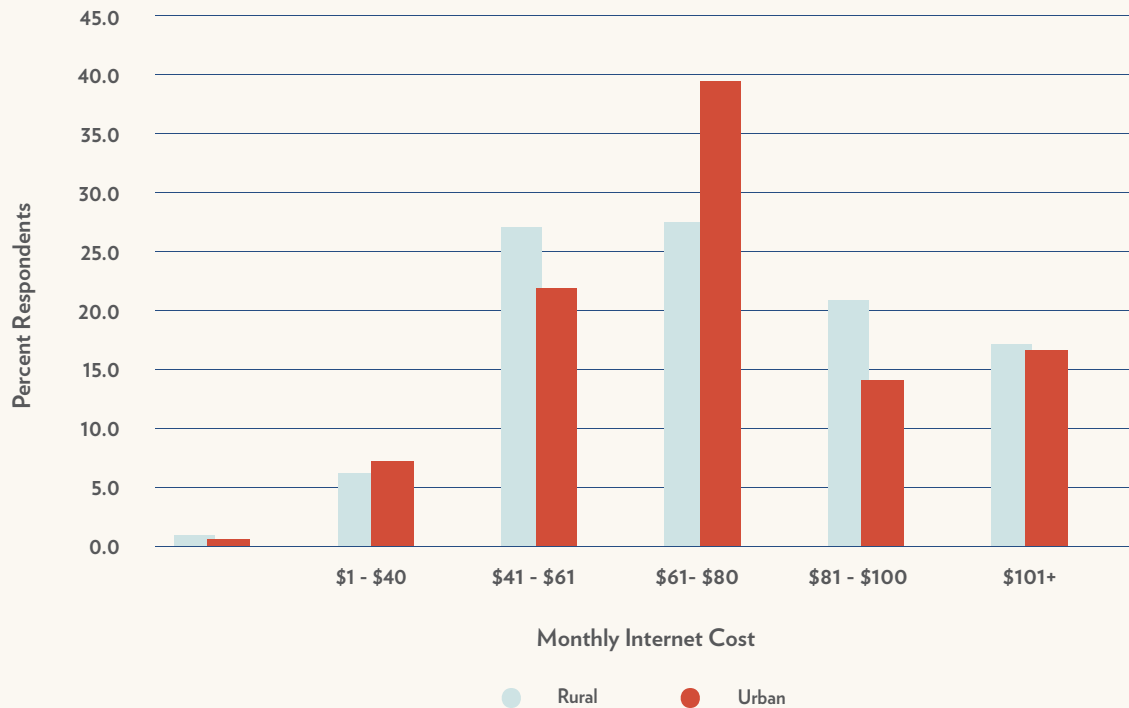
As expected, and illustrated in Figure 1, as monthly costs of internet subscriptions rise, respondents indicate a greater difficulty paying for the service. The median price for internet in Wisconsin falls into the \$61-\$80 per month category. 12.7% of respondents that pay \$61 per month or more indicate they have a difficult or very difficult time paying for their internet service.

Figure 2 | MONTHLY COSTS AND INCOME



As household income increases (Figure 2), households tend to pay more for their broadband services. This could be related to the quality of services they are purchasing. For example, higher income households may choose to purchase a higher speed plan which increases subscription costs. While low-income households are paying less for their internet services, although not a lot less, the potential declines in quality could be large. They are still paying close to average internet prices, while receiving services that may not meet their needs.

Figure 3 | MONTHLY COSTS BY RURAL-URBAN



While there is much discussion around the lack of internet in rural settings, often attributed to limited physical infrastructure, we find these differences in availability do not drive large price differences (Figure 3). This is somewhat unexpected because theory suggests that the lack of access and lower concentration of service providers in rural areas should result in higher prices in rural areas. Yet, there are only modest differences between rural and urban household monthly internet costs (Figure 3). Note that this simple analysis (Figure 3) does not consider the quality of services which tends to be higher in more urban areas. For example, fiber optic internet is typically more expensive than cable internet, but fiber optic is more readily available in urban areas compared to rural areas.

Next, we consider the relationship between how difficult respondents indicated it was to fit broadband expenses into their household budget and household income level (Figure 4) and whether they live in a rural or urban area (Figure 5). As household income increases, households indicate it is easier to pay for their broadband services. No households with an annual income over \$150,000 say they have any difficulty paying for internet. Given the results of the University of Wisconsin-Madison, Division of Extension, study of U.S. Census data, this result is as expected (Conroy et al., 2021) and we can conclude that difficulty paying for internet is clearly tied to income.

Figure 4 | DIFFICULTY PAYING AND INCOME

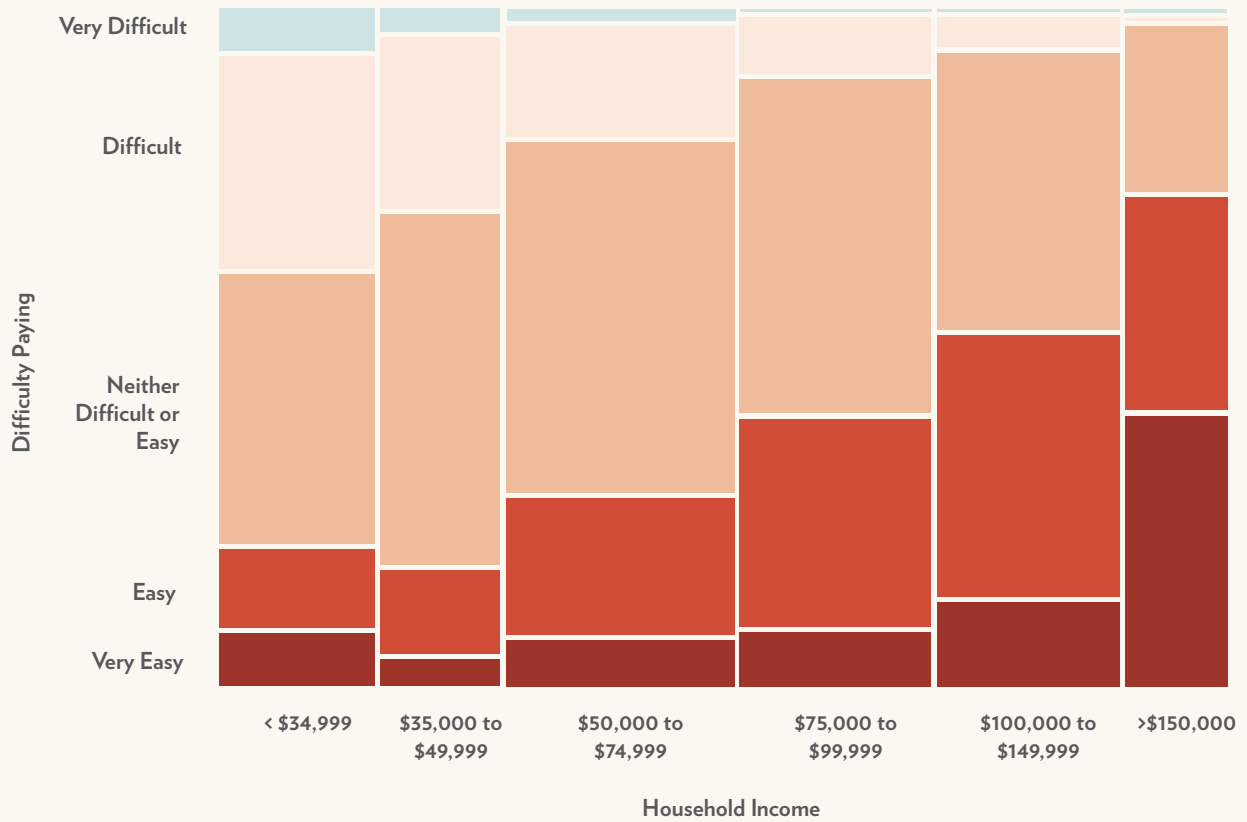
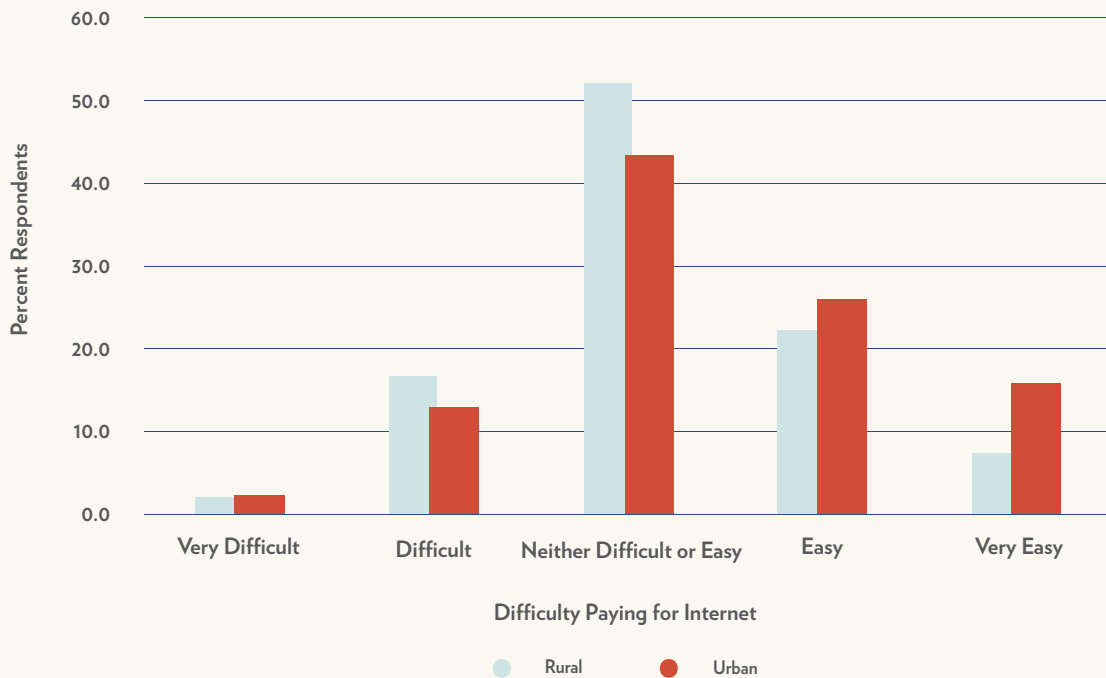


