

Health Affairs

At the Intersection of Health, Health Care and Policy

Cite this article as:

M Brodie, R E Flournoy, D E Altman, R J Blendon, J M
Benson and M D Rosenbaum
Health information, the Internet, and the digital divide
Health Affairs, 19, no.6 (2000):255-265

doi: 10.1377/hlthaff.19.6.255

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Health Information, The Internet, And The Digital Divide

Despite recent improvements, Americans' access to the Internet—and to the growing body of health information there—remains uneven.

by Mollyann Brodie, Rebecca E. Flournoy, Drew E. Altman, Robert J. Blendon, John M. Benson, and Marcus D. Rosenbaum

ABSTRACT: Through an analysis of recent data on adults' and children's computer use and experiences, this DataWatch shows that use of computers and the Internet is widespread and that significant percentages of the public are already using the Internet to get health information. The surveys also show that the Internet is already a useful vehicle for reaching large numbers of lower-income, less-educated, and minority Americans. However, a substantial digital divide continues to characterize computer and Internet use, with lower-income blacks especially affected. Implications for the future of health communication on the Internet also are explored.

DATAWATCH

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AS INTERNET USE HAS EXPANDED we have seen growing interest in determining how effectively health information can be communicated through computer technology and the Internet and how likely the public would be to seek it. To better understand the potential of computer-accessible health information, it is helpful to understand (1) who is using computers and the Internet and thus can access health information; (2) how today's computer-use patterns might change in the future; and (3) who is already using computers to access health information, and what specific information they are seeking.

Using data collected in parallel surveys of adults (ages eighteen and older) and children (ages ten to seventeen), we investigated current computer and Internet use. After briefly describing who is

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using computers and how that may change in the future, we discuss current use of the Internet to gather information about health topics and the potential implications of the current “digital divide” in the communication of health information.

Study Methods

■ **Survey design.** Our research consisted of two telephone surveys conducted between 15 November and 19 December 1999 with nationally representative random samples. Representatives of National Public Radio, the Henry J. Kaiser Family Foundation, and Harvard University’s John F. Kennedy School of Government worked together to develop the survey questionnaire and to analyze the results, with fieldwork conducted by International Communications Research. The first survey interviewed 1,506 adults, including an oversample of 301 African Americans to allow for more detailed subgroup analysis. The second interviewed 625 children, including an oversample of 136 African Americans. For each survey, the results were weighted to reflect nationwide distribution. Other racial and ethnic groups are not reported in this paper because the cell sizes are too small to allow confidence in results within these subcategories. The overall response rate was 53 percent.¹

We focused on the results for the 1,237 adults in the sample who are under age sixty. We do so because in preliminary analyses we found that Americans over age sixty differ greatly from younger adults in ever having used a computer and in having home computer and Internet access (Exhibit 1). For example, while the vast majority of adults ages eighteen to fifty-nine have used a computer, fewer than half over age sixty have ever done so. Adults over age sixty also

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EXHIBIT 1 Computer, Internet, And E-Mail Use And Use Of Computers To Seek Health Information, By Age, 1999

Survey question	Percent answering “yes”				
	Ages 18–29	Ages 30–44	Ages 45–59	Age 60 and above	Under age 60
Have you ever...used a computer?	98%	93%	85%	46% ^a	92%
Do you currently have a computer in your home or a computer that you use at home?	69	72	65	27 ^a	69
Do you have access to the Internet or e-mail on your computer at home?	49	58	51	24 ^a	53
Do you use a computer at home...to get health or medical information?	26	32	34	13 ^a	31

SOURCE: National Public Radio/Kaiser Family Foundation/Kennedy School of Government, National Survey of American Adults and Kids on Technology, February 2000 (conducted in November–December 1999).

^a Age sixty and above is different from all other age groups at the $p < .001$ level.

are less likely than those in the younger age groups are to have a computer at home. In addition, because many adults over age sixty are not in the workforce, it is not relevant to compare their computer use at work with that of younger persons.

■ **Sources of sampling error.** Comparisons between groups were made with statistical tests of differences in the survey-derived estimates of population proportions, with all differences significant at least at the standard 95 percent level. The margin of sampling error for the adult survey is plus or minus three percentage points; for the survey of kids, plus or minus five percentage points. The margin of error for results based on subsets of respondents is higher.

