

Broadband Internet Adoption and Use

Dial-Up Versus Broadband Internet Use

That households and individuals greatly value the Internet, and especially broadband access to the Internet, is readily apparent from the data. Two major data sources directly address individual and household online proclivity and activity: the U.S. Bureau of the Census and PEW (PEW Internet & American Life Project). The Census Bureau has not collected thorough data on online activity since 2003, so we rely on the PEW surveys for our understanding of Internet users (see Appendix B for a description of this and other data used in this report). Aggregate e-retail, peer-to-peer, web-page access counts, and other such information are not used here because such measurements of volume give no information on individual behavior.

The PEW survey data suggest that rural and urban online behavior is alike if one controls for type of Internet access. In other words, rural and urban users with broadband Internet access have similar online behavior patterns vis-à-vis each other; rural and urban users with dial-up Internet access have similar online behavior patterns as well. Users with broadband Internet access, however, exhibit different online behavior than users with dial-up access.

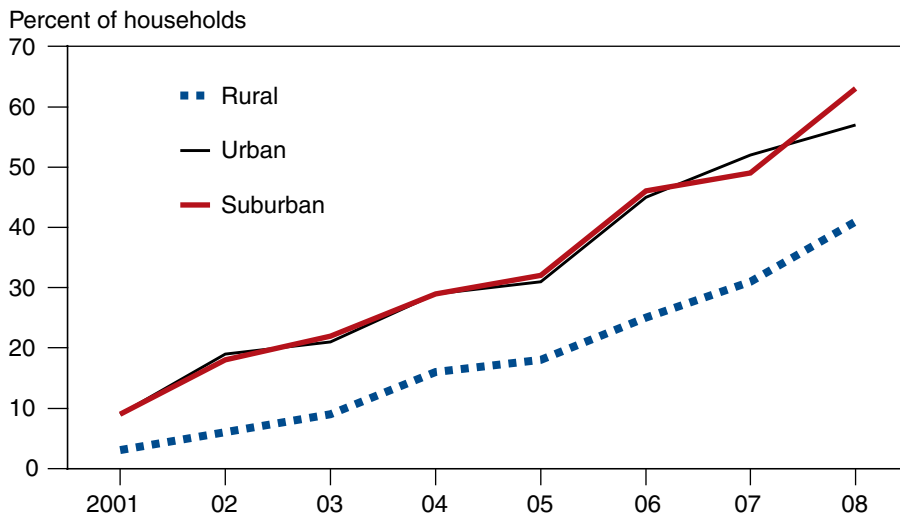
Among the conclusions drawn from 2008 PEW survey data:

- Three-quarters of all adults used the Internet, with 69 percent having access at home.
- Fifty-five percent of all adults had broadband access at home.
- Only 41 percent of adults in rural households had broadband access at home in 2008.

Broadband access at home has increased dramatically for both urban and rural adults since 2001 (fig. 1).

Figure 1

Trends in home broadband adoption by region



Source: Horrigan, 2008

The number of online activities varies between dial-up users and broadband users, but not between rural and urban broadband users (Horrigan, 2008).¹ Most Internet users go online everyday and most of these send e-mail or get information off the Internet (table 1). Getting information, including visiting State and local government websites, is the most common activity. Many of the activities, such as hobbies and web-surfing, are of a personal nature. Still, 23 percent of adults used the Internet daily to conduct research for their job. Broadband Internet users were more likely than dial-up users to take part in any specific online activity, such as getting news online. The more data intensive the activity, the greater the difference is between dial-up and broadband user participation.

The Internet has reduced the economic involvement of the broker and other business middlemen in the economy. More bank transactions, for example, are taking place through ATMs or online instead of via tellers. According to a PEW survey in 2005, a quarter of all U.S. adults, or 44 percent of all adult Internet users, used the Internet for online banking. On any given day, 14 percent of all U.S. adults perform some online banking activity. Broadband users are especially heavy users of online banking services—over 60 percent of urban and nearly 50 percent of rural broadband users conducted some online banking activity in 2007.

As online data intensiveness increases, broadband access becomes more of a necessity. Nearly all online activities are becoming more sophisticated, using more data intensive processes; e-mail, for example, is becoming more data intensive as people are more inclined to attach photo and video files.

¹John Horrigan and a number of other researchers whose works are discussed at length in this report presented their research at the Economic Research Service's broadband workshop, September 2008. For a complete listing of participants and papers, see the workshop agenda in appendix F.