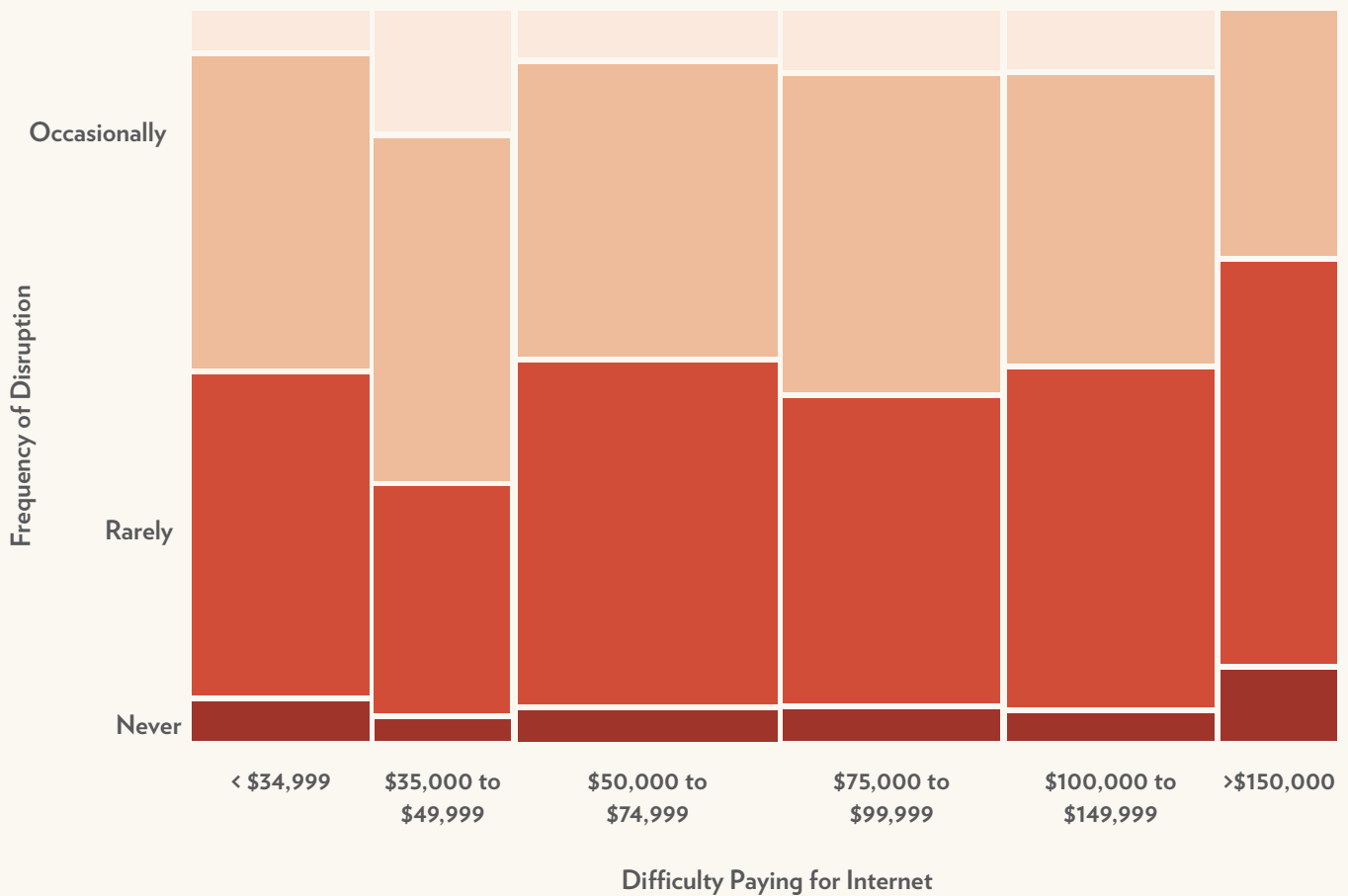
Figure 5 | DIFFICULTY PAYING BY RURAL-URBAN



Based on the survey results, those living in a rural area tend to have an increased likelihood of having difficulty paying for a home internet subscription (Figure 5). In other words, rural residents indicated they had a difficult time fitting internet into their household budget more often than urban residents.

For the final part of the descriptive analysis, we considered how respondents assessed the reliability of their home internet service, using frequency of disruptions as an indicator of reliability. The quality of broadband internet is generally associated with the speed of connection, but the reliability of the connection can be equally important. We first consider the relationship between disruptions and income, difficulty paying, and monthly service costs. We then look at the frequency of disruptions by rural-urban residency.

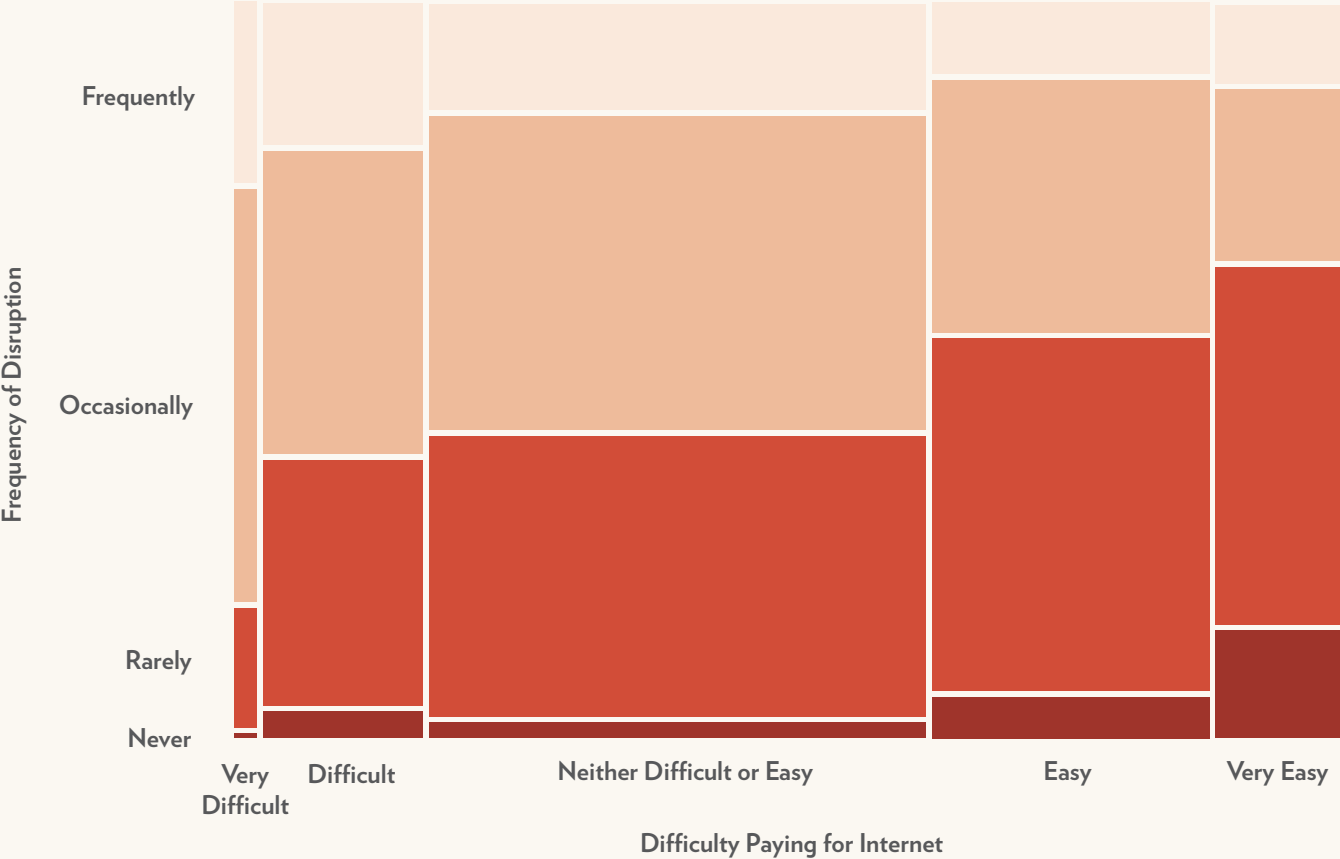
Figure 6 | DISRUPTIONS AND INCOME



There is no obvious pattern between household income and frequency of disruptions (Figure 6). We might expect the frequency of disruptions to decline as household income increases due to perhaps purchasing a higher quality internet package. This is not, however, an obvious trend in this survey data.

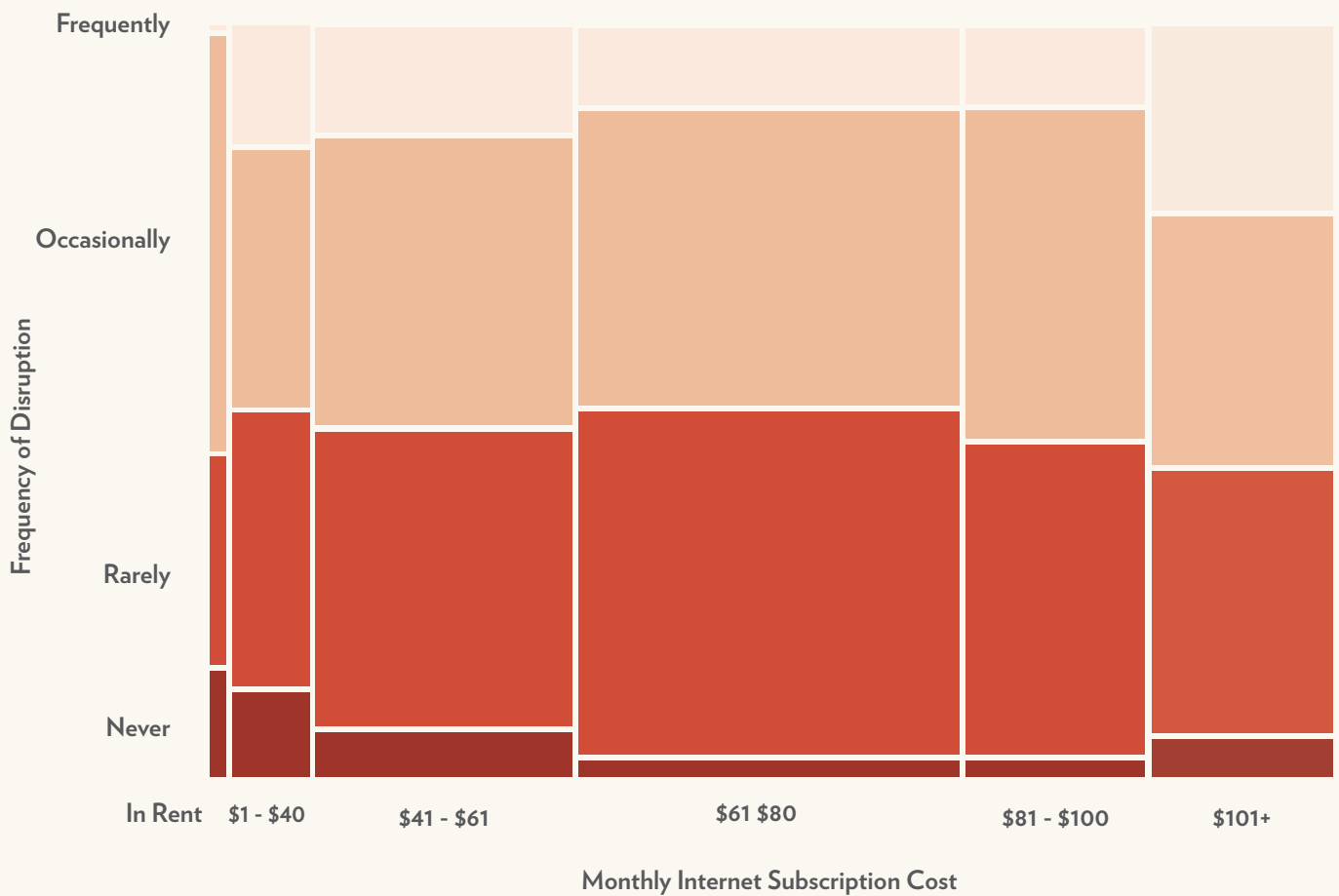
However, if we look at ease of payment rather than income as a more informative consumer characteristic, a clearer trend emerges. Respondents who report an easier time paying for monthly services also report fewer decreases. In other words, those who report their internet subscription as more affordable also report that their internet service is more reliable. Alongside the evidence that higher income households tended to have an easier time paying for internet services (Figure 7), this suggests that households with greater ability to pay (regardless of income) can purchase more reliable internet service.