Other potential sources of error exist from nonresponse, question wording, and context effects, although efforts were made to minimize these. Random-digit dialing, replicate subsamples, callbacks staggered over times of day and days of the week, refusal conversions, and systematic respondent selection within households were used to ensure that the sample is representative.

Nonresponse in telephone surveys produces some known biases in survey-derived estimates because participation tends to vary for various subgroups of the population. In addition, some households do not have telephones and therefore cannot choose to participate in a telephone survey. To compensate for such biases, the sample data were weighted to the most recent Census data available from the Current Population Survey for sex, age, race, education, and number of adults in the household. However, weighting cannot fully compensate for the lack of participation among lower-income groups without telephones. Thus, actual computer and Internet use may be even lower than reported here among persons with lower incomes.

Study Results

■ **Computer use.** Computer use has become commonplace for most adults under age sixty (Exhibit 1). However, we found gaps in use by income, education, and race.

Americans with lower incomes (less than \$30,000 a year) are much less likely to use a computer or have Internet access than their higher-income counterparts (\$50,000 or more) (Exhibit 2). As might be expected, we see a similar digital divide among Americans with different levels of education.

Gaps between blacks and whites are particularly pronounced in home computer use. However, these are largely a function of income, so they tend to disappear once we compare blacks and whites at higher income levels (Exhibit 3). Also, we found no significant differences between lower-income blacks and whites in ownership of other personal electronic devices addressed by the survey, including

EXHIBIT 2**Computer, Internet, And E-Mail Use And Use Of Computers To Access Health Information, By Income, Education, And Race, 1999**

Characteristic	Percent answering "yes" to question		
	Do you currently have a computer in your home or a computer that you use at home?	Do you have access to the Internet or e-mail on your computer at home?	Do you use a computer at home...to get health or medical information?
Income			
Less than \$30,000	48% ^{a,b}	31% ^{a,b}	17% ^{a,c}
\$30,000-\$49,999	66 ^d	50 ^d	30 ^e
\$50,000 or more	86	72	42
Education			
High school diploma or less	57 ^f	41 ^f	22 ^f
Some college or more	80	65	39
Race			
Black	51 ^g	38 ^g	19 ^g
White	73	57	34
Characteristic	Do you use a computer in your work?	Do you use the Internet on your computer at work?	
Income			
Less than \$30,000	35 ^a	12 ^a	17 ^d
\$30,000-\$49,999	42 ^d	17 ^d	43
\$50,000 or more	69	43	
Education			
High school or less	38 ^f	13 ^f	45
College or more	67	45	
Race			
Black	46 ^g	21 ^h	29
White	57	29	

SOURCE: National Public Radio/Kaiser Family Foundation/Kennedy School of Government, National Survey of American Adults and Kids on Technology, February 2000 (conducted in November–December 1999).

^a Different from \$50,000 or more at the $p < .001$ level.

^b Different from \$30,000–\$49,999 at the $p < .001$ level.

^c Different from \$30,000–\$49,999 at the $p < .01$ level.

^d Different from \$50,000 or more at the $p < .001$ level.

^e Different from \$50,000 or more at the $p < .01$ level.

^f Different from college or more at the $p < .001$ level.

^g Different from white at the $p < .001$ level.

^h Different from white at the $p < .05$ level.

videocassette recorders, cable or satellite television, or fax machines.

Overall, women and men are very similar in their use of computers, e-mail, and the Internet at the workplace, but women are slightly less likely than men are to use the Internet or e-mail at home (50 percent versus 57 percent).

■ **Kids and the digital divide.** Among kids (ages ten to seventeen), as among adults, computer use has become widespread. Overall, 68 percent of kids use a computer at home at least once a week, 58 percent use a computer at school at least once a week, and 61 percent use the Internet at home or school at least once a week.

The differences in children's home computer use by income, education, and race are similar to those found among adults. African American kids (44 percent), kids from lower-income households

EXHIBIT 3**Computer And Internet Use Among Lower-Income Blacks And Whites And Among Higher-Income Blacks And Whites, 1999**

Survey question	Percent answering "yes"			
	Annual income less than \$30,000		Annual income \$30,000 or more	
	Whites	Blacks	Whites	Blacks
Do you use a computer in your work?	36%	28%	63%	58%
Do you currently have a computer in your home or a computer that you use at home?	52	35 ^a	80	74
Do you use the Internet on your computer at work?	11	8	34	29
Do you have access to the Internet or e-mail on your computer at home?	34	19 ^a	64	61

SOURCE: National Public Radio/Kaiser Family Foundation/Kennedy School of Government, National Survey of American Adults and Kids on Technology, February 2000 (conducted in November–December 1999).