Table 1
Online activities, 2008

Activity that has ever been done by a user	All Internet users	Dial-up at home	Broadband at home
		<i>Percent</i>	
Use an online search engine	89	80	94
Check weather reports and forecasts	80	75	84
Get news online	73	61	80
Visit a State or local government website	66	55	72
Look online for information about the 2008 election	55	37	62
Watch a video on a videosharing site like YouTube or GoogleVideo	52	29	60
Look online for information about a job	47	36	50
Send instant messages	40	38	44
Read someone else's blog	33	15	40
Use a social networking site like MySpace, Facebook, or LinkedIn	29	21	33
Make a donation to charity online	20	9	23
Download a podcast	19	8	22
Download or share files using peer-to-peer networks such as BiTorrent or LiveWire	15	15	17
Create or work on your own blog	12	8	15

Source: Pew Internet & American Life Project Survey, April 2008.

Broadband access is not uniform across rural and urban America, nor is the broadband access transmission rate identical across the country. Any shortfall in rural broadband availability is an implicit loss in economic opportunity for businesses, consumers, and governments.

Rural Internet Use

While the surveys conducted by PEW indicate popular online activities among adults, we turn to the Current Population Survey (CPS) to better understand who uses the Internet and where. The most recent CPS data are from a survey administered in October 2007. This large sample survey does not include any questions on what the Internet is used for or where it is accessed outside the home, but it provides a better understanding of who uses the Internet and rural-urban regional differences in household online proclivity.

Table 2 shows the share of households in which at least one person went online—no matter the technology—at home, school, work, or elsewhere in 2007. Over 71 percent of all households included one or more members that went online during the year. The CPS data suggest a variation across the country in the occurrence of going online (table 2). Households in the South were the least likely of the four Census regions to go online (see Appendix A for a description of the regions).

Nonmetro areas, in aggregate, had a lower percentage of individuals going online in 2007. While the variation in overall online use was insignificant between regions outside of the South, the same did not hold for nonmetro areas. Only in the Northeast was there not a significant dropoff in online activity going from metro to nonmetro areas.

Income differences have often been offered as a key explanation for the disparity in Internet use by households (Choudrie and Dwivedi, 2006; Flamm and Chaudhuri, 2007; Stenberg and Morehart, 2006). Lower income households clearly access the Internet less than higher income households (fig. 2). Income, of course, is not the whole story as income is highly correlated with or determined by education, age, and other factors, but household income by itself does raise an intriguing question: to what extent does use of the Internet lead to higher household income, and to what extent does higher household income lead to higher levels of Internet use?

Table 2
Households with at least one person going online at home or elsewhere, 2007

	Metro	Nonmetro	Total
		<i>Percent</i>	
Northeast	71.0	69.5	70.9
Midwest	74.0	65.7**	72.1
South	70.7	58.3**	68.3
West	75.5	68.6**	74.9
Total	72.6	63.3**	71.1

** Metro/nonmetro difference significant at 0.01.

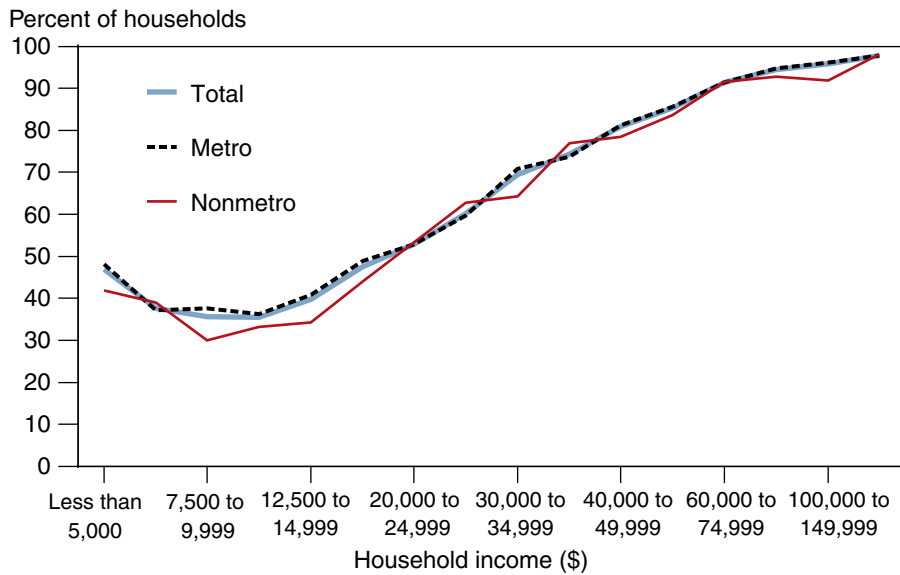
Source: ERS using Bureau of the Census CPS data.