Figure 7 | **DISRUPTIONS AND DIFFICULTY PAYING**



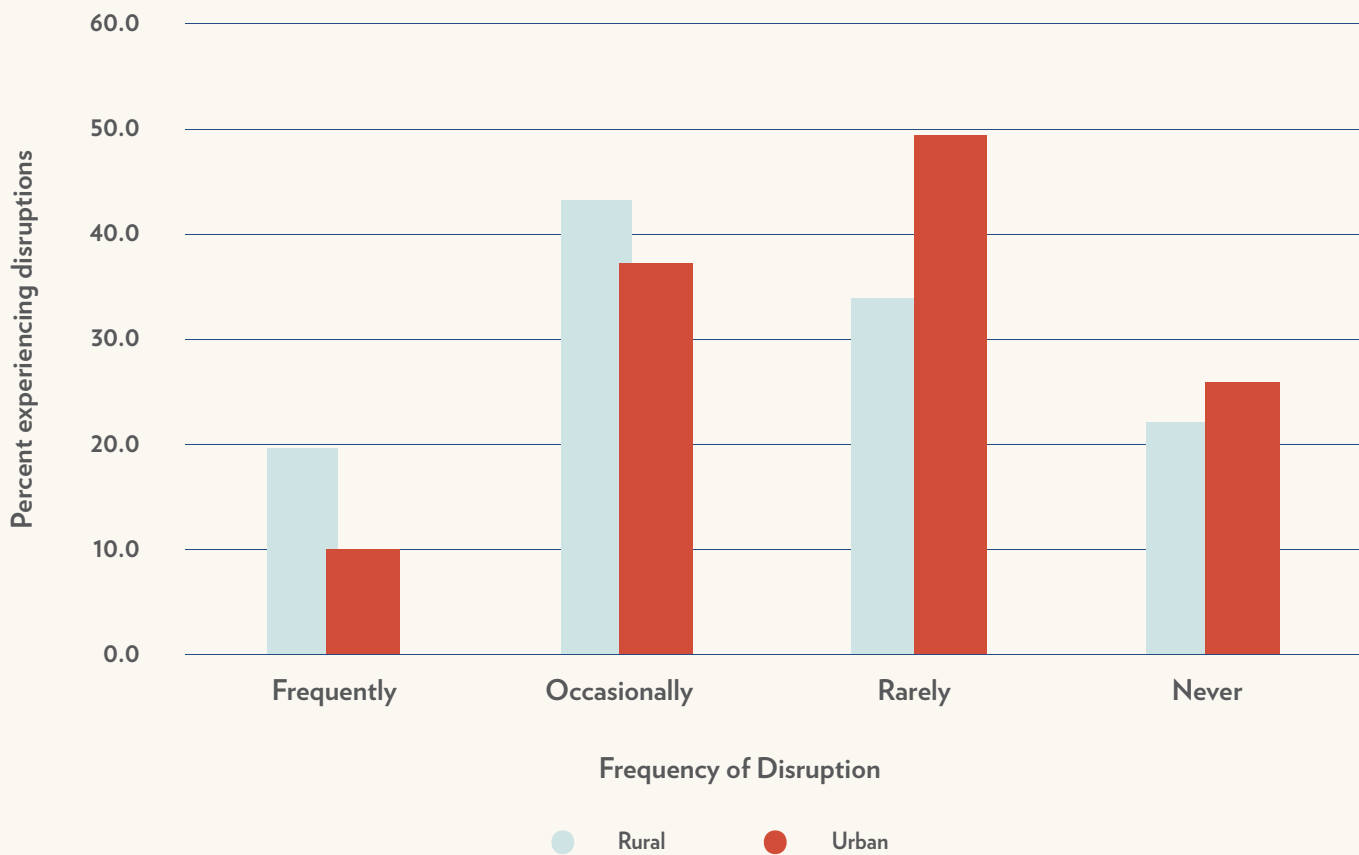
That is, we speculate that the positive relationship between higher income and higher monthly broadband costs may be the result of higher income households purchasing a higher quality service. However, since we found no relationship between income and disruptions, this “higher quality” internet purchased by higher income households may just be faster speeds.

Figure 8 | DISRUPTIONS AND MONTHLY COSTS



There is not a noticeable relationship between cost and reliability based on our descriptive analysis of the data (Figure 8). Households paying all different broadband subscription prices appear to experience disruptions at different rates. Households on both the high and low end of the monthly cost spectrum experience both frequent and occasional outages similarly. Our statistical analysis that follows, however, indicates there is a significant difference between frequency of disruptions by monthly costs, suggesting that even though it is not immediately visible cost is associated with higher quality service.

Figure 9 | FREQUENCY OF DISRUPTIONS BY RURAL-URBAN



Living in a rural area is associated with a greater frequency of disruptions to home internet services (Figure 9). For example, 19.5% of rural residents report service disruptions “frequently” whereas only 9.9% of urban residents reported frequent disruptions. Conversely, 33.8% of rural residents report that disruption of broadband services is “rare” compared to 49.2% of urban respondents.

The descriptive analysis provided a baseline of the current household broadband landscape in Wisconsin for this sample. We can clearly see higher income households are paying more for monthly internet subscriptions, difficulty paying is tied to income levels, and rural areas tend to experience more disruptions to their services. Unfortunately, given the focus of our survey we are unable to provide insights into why higher income households tend to pay more for internet. While we presented some hypotheses, the willingness to pay analysis in the next section provides more insight on how different income groups value broadband attributes differently.

WILLINGNESS TO PAY FOR BROADBAND IN WISCONSIN

To estimate the willingness to pay for broadband in Wisconsin, a discrete choice experiment was included in the survey. A discrete choice experiment allows us to understand the trade-offs that individuals make when choosing between services with different attributes and costs. For this study, a scenario was staged where respondents were given eight choice sets containing three different broadband packages available for “purchase” and one option to not purchase any of these packages. An example of one of these eight choice sets is provided in Figure 10. Here the respondent is presented with three broadband internet service packages: option A has a speed of 50 Mbps, occasional outages or disruptions and a monthly subscription price of \$75; option B has a speed of 300 Mbps, with rare outages, and a monthly cost of \$150; option C has a speed of 25 Mbps, rare outages and a monthly cost of \$75. Here there are two measures of service quality: speed and disruptions or outages. The final option (D) is to not purchase any of the three packages and opt-out of purchasing internet services altogether.

Figure 10 | CHOICE SET EXAMPLE

A		B		C		D	
Speed	50 Mbps	Speed	300 Mbps	Speed	25 Mbps	Do not buy home internet	
Outages	Occasional	Outages	Rare	Outages	Rare		
Cost	\$75	Cost	\$150	Cost	\$75		
○		○		○		○	

We can then use a statistical model to determine respondents’ preferences for different broadband attribute levels (speed, outages, cost), accounting for the income group of the respondent. This is possible because respondents are trading off between attributes to make a choice and presumably make the choice that brings them the most satisfaction. The estimates obtained from this model can then be used to calculate respondents’ average willingness to pay for speed and reliability (frequency of outages). Further explanation of our methods, along with the full regression results, are provided in the appendix.

WILLINGNESS TO PAY FOR SPEED

First, we consider respondents willingness to pay for speed by their household income level. These estimates (Table 1) reflect what respondents are willing to pay for speeds of 25 Mbps up to 1,000 Mbps, relative to not purchasing home

internet at all (0 Mbps).

Wisconsin households making less than \$35,000 annually are willing to pay \$46.72 for internet with a speed of 25 Mbps (the minimum download speed required to be defined as broadband), relative to not having internet. This willingness to pay estimate increases for higher income groups, with households making more than \$150,000 annually being willing to pay \$165.76 per month for the same speed. A former broadband study in Indiana found people were willing to pay between \$0.06-\$0.10 per Mbps per month for internet services (Lai et al., 2020). Meaning, their estimated willingness to pay for 200 Mbps per month is between \$12 and \$20. While our willingness to pay estimates are higher, they appear to be realistic given current market prices.

There are two clear patterns identifiable in the estimated willingness to pay: (1) as income increases people are willing to pay more for broadband internet and (2) the willingness to pay for speed peaks at 200 Mbps across all income groups, retreats at 300 Mbps, and then increases again at 1,000 Mbps. The first result is as expected: higher income households are willing to pay more for broadband. The second result is perhaps less anticipated: Wisconsin households, regardless of income, appear to be willing to pay more for speeds, but are not interested in paying much more for something that is viewed as only marginally better. Increasing from a speed of 25 Mbps to 50 Mbps or 100 Mbps seems to be more valuable to a respondent than increasing from 200 Mbps to 300 Mbps or 1,000 Mbps.