^a Differs from the preceding column at the $p < .05$ level.

(41 percent), and kids whose parents have a high school diploma or less (57 percent) are much less likely to use a computer at home (at least once a week) than are white kids (76 percent), kids from higher-income families (83 percent), and kids whose parents have at least some college education (87 percent).

We saw similar patterns looking at home Internet and e-mail use. African American kids (34 percent), kids from lower-income households (36 percent), and kids whose parents have a high school diploma or less (43 percent) are also less likely to use the Internet or e-mail at home than are white kids (66 percent), kids from higher-income families (71 percent), and kids whose parents have at least some college education (69 percent). We were not able to analyze computer use by race within low and high income categories because the survey sample size for children was smaller than that for adults, but we suspect that the results would be similar to those seen in the adult sample.

Despite the different computer experiences at home by family income, parents' educational status, and race, access to and use of school computers and the Internet appear much more similar across all children. These findings are consistent with surveys of larger samples.² Computer and Internet access at school helps to equalize access for kids from different income levels (Exhibit 4). What is not known from our survey is whether equal access is the same as equal experience. The speed of Internet connections, whether kids use computers alone or in a group, and how much or what kind of computer instruction is provided are all important factors in comparing experiences in school settings, but ones not asked about in

EXHIBIT 4
Children's Computer And Internet Use, By Household Income, 1999

	Households with incomes less than \$30,000 per year	Households with incomes of \$50,000 per year or more
Use computer at home at least once a week	41%	83% ^a
Use computer at school at least once a week	59	56
Use the Internet or e-mail at home	36	71 ^a
Use the Internet at home or school at least once a week	50	67 ^b

SOURCE: National Public Radio/Kaiser Family Foundation/Kennedy School of Government, National Survey of American Adults and Kids on Technology, February 2000 (conducted in November–December 1999).

NOTES: Ages ten to seventeen. For the first two items, respondents were asked, “Do you or your family have a computer at home, or not?” and “Are there computers for students to use at your school?” followed by “How often do you use the computer? Almost every day? About once a week? Less often than that? Or never?” For the next item, respondents with computers at home were asked, “Do you use the Internet or e-mail on your computer at home?” For the last item, respondents were asked, “How often do you use the Internet? Almost every day? About once a week? Less often than that? Or never?”

^a Differs from the preceding column at the $p < .001$ level.

^b Differs from the preceding column at the $p < .01$ level.

our survey.

■ **Adults' use of computers for health information.** Thirty-one percent of all respondents under age sixty use computers at home to get health information (Exhibit 1). Obviously, the digital divide affects access to health information, as more of it is provided through online sources. Because computer use is lower among persons over age sixty, it is not surprising that only 13 percent of them are using computers at home to get health information. For those under age sixty, there are also digital divides in access to health information by income, education, and race (Exhibit 2).

However, once people have access to the Internet, the health information digital divide tends to disappear. Of the 53 percent of respondents under age sixty who have access to the Internet or e-mail at home, more than half are using the Internet “to get health or medical information” (Exhibit 5).³ Among all Americans with Internet access, there are no significant differences between persons under age sixty and those age sixty or above in seeking health information on home computers. Among persons under age sixty with Internet access, there are no significant differences by income or educational level or between blacks and whites. However, women are more likely than men are (62 percent versus 48 percent) to use the Internet at home to access health information.

Of American adults under age sixty who use computers at home to get health or medical information, about six in ten are looking for “information about how to treat a disease [they] or a family member have” (63 percent) or “information about medicines or prescription

EXHIBIT 5 Kinds Of Internet Use Among Adults And Children, 1999

Purpose	Percent answering "yes"	
	Adults ages 18–59 who have Internet access on a home computer (53%)	Kids ages 10–17 who have Internet access on a home computer (57%)
To send and receive e-mail	91%	88%
To get information on entertainment, sports, and hobbies	78	82
To get news or information about current events	75	65
To find news about travel or make travel arrangements	69	– ^a
To get health or medical information	55	19
To shop	52	21
To participate in chat rooms	26	69
To make investments in stocks and bonds	19	– ^a

SOURCE: National Public Radio/Kaiser Family Foundation/Kennedy School of Government, National Survey of American Adults and Kids on Technology, February 2000 (conducted in November–December 1999).