Over 80 percent of households with annual incomes above \$40,000 used the Internet during 2007. The rural-urban gap in accessing the Internet—either in-home or elsewhere—is not evident between rural and urban households of the same income (fig. 2).

Sixty-two percent of all U.S. households had in-home Internet access in 2007 (table 3). The West had the highest share of households with in-home access, partially reflecting the more urbanized population distribution there. A significant dropoff in in-home Internet access is apparent between urban and rural households, especially outside the Northeast; fewer than half of rural households in the South had Internet access at home in 2007.

Income is a major factor in whether a household has in-home Internet access (fig. 3). Over 70 percent of all households with incomes above \$40,000 had in-home Internet access, and again rural-urban differences are largely nonexistent between households of the same income level. The steeper slope

Figure 2
Households accessing the Internet using any technology anywhere, 2007



Source: ERS using Bureau of the Census CPS data.

Table 3
Households with at least one person going online at home using any technology, 2007

	Metro	Nonmetro	Total
	<i>Percent</i>		
Northeast	64.1	61.0	63.7
Midwest	63.1	53.7**	60.9
South	61.7	46.4**	58.7
West	67.0	56.9**	66.1
Total	63.7	51.9**	61.8

** Metro/nonmetro difference significant at 0.01.

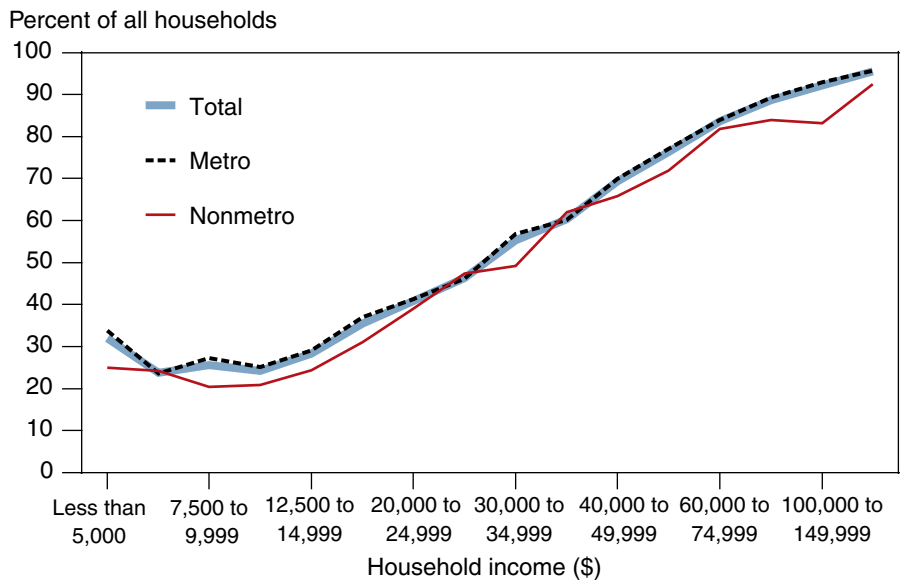
Source: ERS using Bureau of the Census CPS data.

for in-home access rates versus going online anywhere suggests that affordability may be a factor in Internet access at home.

Most households with in-home Internet access have broadband connections (table 4). This rate varies little across regions for urban households. The same cannot be said for rural households. A marked difference in broadband access exists between urban and rural residents, even in the Northeast. Only 70 percent of rural households with in-home Internet access had broadband access in 2007, versus 84 percent of urban households. The data suggest that broadband availability is an issue for rural areas across the country.

The rural-urban dichotomy in broadband access becomes even more apparent when household income is taken into account (fig. 4). Income appears to be a minor factor in opting for broadband over dial-up for an in-house Internet connection. Generally, over 70 percent of Internet users, regardless of income, choose to pay for broadband (fig. 4). Thus, the gap between rural and urban household use of broadband suggests that the availability of broadband services is more of a challenge for rural than urban households (unless there is some systemic difference between rural and urban house-

Figure 3
Home internet access by income, 2007



Source: ERS analysis of Bureau of the Census CPS data.