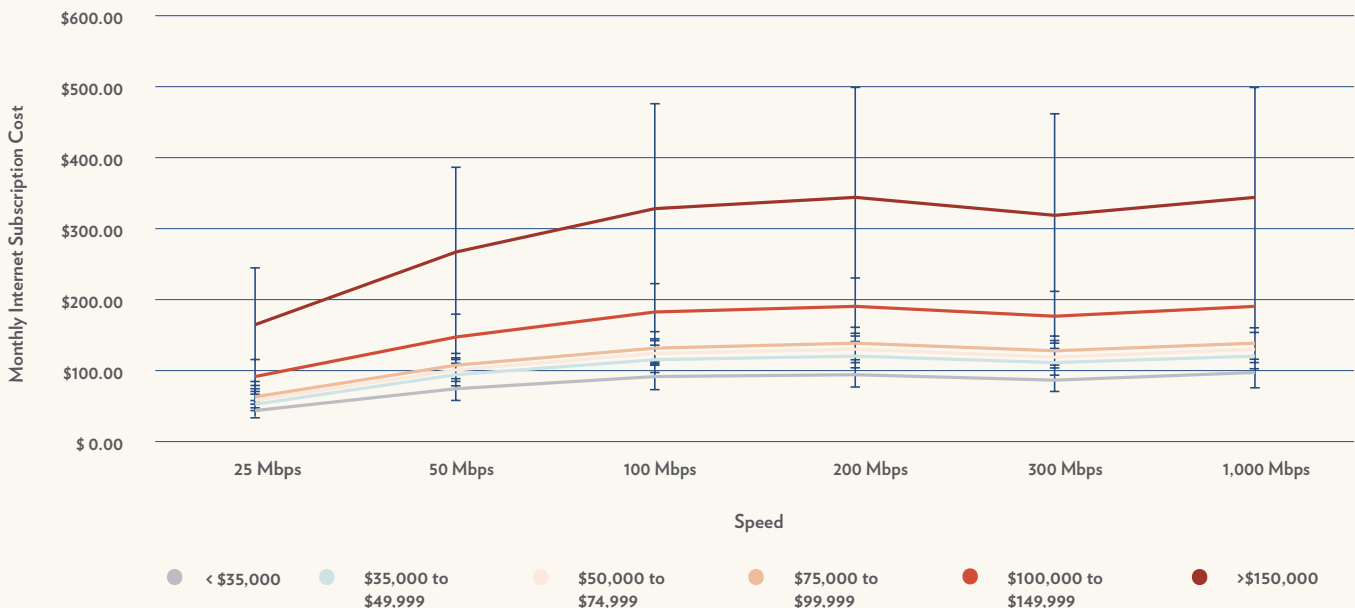
Wisconsin median household income is about \$67,000 which is slightly above the middle of the \$50,000 to \$74,999 income category used for this study. As such, the willingness to pay for this income range is perhaps most relevant. Here the average willingness to pay for 25 Mbps, the current threshold definition of broadband, is \$63.18 and \$102.23 for 50 Mbps, an increase of 62% over 25 Mbps. These same households are willing to pay more for 100 Mbps, specifically \$126.15, which is a 23% increase over their willingness to pay for 50 Mbps. But to go to 200 Mbps the willingness to pay increases by only 5% to \$132.17. Here increases in willingness to pay for broadband plateaus between 100 to 200 Mbps.

Table 1 | WILLINGNESS TO PAY FOR HIGHER SPEEDS BY INCOME GROUP, RELATIVE TO NOT HAVING INTERNET

INCOME GROUP	25 Mbps	50 Mbps	100 Mbps	200 Mbps	300 Mbps	1,000 Mbps
< \$35,000	\$46.72	\$75.60	\$93.29	\$97.74	\$90.24	\$97.83
\$35,000 - \$49,999	\$58.96	\$95.40	\$117.73	\$123.34	\$113.88	\$123.46
\$50,000 - \$74,999	\$63.18	\$102.23	\$126.15	\$132.17	\$122.03	\$132.30
\$75,000 - \$99,999	\$66.98	\$108.37	\$133.74	\$140.12	\$129.36	\$140.25
\$100,000 - \$149,999	\$92.61	\$149.85	\$184.92	\$193.74	\$178.87	\$193.92
> \$150,000	\$165.76	\$268.18	\$330.95	\$346.74	\$320.14	\$347.06

To make better sense of the estimates from Table 1, the variation of respondents' willingness to pay for higher speeds by income groups can be illustrated in two ways. While the same willingness to pay estimates are used, Figure 11 presents the willingness to pay of different income groups at each speed, while Figure 12 shows the willingness to pay for each speed at different income levels. The same information is provided in both Figures 11 and 12 but in different ways.

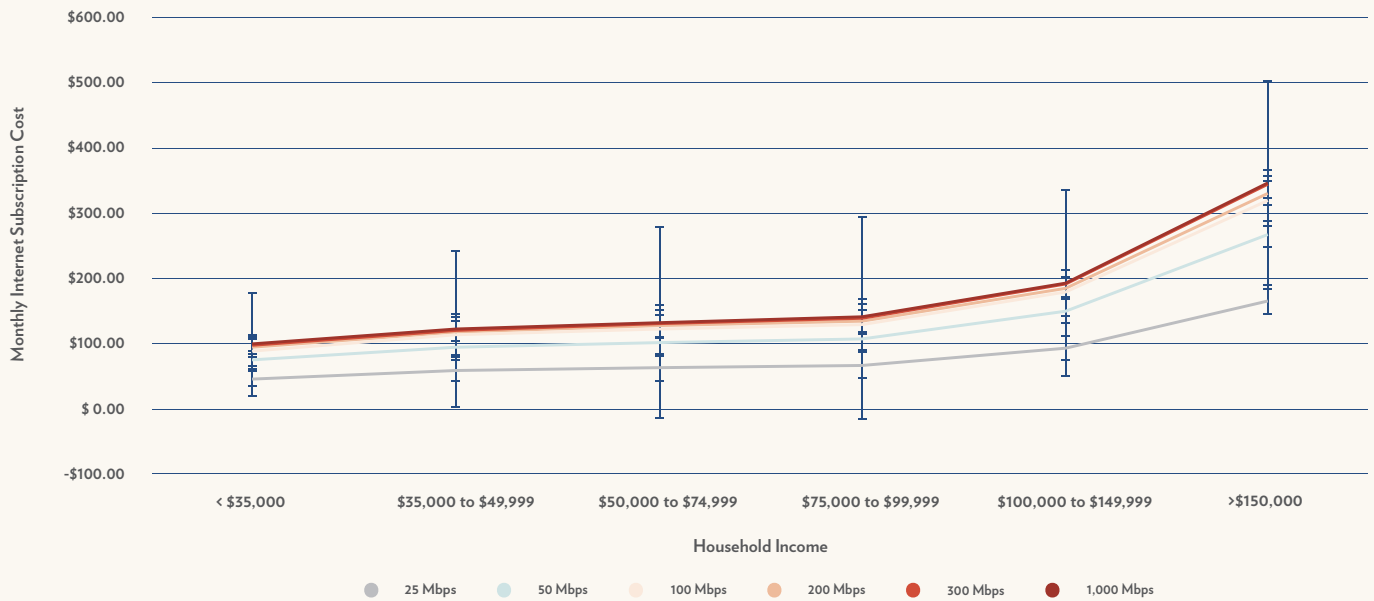
Figure 11 | WILLINGNESS TO PAY FOR SPEED BY INCOME GROUP



Note: The vertical lines represent confidence intervals for the willingness to pay estimates.

Figure 11 makes it clear that the highest income group, those with a household income greater than \$150,000, have a much greater willingness to pay for speed than mid to low-income households. The willingness to pay of households earning less than \$35,000 is below \$100 per month for any speed and the willingness to pay of households earning \$35,000 to \$150,000 is under \$200 per month, while households earning above \$150,000 have a minimum willingness to pay of \$165 for just 25 Mbps and are willing to pay nearly \$350 per month for speeds of 1 gigabyte. For the two higher income groups, particularly the highest income group (greater than \$150,000), the willingness to pay is noticeably higher for all speeds. While there is a large difference in willingness to pay amongst the higher and lower income groups, higher income households presumably have a higher ability to pay for internet services. Higher income households are also currently paying well below their actual willingness to pay, as the PSC indicated the highest cost of internet in the state is \$167.35 per month.

Figure 12 | WILLINGNESS TO PAY FOR SPEED BY INCOME GROUP



Note: The vertical lines represent confidence intervals for the willingness to pay estimates.

Figure 12 illustrates households of all income levels are willing to pay more for speeds of 25 Mbps, 50 Mbps, and 100 Mbps, relative to not having home internet, but appear to get little additional value from paying more for speeds past 100 Mbps. For households making below \$150,000, their willingness to pay for speeds between 100 Mbps and 1,000 Mbps only varies by \$10. Households are willing to pay more for 200 Mbps than 100 Mbps but are not willing to pay more for 300 Mbps than 200 Mbps. This result has interesting implications as discussions continue about “future proofing” internet services and going straight to higher speed availability. Consumers may need more information on the benefits of higher speeds, compared to the lower speeds they may currently be using. For example, at a speed of 100 Mbps, households should be able to easily stream high-definition video on 5+ devices, play online games, run 5+ smart devices, and download large files very quickly. If this is meeting the needs of households currently it may be hard to understand why they may need a higher speed. However, it is encouraging that respondents appear to be willing to pay for 100 Mbps of service, which is the current requirement for BEAD funding and may become the new definition of broadband.

WILLINGNESS TO PAY FOR RELIABILITY

Next, we look at willingness to pay for reliability. Greater reliability is experiencing fewer outages with their home internet service. High reliability is defined as having “rare” internet outages, meaning 0-2 outages per year. Alternatively, low reliability is defined as having “occasional” outages, meaning 3-4+ outages per year.

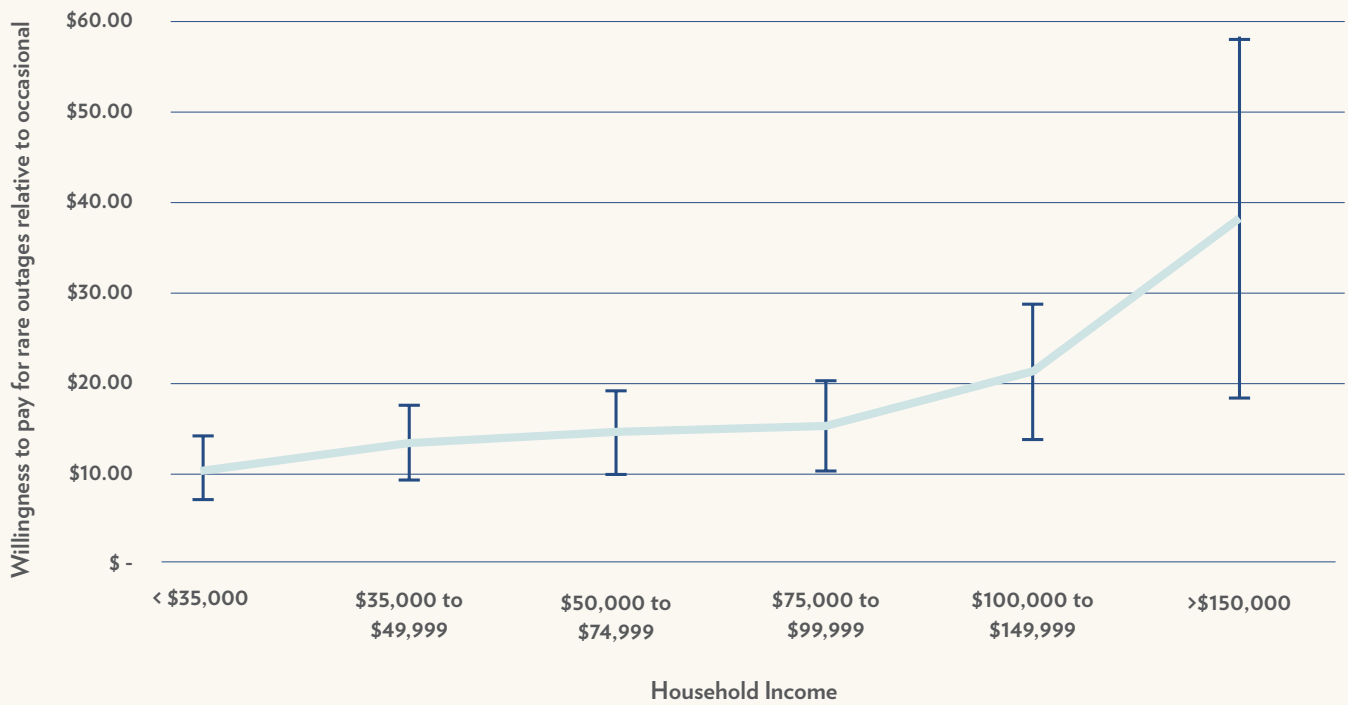
Wisconsin residents’ willingness to pay to receive a high reliability service, relative to a low reliability service, ranges from \$10.85 to \$38.48 per month (Table 2), depending on their household income. Lower-income households are willing to pay almost \$20 per month less for higher quality service. While all households show they value higher quality internet, some households may be able to pay more than others, which may be related to the variation in these estimates.