Table 4
Share of online households with broadband access, 2007

	Metro	Nonmetro	Total
	<i>Percent of online households</i>		
Northeast	87.3	68.8**	85.4
Midwest	82.9	70.6**	80.4
South	83.0	67.3**	80.5
West	85.3	75.2**	84.4
Total	84.4	69.7**	82.3

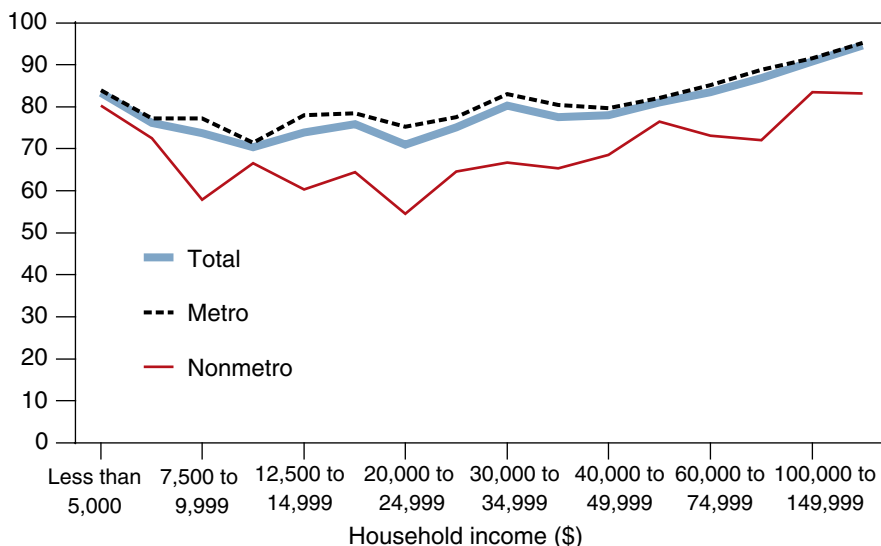
** Metro/nonmetro difference significant at 0.01.

Source: ERS using Bureau of the Census CPS data.

Figure 4

Households with broadband access by income, 2007

Percent of online households



Source: ERS analysis of Bureau of the Census CPS data.

holds that otherwise could explain the gap). Systemic household differences, if they exist, would have to explain why rural households are as likely as urban households to use the Internet but do not opt for broadband when they already use the Internet at home.

Further Factors in Rural Broadband Use

The presence of children in the household is a contributing factor in a household's having in-home Internet access (Stenberg and Morehart, 2006; Choudrie and Dwivedi, 2006). One way in which in-home Internet access may improve household well-being is through educational programs. The Internet has increased course offerings for students in primary, secondary, post-secondary, and continuing education programs, especially those attending small, isolated rural primary and secondary schools. The Internet has also improved interaction among students, parents, teachers, and school administrators in primary and secondary education. This is especially significant as studies have shown the importance of parental involvement in their children's education (Moore, 2007; Poley, 2008). As a result, education programs drive household demand for in-home Internet access. Analysis of the CPS data shows households with children have higher rates of in-home Internet access and households with teenage children are the most likely to have it (table 5).

Rural households, however, have uniformly less access to in-home Internet than urban households across all household composition types. Inasmuch as distance education is beneficial to economic well-being, continuation of this rural-urban dichotomy could put rural households at a disadvantage.

Once a household has in-home Internet access, the upgrade to broadband is seemingly not affected by household composition (table 6). The rural-urban gap, however, is more extreme and broadband's role in distance education would seem to put rural households at a further disadvantage.

Table 5

All types of Internet access at home by household composition, 2007

	Metro	Nonmetro	Total
<i>Percent of households</i>			
Not a parent	65.0	53.4**	63.3
No children under 18 years of age	69.7	59.4**	67.7
Only children less than 6	70.8	55.1**	68.7
At least one child 6-13 and none older than 13	72.8	65.4*	71.7
At least one child older than 13	81.4	76.5**	80.6
Total	68.5	58.1**	66.8

** Metro/nonmetro difference significant at 0.01; * difference significant at 0.05.

Source: ERS using Bureau of the Census CPS data.

Table 6

Broadband in homes with Internet access by household composition, 2007

	Metro	Nonmetro	Total
<i>Percent of online households</i>			
Not a parent	85.7	71.4**	83.9
No children under 18 years of age	82.3	66.9**	79.7
Only children less than 6	90.5	78.4**	89.1
At least one child 6-13 and none older than 13	87.3	71.8**	85.2
At least one child older than 13	85.4	71.8**	83.3
Total	85.2	70.3**	83.1

** Metro/nonmetro difference significant at 0.01.

Source: ERS using Bureau of the Census CPS data.

In a recessionary economy a number of Internet activities—including job searches and home businesses—may become more critical for households. The 2007 CPS data give some information on both activities.

Unemployed adults, while less frequent users of the Internet than employed persons, still had high “anywhere” access rates (table 7). People not in the labor force due to retirement or disability had the lowest rate of online activity. Unemployed individuals looking for work were more likely to use the Internet than other people not employed. Rural people in the labor force had a lower access rate than urban people.

The picture changes for home Internet access, where affordability likely becomes an issue for unemployed or disabled/retired persons (table 8). The dropoff in use for these groups holds for both rural and urban residents. These individuals likely go online at such locations as libraries and schools when in-home access becomes unaffordable.

A broadband connection is again the choice for most homes with in-home Internet access across all labor force categories (table 9). Regardless of labor force status, whether the household is in an urban or rural location, if a household has in-home Internet access, the household will most likely have a broadband connection.

Table 7

**Online activity using any access technology
by labor force status, 2007**

	Metro	Nonmetro	Total
	<i>Percent within labor force category</i>		
Employed—At work	83.7	78.6**	82.9
Employed—Absent (on day of survey)	85.9	79.4**	84.8
Unemployed—On layoff	72.8	62.3**	70.6
Unemployed—Looking	77.7	72.8*	76.9
Retired—Not in labor force	52.6	43.7**	50.9
Disabled—Not in labor force	47.1	43.2*	46.1
Total of all adults	77.2	70.6**	76.1

** Metro/nonmetro difference significant at 0.01; * difference significant at 0.05.

Source: ERS using Bureau of the Census CPS data.

Table 8

**Home Internet access using any technology
by labor force status, 2007**

	Metro	Nonmetro	Total
	<i>Percent within labor force category</i>		
Employed—At work	74.8	65.0**	73.3
Employed—Absent (on day of survey)	75.0	65.2**	73.5
Unemployed—On layoff	60.3	49.6**	58.1
Unemployed—Looking	63.8	51.4**	62.0
Retired—Not in labor force	48.8	41.3*	47.4
Disabled—Not in labor force	39.6	34.9*	38.4
Total of all adults	68.5	58.1**	66.9

** Metro/nonmetro difference significant at 0.01; * difference significant at 0.05.

Source: ERS using Bureau of the Census CPS data.

Table 9

Broadband in homes with Internet access by labor force status, 2007

	Metro	Nonmetro	Total
	<i>Percent within labor force category</i>		
Employed—At work	86.6	72.1**	84.6
Employed—Absent (on day of survey)	87.3	75.5**	85.6
Unemployed—On layoff	75.7	54.2**	72.0
Unemployed—Looking	83.7	72.0**	82.1
Retired—Not in labor force	75.0	59.0**	72.3
Disabled—Not in labor force	75.0	63.2**	72.4
Total of all adults	85.2	70.2**	83.1

** Metro/nonmetro difference significant at 0.01.

Source: ERS using Bureau of the Census CPS data.

A small but significant number of households have home businesses covering a wide range of professions such as farmers, doctors, and artisans (table 10). Such households may become more commonplace in the current economic downturn as more households try to compensate for loss of jobs or reduced work hours by starting home businesses. Home businesses are more commonplace in rural areas than urban areas (table 10). In-home Internet access is much more common in households with home businesses (81 percent) than among all households in the aggregate (62 percent). This is true for both urban (83 versus 64 percent) and rural home businesses (70 versus 52 percent).

In summary, a broadband connection is almost the default for a great majority of online households. Analysis of the CPS data suggests that more rural households would have broadband connections if these connections were as readily available as in urban areas, implying lost economic opportunity for some rural households.

The data, however, also suggest that some of the shortfall in rural Internet activity may be due to other factors that precede the decision to get a broadband connection. These factors include the lower average income for rural households, higher average age of the rural population, and lesser educational attainment of rural residents as compared to their urban counterparts.

Table 10
Internet users by home business status, 2007

	Metro	Nonmetro	Total
	<i>Percent</i>		
Households with home businesses	11.7	14.8*	12.2
Home businesses with any kind of home Internet access	83.3	70.1**	80.7
Proportion of home Internet access with broadband	87.6	71.3**	84.6

Note: Difference between metro/nonmetro (*--significant at 0.05, ** -- significant at 0.01).

Source: ERS using Bureau of the Census CPS data.