Table 2 | WILLINGNESS TO PAY FOR GREATER RELIABILITY (FEWER OUTAGES), RELATIVE TO LOWER RELIABILITY (MORE OUTAGES)

INCOME GROUP	WTP
< \$35,000	\$10.85
\$35,000 - \$49,999	\$13.69
\$50,000 - \$74,999	\$14.67
\$75,000-\$99,999 -	\$15.55
\$100,000 - \$149,999	\$21.50
> \$150,000	\$38.48

The variation in willingness to pay for high reliability by household income group is also provided in Figure 13. One can easily see the trend of willingness to pay for reliability increasing with higher income groups. Like willingness to pay for speed, willingness to pay for high reliability tends to be similar for households earning under \$100,000 and then increases to slightly more than \$20.00 for those earning more than \$100,000 per year, and then increases again, but to just below \$40.00 per month for those earning \$150,000.

Figure 13 | WILLINGNESS TO PAY FOR RARE OUTAGES BY INCOME GROUP



Note: High reliability is defined as having rare internet outages, 0-2 outages per year. Low reliability is defined as having occasional outages, 3-4+ outages per year. The vertical lines represent confidence intervals for the willingness to pay estimates.

WHO IS WILLING TO PAY FOR BROADBAND?

We can see willingness to pay for broadband and broadband attributes varies by income, but what else might be associated with differences in willingness to pay? Using an ordinary least squares regression model, we find higher educational attainment levels, indicating an ease of fitting broadband into a monthly household budget, using home internet for work or school, and having children at home increase willingness to pay for higher speeds and greater reliability, while older age is associated with a lower willingness to pay for speed and greater reliability.

Relative to those respondents without a high school education, higher educational attainment levels are associated with a higher willingness to pay for speed and greater reliability. Respondents with some college education are willing to pay \$15.00

more, those with a bachelor's degree are willing to pay \$16.08, and those with a graduate or professional degree are willing to pay \$28.99 more. Respondents with a graduate or professional degree are also willing to pay \$3.35 more for greater reliability. Respondents aged 65 to 74 years-old are willing to pay \$17.62 less for speed than respondents under 35 years old, and \$1.79 less for greater reliability. Households with children living at home are also willing to pay \$14.91 more for speed and \$1.83 more for greater reliability.

Households that have members either working from home or completing school from home are willing to pay \$15.93 more for speed and \$1.74 for greater reliability, relative to those that do not. This finding may shed light on the current landscape of working and learning remotely following the COVID-19 pandemic.

The difficulty/ease of fitting broadband into a household budget is also associated with respondents' willingness to pay for broadband and may serve as an indicator for their ability to pay. Relative to those respondents with a very difficult time paying for broadband, those who have a neither difficult or easy time paying for broadband are willing to pay \$21.37 more for speed and \$2.43 for greater reliability. Respondents who indicate they have an easy time paying for broadband are willing to pay \$31.51 more for speed and \$3.58 more for greater reliability. Additionally, those that have a very easy time paying for internet are willing to pay \$66.62 more for speed and \$7.50 more for greater reliability. These findings suggest the ease of paying, or the ability of individuals to fit broadband expenses into their monthly household budget, is associated with being willing to pay more for broadband services.

The full set of regression results are in the appendix.

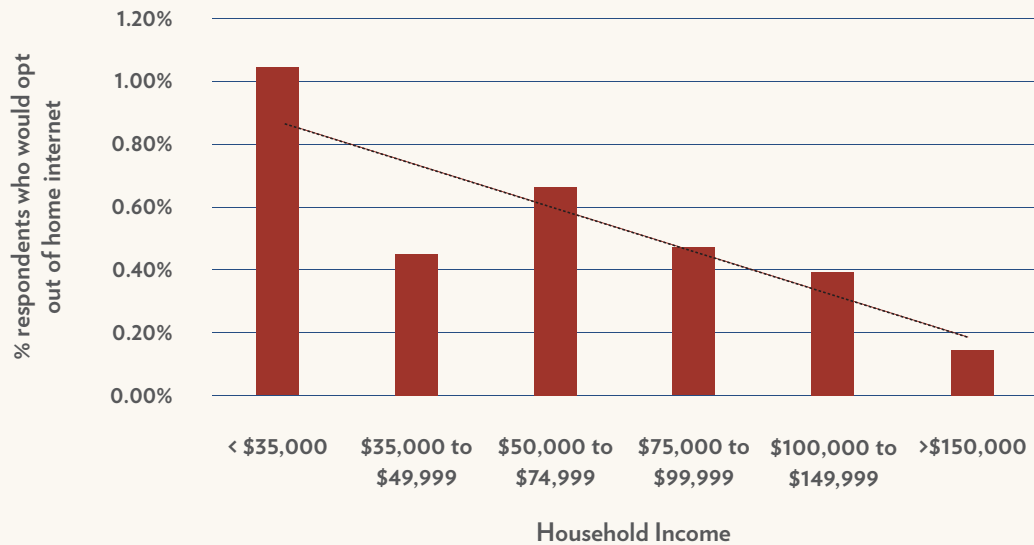
WHO IS OPTING OUT OF PURCHASING BROADBAND?

In the discrete choice survey experiment described above, respondents had the opportunity to choose not to purchase internet at all. In total, only 3.13% of observations were choosing to "opt out" of purchasing home internet. The very limited number of times that the survey respondents "opt out" suggests that the demand for broadband services is high.

While it is difficult to draw conclusions when there are so few observations, there are some general trends. How this choice varied by income group is examined in Figure 14 and rural-urban differences are explored in Figure 15. There is a clear downward trend in the frequency of opting out of purchasing home internet as household income levels rise. Just over 1% of respondents in the lowest income category chose to opt out of purchasing an internet package, while less than 0.20% of households with an income over \$150,000 choose to opt out. This is expected, as households with more disposable income may not consider walking away from the broadband market as easily.

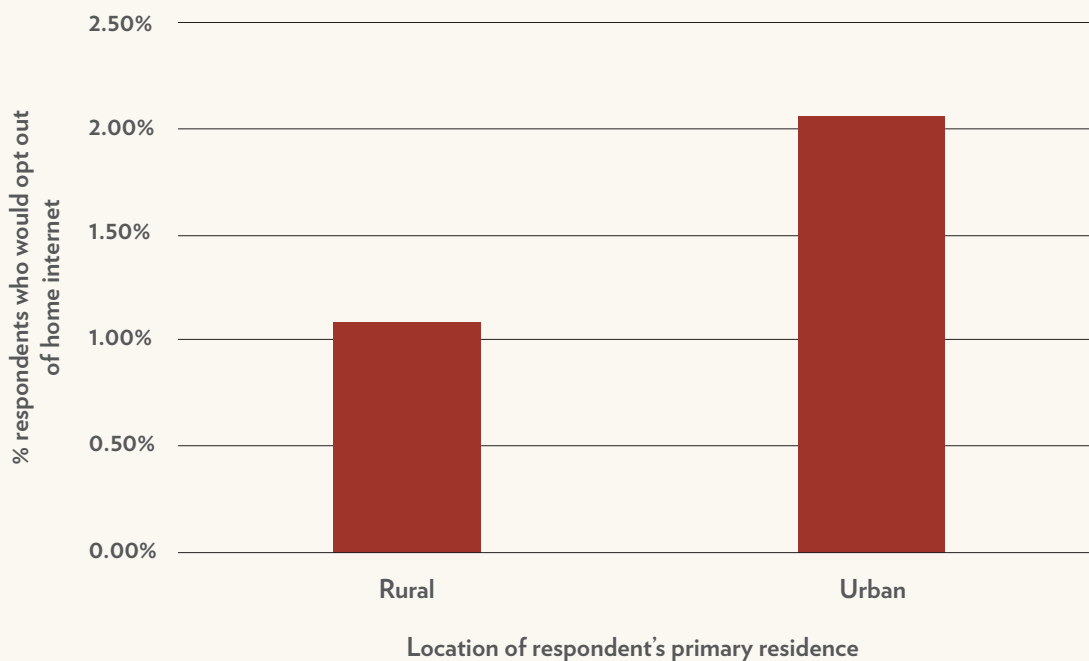
Figure 14 | FREQUENCY OF OPTING OUT BY INCOME GROUP

Choosing to opt out also varies by rural-urban residency, as displayed in Figure 15. Around 1% of rural respondents indicated



they wanted to opt out of purchasing home internet, while around 2% of urban residents chose to opt out. Given the very modest number of respondents that elected to opt out it is difficult to assess if the patterns observed in Figures 14 and 15 are statistically meaningful. In the end, the rarity of respondents electing to opt out suggests that the demand for broadband is high.

Figure 15 | FREQUENCY OF OPTING OUT BY RURALITY



HOW CAN THIS ANALYSIS BE USED?

As broadband expansion efforts continue in Wisconsin, both access and affordability are important considerations. While the physical infrastructure is necessary to bring broadband to people's homes, the services also need to be available at prices residents can afford to pay and are willing to pay.

We estimated households willingness to pay for broadband speeds between 50-1,000 Mbps ranged from \$46-348/month and willingness to pay for greater reliability ranged from \$10-39, depending on household income levels. Consumers are willing to pay more for speed than greater reliability, but the value consumers place on higher speeds is diminishing. While consumers use the internet for remote school/work and streaming and gaming, the difference in willingness to pay between 200-1,000 Mbps is negligible. Perhaps speeds up to 100 Mbps are satisfactory for many households in the state. At speeds of 100 Mbps, households can stream on 5+ devices, game, and run 5+ smart devices, which may be enough for the average household. Increasing to speeds that would allow the same quality of service across 10+ devices may have limited appeal, and hence there is a small willingness to pay increase for 1,000 Mbps, but not something necessary to the average household currently.

The gap among low- and high-income households' willingness to pay is not something to overlook. A community should consider the income levels of their residents when trying to expand broadband. The cost of internet in some communities may be within the range that residents can afford and are willing to pay, but that is not the case across all communities, nor is it universally true even in communities with relatively high incomes. The state, communities, and individual households may need to seek additional funding to fill the gap between what a household can pay for internet and what the broadband market price is at their residence. For example, the Affordable Connectivity Program (ACP) provides a monthly internet service discount to low-income eligible households (up to \$30 per month) and those on qualifying tribal lands (up to \$75 per month) to help make home internet services affordable. Conroy et al. (2021) provides useful strategies and policy options for improving the broadband landscape across the state. For example, states and communities may work with legislators to seek additional funding for both infrastructure and affordability and communities may form partnerships with surrounding areas and anchor institutions to increase access.

While broadband is a critical utility for many households, and a frequent discussion topic among Wisconsin communities, it remains a difficult subject to research. Surveys have low rates of response and broadband data available from public services can be unreliable. While our survey sample was biased towards older, more highly educated respondents the willingness to pay estimates are still insightful. This method of analysis is a new, forward-looking way of thinking about broadband in Wisconsin by considering not only what people are currently paying, but what they are willing to pay to have these services be available to them.

REFERENCES

- Conroy, T., Deller, S., Kures, M., Low, S., Glazer, J., Huyke, G., and Stark, C. (2021). Broadband and the Wisconsin Economy. The Wisconsin Economy Series 7. University of Wisconsin – Madison, Division of Extension.
- Conroy, T., Deller, S., Kures, M., McDermott, M., Stark, C., and Huyke, G. (2021). Strategies and Policy Options for Broadband Across Wisconsin. The Wisconsin Economy Series Number 7. University of Wisconsin – Madison, Division of Extension.
- Consumer Reports. (2022). “Fight for Fair Internet: Consumer Reports white paper on broadband pricing.” Retrieved from <https://advocacy.consumerreports.org/research/fight-for-fair-internet-consumer-reports-white-paper-on-broadband-pricing/>
- Governor’s Task Force on Broadband Access. “Report to Governor Tony Evers and Wisconsin State Legislature.” (2022). Retrieved from <https://psc.wi.gov/Documents/broadband/2022GovernorsTaskForceOnBroadbandAccess.pdf>
- Jeffcoat, C., Davis, A. F., & Hu, W. (2012). Willingness to pay for broadband access by Kentucky farmers. *Agricultural and Applied Economics*, 44(3), 323-334.
- Lai, J., Widmar, N. O., & Bir, C. (2020). Eliciting consumer willingness to pay for home internet service: Closing the digital divide in the state of Indiana. *Applied Economic Perspectives and Policy*, 42(2), 263-282.
- Lee, H. J., & Whitacre, B. (2017). Estimating willingness-to-pay for broadband attributes among low-income consumers: Results from two FCC lifeline pilot projects. *Telecommunications Policy*, 41(9), 769-780.
- Liu, Y. H., Prince, J., & Wallsten, S. (2018). Distinguishing bandwidth and latency in households’ willingness-to-pay for broadband internet speed. *Information Economics and Policy*, 45, 1-15.
- National Telecommunications and Information Administration. (2022). “New analysis shows offline households are willing to pay \$10-a-month on average for home internet services, though three in four say any cost is too much.” Retrieved from <https://ntia.gov/blog/2022/new-analysis-shows-offline-households-are-willing-pay-10-month-average-home-internet>
- Regmi, S., Kim, A., Mills, D. P., & Green, J. (2023). Meta-analysis of Consumer’s willingness to pay for broadband. Retrieved from <https://ageconsearch.umn.edu/record/335602?ln=en>
- United States Census Bureau. (2022). QuickFacts: Wisconsin. Retrieved from <https://www.census.gov/quickfacts/fact/table/WI/PST045222>

APPENDIX

SURVEY INSTRUMENT

Fill the circle that most closely matches your opinion about the following questions

Like this: Not like this:

1. Which of the following best describes your current place of residence?

- | | | | | |
|--------------------------|---------------------------------------|---------------------------|--|---------------------------|
| Owned single-family home | Owned unit in a multi-family building | Rented single-family home | Rented unit in a multi-family building | Other (specify):
_____ |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

2. Which of these options describes how you access the internet at your Wisconsin residence? Please select all that apply.

- | | |
|---|--|
| <input type="radio"/> I do not have internet access at home (skip to 9) | <input type="radio"/> Cable service or cable modem |
| <input type="radio"/> Dial-up | <input type="radio"/> An antenna or fixed wireless |
| <input type="radio"/> Cellular data plan with smart phone | <input type="radio"/> Fiber-optic line |
| <input type="radio"/> Hotspot device/setting on smart phone | <input type="radio"/> Satellite |
| <input type="radio"/> Landline or digital subscriber line (DSL) | <input type="radio"/> Other _____ |

3. How many household members use the internet from home to do the following?

- | | | | | |
|---|-----------------------|-----------------------|-----------------------|-----------------------|
| | None | 1 to 2 | 3 to 4 | 5 or more |
| a. Run a business, either part time or full time | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| b. Go to work, school, or attend classes | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| c. Check email, pay bills, use social media, or read news | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| d. Play games or stream video | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

4. What is your current monthly cost for internet service at your Wisconsin residence?

- | | | | | | |
|---------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| It is included in my rent | \$1 - \$40 | \$41 - \$60 | \$61 - \$80 | \$81 - \$100 | \$100+ |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

5. Is this the monthly cost for only your internet service or is it part of a bundle of services (TV, phone, etc.)?

- | | | |
|-----------------------|-----------------------|-----------------------|
| Just the internet | Part of a bundle | Not sure |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

6. Do you participate in the Affordable Connectivity Program which reduces the cost of internet for modest income households?

- | | | |
|-----------------------|-----------------------|-----------------------|
| Yes | No | Not sure |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

7. Thinking of your current household budget, how difficult or easy is it for you to pay for home internet?

- | | | | | |
|-----------------------|-----------------------|----------------------------|-----------------------|-----------------------|
| Very Difficult | Difficult | Neither difficult nor easy | Easy | Very easy |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

8. How often, if ever, do you experience service disruptions or issues with quality with your home internet?

- | | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|
| Frequently | Occasionally | Rarely | Never |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

If you have internet at home, skip to question 10

9. If you do not have internet access at your residence, why not? Select all that apply.

- | | |
|---|---|
| <input type="radio"/> I have no need | <input type="radio"/> Service is not available where I live |
| <input type="radio"/> Internet service is too expensive | <input type="radio"/> I use the internet somewhere else |
| <input type="radio"/> Equipment (e.g., a computer) is too expensive | <input type="radio"/> Other: _____ |

10. If it would not increase your taxes, would you support using available tax dollars for the following?

- | | Strongly Support | Support | Neutral | Oppose | Strongly Oppose |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| a. Extending broadband access to areas of Wisconsin that currently do not have access. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| b. Lowering the cost of broadband internet for households that otherwise cannot afford it. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

11. What is your gender	Male <input type="radio"/>	Female <input type="radio"/>	Other <input type="radio"/>	12. What is your zip code?	<input style="width: 100px; height: 20px;" type="text"/>
-------------------------	-------------------------------	---------------------------------	--------------------------------	----------------------------	--

13. What is your age?

18 - 24 <input type="radio"/>	25 - 34 <input type="radio"/>	35 - 44 <input type="radio"/>	45 - 54 <input type="radio"/>	55 - 64 <input type="radio"/>	65 - 74 <input type="radio"/>	75+ <input type="radio"/>
----------------------------------	----------------------------------	----------------------------------	----------------------------------	----------------------------------	----------------------------------	------------------------------

14. Do you have children at home? If yes, what are their ages? Select all that apply.

No children at home <input type="radio"/>	Preschool or younger <input type="radio"/>	Kindergarten - 5th Grade <input type="radio"/>	6th Grade - 8th Grade <input type="radio"/>	9th Grade - 12th Grade <input type="radio"/>	College or technical school <input type="radio"/>
--	---	---	--	---	--

15. What is the highest degree or level of education you have completed?

Less than High School <input type="radio"/>	High School/GED <input type="radio"/>	Associates/Tech. Degree <input type="radio"/>	Some College <input type="radio"/>	Bachelor's Degree <input type="radio"/>	Graduate/Prof. Degree <input type="radio"/>
--	--	--	---------------------------------------	--	--

16. Which best describes your race and ethnicity? Select all that apply.

Hispanic <input type="radio"/>	White or Caucasian <input type="radio"/>	Black or African American <input type="radio"/>	Asian or Asian American <input type="radio"/>	Native Amer. or American Indian <input type="radio"/>	Pacific Islander or Native Hawaiian <input type="radio"/>	Other <input type="radio"/>
-----------------------------------	---	--	--	--	--	--------------------------------

17. What is your total household income?

Under \$15,000 <input type="radio"/>	\$15,000 to \$35,000 <input type="radio"/>	\$35,000 to \$49,999 <input type="radio"/>	\$50,000 to \$74,999 <input type="radio"/>	\$75,000 to \$99,999 <input type="radio"/>	\$100,000 to \$149,999 <input type="radio"/>	\$150,000 or more <input type="radio"/>
---	---	---	---	---	---	--

18. Which best describes your employment?

Employed- Full time <input type="radio"/>	Employed- Part time <input type="radio"/>	Self employed <input type="radio"/>	Unemployed <input type="radio"/>	Homemaker <input type="radio"/>	Student <input type="radio"/>	Retired <input type="radio"/>	Disabled <input type="radio"/>
--	--	--	-------------------------------------	------------------------------------	----------------------------------	----------------------------------	-----------------------------------

19. We would like to make sure that we are collecting opinions from people with a wide variety of viewpoints. When it comes to economic issues, how do you describe yourself politically?

Very conservative <input type="radio"/>	Conservative <input type="radio"/>	Moderate <input type="radio"/>	Liberal <input type="radio"/>	Very liberal <input type="radio"/>
--	---------------------------------------	-----------------------------------	----------------------------------	---------------------------------------

You're doing really well! Keep up the good work!

The next two pages include very important questions that will help us determine what Wisconsin residents can afford to pay and what they are willing to pay for broadband internet. Your answers will help us advise policy makers on how they can make broadband affordable and accessible to all state residents.

Instructions

We would like you to imagine that you are purchasing broadband Internet for your household. Each of the packages below contains three different options for internet and a "do not buy" option, where you would not have internet at your home if you did not purchase one of the three alternatives.

The packages have different monthly costs and speeds. Some packages will have rare internet outages (0-2 times per year) and others will have occasional outages (3-4 times or more per year). The packages are for broadband internet only and do not come bundled with other services. Please select your preferred option in each package below.

What can I do at different Internet speeds?

Internet speeds are measured in megabits per second, which we abbreviate as Mbps. You can do the following activities easily at these different Mbps speeds:

- | | | | |
|---|---|---|--|
| <p>25 Mbps</p> <ul style="list-style-type: none"> • Stream high-definition video on 1-2 devices • Play online games • Run 1-2 smart devices | <p>50 Mbps</p> <ul style="list-style-type: none"> • Stream high-definition video on 2-4 devices • Play online games with multiple players • Run 3-5 smart devices | <p>100 Mbps or more</p> <ul style="list-style-type: none"> • Stream high-definition video on 5+ devices • Play online games with many players • Run 5+ smart devices • Download large files very quickly | <p>500 Mbps or more</p> <ul style="list-style-type: none"> • Stream high-definition video on 10+ devices • Play online games with many players • Run 10+ smart devices • Download and upload files very quickly |
|---|---|---|--|

PLEASE SELECT ONLY ONE OPTION IN EACH PACKAGE (OR ROW)

Package 1

A		B		C		D	
Speed	50 Mbps	Speed	300 Mbps	Speed	25 Mbps	Do not buy home Internet	
Outages	Occasional	Outages	Rare	Outages	Rare		
Cost	\$75	Cost	\$150	Cost	\$75		
O		O		O		O	

Package 2

A		B		C		D	
Speed	350 Mbps	Speed	1,000 Mbps	Speed	200 Mbps	Do not buy home Internet	
Outages	Rare	Outages	Occasional	Outages	Rare		
Cost	\$125	Cost	\$20	Cost	\$10		
O		O		O		O	

Package 3

A		B		C		D	
Speed	50 Mbps	Speed	25 Mbps	Speed	300 Mbps	Do not buy home Internet	
Outages	Occasional	Outages	Rare	Outages	Rare		
Cost	\$25	Cost	\$50	Cost	\$125		
O		O		O		O	

Package 4

A	
Speed	50 Mbps
Outages	Occasional
Cost	\$75
O	

B	
Speed	100 Mbps
Outages	Rare
Cost	\$150
O	

C	
Speed	1,000 Mbps
Outages	Occasional
Cost	\$50
O	

D	
Do not buy home Internet	
O	

Package 5

A	
Speed	200 Mbps
Outages	Rare
Cost	\$50
O	

B	
Speed	100 Mbps
Outages	Rare
Cost	\$20
O	

C	
Speed	300 Mbps
Outages	Occasional
Cost	\$100
O	

D	
Do not buy home Internet	
O	

Package 6

A	
Speed	100 Mbps
Outages	Rare
Cost	\$50
O	

B	
Speed	1,000 Mbps
Outages	Occasional
Cost	\$50
O	

C	
Speed	25 Mbps
Outages	Occasional
Cost	\$20
O	

D	
Do not buy home Internet	
O	

Package 7

A	
Speed	300 Mbps
Outages	Occasional
Cost	\$150
O	

B	
Speed	200 Mbps
Outages	Occasional
Cost	\$50
O	

C	
Speed	50 Mbps
Outages	Rare
Cost	\$50
O	

D	
Do not buy home Internet	
O	

Package 8

A	
Speed	300 Mbps
Outages	Rare
Cost	\$150
O	

B	
Speed	200 Mbps
Outages	Occasional
Cost	\$100
O	

C	
Speed	1,000 Mbps
Outages	Occasional
Cost	\$125
O	

D	
Do not buy home Internet	
O	

20. If you are interested in entering the random draw for one of five \$100 cash vouchers, please provide your name and phone number below. This information will only be used to select and contact the winners.

Name: _____ Phone number: _____

Thank you for completing the survey!

Please return the survey in the postage-paid envelope provided to the following address:

Survey Research Center
 124 Regional Development Institute
 University of Wisconsin - River Falls
 410 S. 3rd St., River Falls, WI 54022-9989

STATISTICAL MODELING

Conjoint analysis and discrete choice experiments are based on random utility theory. It is assumed that respondents will choose to maximize their “utility,” by indicating they choose to purchase the item that will bring them the most satisfaction/happiness. For example, if given three broadband packages and the choice to not purchase any of them, I will choose the option that brings me the most satisfaction. The choice is made by making tradeoffs among the attribute levels (speed, reliability, and price in this situation) of each package. Therefore, it can be inferred that the other options brought me less satisfaction than the option I chose.

A conditional logit model is often used to model the choices made by a respondent, based on the attributes of the product. In this case, we model the broadband package choice as a function of the attribute levels of the packages the respondent was choosing between (speed, reliability, cost). The estimates from this conditional logit model are provided in Table A.1.

The estimates from this conditional logit model can then be used to estimate the WTP of respondents for their respective income level, by dividing the attribute estimate by the price estimate plus the corresponding income and price interaction term. The WTP estimate for attribute k is calculated using the following formula:

$$WTP_k = - \frac{\beta_k}{\beta_{price} + \beta_{price*income}}$$

Aside from estimating WTP, the conditional logit model also allows us to see how opting out impacts one’s utility. The opt out variable alone signals whether there was an increase (+) or decrease (-) in utility (satisfaction/happiness) from not choosing to enter the market. The interaction terms between opting out and being low income or living in a rural area can then be added to the opt out result to see if there is an additional increase or decrease in utility from not entering the market specific to low income or rural residents.

We then use the WTP for speed and reliability estimated from the conditional logit model to find the relationship between WTP and household characteristics. The regression results that indicate the relationship between the WTP for speed and household characteristics such as educational attainment, age, and their perceived difficulty paying for Internet are provided in Table A.2. The estimated relationship between WTP for greater reliability and the same household characteristics is provided in Table A.3. The results discussion was included in the main text. A (+) coefficient indicates there is a positive relationship between WTP and that household characteristic, while a (-) coefficient indicates there is a negative relationship. For example, having a high school diploma increases the WTP for speed while 65-74 years old decrease the WTP for reliability.

Table A.1. CONDITIONAL LOGIT MODEL REGRESSING RESPONDENT CHOICE ON BROADBAND PACKAGE ATTRIBUTES

Variable	Coefficient	Robust Standard Error	P-value	95% Confidence Interval
Price	-0.036	0.003	0	(-0.043, -0.030)
Rare Outages	0.395	0.061	0	(0.276, 0.514)
25 Mbps	1.703	0.157	0	(1.395, 2.010)
50 Mbps	2.755	0.166	0	(2.430, 3.080)
100 Mbps	3.4	0.167	0	(3.072, 3.727)
200 Mbps	3.562	0.179	0	(3.212, 3.912)
300 Mbps	3.288	0.171	0	(2.953, 3.623)
1000 Mbps	3.565	0.169	0	(3.233, 3.897)
Low Income*Optout	0.245	0.332	0.461	(-0.406, 0.896)
Rural*Optout	-0.372	0.213	0.081	(-0.790, 0.046)
Price*Income<\$35,000	0.008	0.004	0.057	(-0.000, 0.015)
Price*Income\$35-49,999	0.009	0.004	0.012	(0.002, 0.017)
Price*Income\$50-99,999	0.011	0.004	0.005	(0.003, 0.019)
Price*Income\$100-149,999	0.018	0.004	0	(0.011, 0.025)
Price*Income>\$150,000	0.026	0.004	0	(0.018, 0.034)
Number of observations	15,396			
Pseudo R2	0.208			
Log pseudo likelihood	-4,225. 831			

Note: These regression results are those that are used in the WTP estimates.

Table A.2. ORDINARY LEAST SQUARES MODEL REGRESSING WTP FOR SPEED ON DEMOGRAPHIC AND SOCIOECONOMIC CHARACTERISTICS

Variable	Coefficient	Robust Standard Error	P-value	95% Confidence Interval
35-44years	-2.235	9.945	-0.22	(-21.776, 17.306)
45-54years	5.727	9.254	0.62	(-12.457, 23.912)
55-64years	-4.606	8.6	-0.54	(-21.505, 12.293)
65-74years	-17.618	8.087	-2.18	(-33.508, -1.727)
75+years	-10.426	8.914	-1.17	(-27.942, 7.091)
HS Diploma	14.298	8.959	0.111	(-3.306, 31.902)
Associates Tech	10.046	8.609	0.244	(-6.871, 26.963)
Some College	15.002	8.78	0.088	(-2.250, 32.255)
Bachelors	16.078	8.439	0.057	(-0.504, 32.659)
Graduate	28.991	8.908	0.001	(11.486, 46.495)
Children	14.914	5.447	0.006	(4.210, 25.617)
Rural	-1.461	3.723	0.695	(-8.777, 5.856)
Home Business	-0.205	4.281	0.962	(-8.618, 8.207)
Work/School	15.939	4.399	0	(7.295, 24.583)
Email/Bills/Social/News	6.915	7.936	0.384	(-8.679, 22.508)
Gaming/Streaming Video	-1.022	4.442	0.818	(-9.750, 7.706)
Difficult Paying	8.923	5.941	0.134	(-2.750, 20.596)
Neutral Paying	21.365	6.058	0	(9.460, 33.269)
Easy Paying	31.505	6.564	0	(18.608, 44.403)
Very Easy Paying	66.621	8.697	0	(49.531, 83.710)
Constant	51.93	14.516	0	(23.406, 80.454)
Number of observations	14,548			
R2	0.11			

Note: These regression results are those that are used in the WTP estimates.

Table A.3. ORDINARY LEAST SQUARES MODEL REGRESSING WTP FOR OUTAGES ON DEMOGRAPHIC AND SOCIOECONOMIC CHARACTERISTICS

Variable	Coefficient	Robust Standard Error	P-value	95% Confidence Interval
35-44years	0.285	1.171	0.808	(-2.016, 2.585)
45-54years	0.78	1.019	0.445	(-1.224, 2.783)
55-64years	-0.214	0.951	0.822	(-2.083, 1.655)
65-74years	-1.791	0.874	0.041	(-3.509, -0.073)
75+years	-1.051	0.967	0.278	(-2.951, 0.849)
HS Diploma	1.544	1.27	0.225	(-0.952, 4.040)
Associates Tech	1.277	1.258	0.311	(-1.195, 3.749)
Some College	1.861	1.274	0.145	(-0.642, 4.363)
Bachelors	1.922	1.234	0.12	(-0.503, 4.347)
Graduate	3.353	1.268	0.008	(0.860, 5.845)
Children	1.831	0.666	0.006	(0.522, 3.139)
Rural	-0.303	0.446	0.498	(-1.178, 0.573)
Home Business	-0.175	0.51	0.732	(-1.178, 0.828)
Work/School	1.742	0.519	0.001	(0.723, 2.762)
Email/Bills/Social/News	0.646	0.96	0.501	(-1.240, 2.532)
Gaming/Streaming Video	-0.225	0.551	0.683	(-1.309, 0.858)
Difficult Paying	1.002	0.777	0.198	(-0.525, 2.529)
Neutral Paying	2.426	0.785	0.002	(0.884, 3.968)
Easy Paying	3.576	0.856	0	(1.894, 5.257)
Very Easy Paying	7.497	1.058	0	(5.418, 9.577)
Constant	5.815	1.844	0.002	(2.192, 9.438)
Number of observations	14,548			
R2	0.091			

Note: These regression results are those that are used in the WTP estimates.

ADDITIONAL TABLES AND FIGURES

Table A.4. WHAT IS YOUR CURRENT MONTHLY COST FOR INTERNET SERVICE AT YOUR WISCONSIN RESIDENCE? THINKING OF YOUR CURRENT HOUSEHOLD BUDGET, HOW DIFFICULT OR EASY IS IT FOR YOU TO PAY FOR HOME INTERNET?

	Very Easy	Easy	Neither Difficult nor Easy	Difficult	Very Difficult	Total
In Rent	0.5	0.3	0	0.3	0	1.1
\$1-\$40	1.5	1.7	2.9	0.8	0	6.9
\$41-\$60	3.4	7.4	9.6	2.8	0.3	23.5
\$61-\$80	3.1	10	15.6	6.2	0.3	35.2
\$81-\$100	1.7	3.4	9	2.3	0.5	16.8
\$101+	1.2	2.6	9.3	2.6	0.8	16.5
Total	11.4	25.5	46.3	15	1.9	100.0

n=631; Chi-Square pS.05

UW-Madison Extension; Wisconsin Broadband Willingness to Pay Survey; Fall/Winter 2022

Table A.5. WHAT IS YOUR CURRENT MONTHLY COST FOR INTERNET SERVICE AT YOUR WISCONSIN RESIDENCE? WHAT IS YOUR TOTAL HOUSEHOLD INCOME?

	<\$34,999	\$35000 to \$49999	\$50000 to \$74,999	\$75000 to \$99,999	\$100,000 to \$149,999	>\$150,000	Total
In Rent	0.6	0.2	0.2	0	0.2	0	1.1
\$1-\$40	1.7	1	1.7	1.1	0.6	0.5	6.7
\$41-\$60	4.8	3.5	4.8	5.2	3.7	1.4	23.3
\$61-\$80	4.6	4	9.4	7.6	6.8	3.2	35.5
\$81-\$100	2.5	1.9	3.7	3.2	3.2	2.5	17
\$101+	1.6	1.7	3.7	2.4	4.4	2.7	16.5
Total	15.9	12.2	23.3	19.5	18.9	10.3	100.0

n=631; Chi-Square pS.05

UW-Madison Extension; Wisconsin Broadband Willingness to Pay Survey; Fall/Winter 2022

Table A.6. WHAT IS YOUR CURRENT MONTHLY COST FOR INTERNET SERVICE AT YOUR WISCONSIN RESIDENCE?

	Rural	Urban	Total
In Rent	0.4	0.4	0.8
\$1-\$40	2.4	4.5	6.9
\$41-\$60	10.2	13.7	23.9
\$61-\$80	10.4	24.7	35
\$81-\$100	7.8	8.8	16.6
\$101+	6.5	10.4	16.8
Total	37.6	62.4	100.0

n=511; Chi-Square p>.05 (not statistically significant differences)

UW-Madison Extension; Wisconsin Broadband Willingness to Pay Survey; Fall/Winter 2022

Table A.7. WHAT IS YOUR TOTAL HOUSEHOLD INCOME? THINKING OF YOUR CURRENT HOUSEHOLD BUDGET, HOW DIFFICULT OR EASY IS IT FOR YOU TO PAY FOR HOME INTERNET?

	Very Easy	Easy	Neither Difficult nor Easy	Difficult	Very Difficult	Total
<\$34,999	1.3	1.9	6.6	5.2	0.9	15.9
\$35,000 to \$49,999	0.5	1.6	6.8	3.3	0.3	12.4
\$50,000 to \$74,999	1.6	4.9	12.6	3.9	0.3	23.2
\$75,000 to \$99,999	1.6	6.3	10.1	1.6	0	19.5
\$100,000 to \$149,999	2.4	7.5	7.9	0.8	0	18.5
>\$150,000	4.4	3.5	2.7	0	0	10.5
Total	11.6	25.6	46.5	14.8	1.6	100.0

n=637; Chi-Square p≤.05

UW-Madison Extension; Wisconsin Broadband Willingness to Pay Survey; Fall/Winter 2022

Table A.8. THINKING OF YOUR CURRENT HOUSEHOLD BUDGET, HOW DIFFICULT OR EASY IS IT FOR YOU TO PAY FOR HOME INTERNET?

	Rural	Urban	Total
Very Easy	2.7	9.8	12.5
Easy	8.3	16.2	24.5
Neither Difficult nor Easy	19.5	27.2	46.6
Difficult	6.2	8.1	14.3
Very Difficult	0.8	1.4	2.1
Total	37.6	62.4	100.0

n=519; Chi-Square p≤.05

UW-Madison Extension; Wisconsin Broadband Willingness to Pay Survey; Fall/Winter 2022

Table A.9. WHAT IS YOUR TOTAL HOUSEHOLD INCOME? HOW OFTEN, IF EVER, DO YOU EXPERIENCE SERVICE DISRUPTIONS OR ISSUES WITH QUALITY WITH YOUR HOME INTERNET?

	Never	Rarely	Occasionally	Frequently	Total
<\$34,999	0.8	6.7	6.6	1.9	15.9
\$35,000 to \$49,999	0.3	3.7	5.6	2.8	12.5
\$50,000 to \$74,999	0.9	10.5	8.9	3	23.2
\$75,000 to \$99,999	0.8	7.8	8.1	2.8	19.5
\$100,000 to \$149,999	0.6	8.3	7	2.7	18.6
>\$150,000	0.9	5.5	3.4	0.5	10.3
Total	4.4	42.4	39.6	13.6	100.0

n=641; Chi-Square p>.05 (not statistically significant differences)

UW-Madison Extension; Wisconsin Broadband Willingness to Pay Survey; Fall/Winter 2022

Table A.10. THINKING OF YOUR CURRENT HOUSEHOLD BUDGET, HOW DIFFICULT OR EASY IS IT FOR YOU TO PAY FOR HOME INTERNET? HOW OFTEN, IF EVER, DO YOU EXPERIENCE SERVICE DISRUPTIONS OR ISSUES WITH QUALITY WITH YOUR HOME INTERNET?

	Never	Rarely	Occasionally	Frequently	Total
Very Easy	1.7	5.8	2.7	1.2	11.4
Easy	1.4	12.8	9.1	2.4	25.7
Neither Diifcult nor Easy	0.8	18.4	20.7	6.7	46.5
Difficult	0.5	5	6.2	2.9	14.6
Very Difficult	0	0.3	1.1	0.5	1.8
Total	4.3	42.3	39.8	13.7	100

n=658; Chi-Square p<.05

UW-Madison Extension; Wisconsin Broadband Willingness to Pay Survey; Fall/Winter 2022

Table A.11. WHAT IS YOUR CURRENT MONTHLY COST FOR INTERNET SERVICE AT YOUR WISCONSIN RESIDENCE? HOW OFTEN, IF EVER, DO YOU EXPERIENCE SERVICE DISRUPTIONS OR ISSUES WITH QUALITY WITH YOUR HOME INTERNET?

	Never	Rarely	Occasionally	Frequently	Total
In Rent	0.2	0.3	0.6	0	1.1
\$1-\$40	0.8	2.6	2.5	1.1	6.9
\$41-\$60	1.4	9.5	9.4	3.4	23.7
\$61-\$80	0.6	16.6	14.3	3.7	35.2
\$81-\$100	0.3	7.1	7.5	1.7	16.6
\$101+	0.8	6	5.7	4.2	16.6
Total	4	42.1	39.9	14	100.0

n=651; Chi-Square p≤.05

UW-Madison Extension; Wisconsin Broadband Willingness to Pay Survey; Fall/Winter 2022

Table A.12. HOW OFTEN, IF EVER, DO YOU EXPERIENCE SERVICE DISRUPTIONS OR ISSUES WITH QUALITY WITH YOUR HOME INTERNET?

	Rural	Urban	Total
Never	1.4	2.3	3.7
Rarely	12.7	30.7	43.4
Occasionally	16.2	23.2	39.4
Frequently	7.3	6.2	13.5
Total	37.6	62.4	100.0

n=518; Chi-Square $p \leq .05$

UW-Madison Extension; Wisconsin Broadband Willingness to Pay Survey; Fall/Winter 2022

ABOUT THE WISCONSIN ECONOMY SERIES

The Wisconsin Economy Series is a publication of the University of Wisconsin-Madison Economic Development Administration (EDA) University Center, which is housed at the Division of Extension, University of Wisconsin-Madison.

This series, along with other publications by the EDA University Center at UW Madison, are designed to provide the economic development community in Wisconsin and the Upper Midwest with data specific to issues related to the current economy in this part of the United States. Additional publications, including our WIndicator series and the results of our most recent public opinion survey on the economy of Wisconsin, can be found at <https://economicdevelopment.extension.wisc.edu/>

For additional information about the Wisconsin Economy Series or the Economic Development Administration University Center at the University of Wisconsin-Madison please contact:

Dr. Kristin Runge, Ph.D, Principal Investigator
EDA University Center, Community
Development Institute, Division of Extension
kristin.runge@wisc.edu

Brandon Hofsted, Program Manager
EDA University Center, Community
Development Institute, Division of Extension
Brandon.hofstedt@wisc.edu

Dr. Tessa Conroy, Ph.D, Associate Professor
and Economic Development Specialist
EDA University Center, Community
Development Institute, Division of Extension
Department of Agricultural & Applied Economics
tessa.conroy@wisc.edu

Matt Kures, M.S., GIS Community
Development Specialist
EDA University Center,
Community Development Institute,
Division of Extension
matthew.kures@wisc.edu

Dr. Steven Deller, Ph.D., Professor and
Economic Development Specialist
EDA University Center, Community
Development Institute, Division of Extension
Department of Agricultural & Applied Economics
scdeller@wisc.edu