^a Not applicable.

drugs" (60 percent), and more than half (53 percent) are looking for "information about ways to prevent illnesses." Approximately three in ten are looking for "information about a health care provider, such as a doctor or a hospital" (28 percent), and 19 percent are looking for "information about sexual health issues" such as birth control, human immunodeficiency virus (HIV), acquired immunodeficiency syndrome (AIDS), or sexually transmitted diseases (STDs).

■ **Kids' use of computers for health information.** In contrast to adults, only about two in ten kids between ages ten and seventeen who have a computer at home use the Internet "to get health or medical information" (Exhibit 5). Similar to our findings about adults, girls are more likely than boys (22 percent versus 13 percent) to say that they do so.

Among kids who use their home computers for this purpose, 65 percent are looking for "information about diseases," 51 percent are looking for "information about ways to prevent illnesses," and 44 percent are looking for "information about diet, exercise, or how to look your best." Around one-fourth are looking for "information about sexual health issues such as birth control, HIV, AIDS, or STDs" (28 percent) and "information about doctors, hospitals, or how to find a clinic" (22 percent).

■ **Trust and privacy concerns.** Trust and privacy concerns may affect people's use of the Internet to get health information. Overall, 53 percent of adults are distrustful of information that they find on the Internet, and 46 percent are at least somewhat worried that an unauthorized person might gain access to their financial records or personal information. Blacks are more likely than whites to distrust

Internet information and to have concerns about Internet privacy. More blacks (61 percent) than whites (51 percent) said that they trust information on the Internet “just a little” or “not at all” ($p < .01$), and almost one-third of blacks (32 percent), compared with fewer than two in ten whites (17 percent), said that they are “very worried” about an unauthorized person’s gaining access to their personal data. These differences remain after income is controlled for. Similar to adults, black kids are more likely than white kids are to have concerns about trust and privacy. Sixty-two percent of black kids, compared with 37 percent of white kids, said that they trust the Internet “a little” or “not at all” ($p < .001$), and 64 percent of black kids, compared with 26 percent of white kids, said that they are “very worried” about someone’s gaining access to their personal information ($p < .001$).

Discussion

Our results suggest that there is great potential for using computers and the Internet to make health information available to a wide audience. Already close to one-third of adults under age sixty are using the Internet at home to access such information. Once people gain access to the Internet, its use at home to get health information is similar across income, education, race, and age. Therefore, the number of persons using the Internet to access health information should rise along with computer use.

■ **The age divide.** We found that even though persons over age sixty might be expected to have a high level of interest in health information, only about one in ten are using computers to get it. The computer revolution does not appear to be reaching current retirees and Medicare enrollees directly, although their children and grandchildren may access health information for them. Computers seem potentially useful for older Americans, who are the biggest users of health care, to be able to access health information on the Internet directly. However, the real benefits of accessing health information online are unclear.

■ **The race divide.** The divide between lower-income blacks and whites in computer ownership at home is perplexing, especially since we found ownership of other personal electronic devices to be similar. One explanation may be that lower-income whites tend to have more accumulated wealth than lower-income blacks do, making the expense of a computer purchase less of a burden.⁴ Unfortunately, this survey did not measure wealth. Differences in trust of Internet information and concerns about confidentiality between lower-income blacks and whites may be another contributing factor. Other hypotheses for this divide include a lack of Internet con-

“New technologies may make computer ownership far less important in determining who is able to use the Internet.”

tent of interest to blacks, lack of exposure to computers in everyday life in predominantly low-income black communities, and possible cultural biases against being seen as a computer “geek.”⁵ Since our analysis revealed that use of computers to find health information did not vary by race or income once people had access to the Internet, it appears that once barriers to using the technology are overcome, lower-income blacks and whites might be equally interested in computer-accessible health information.

■ **Is the digital divide narrowing?** Computer and Internet use at home and work are increasing rapidly, but there is disagreement about whether access is increasing among all groups at similar rates.⁶ One recent analysis suggests that the divide may shrink in the near future, and another finds that the number of computer users with lower incomes is increasing more rapidly than the total number of computer users overall.⁷ However, other research has found that the digital divide has been widening by income and education, and between whites compared with blacks and Hispanics.⁸ One study concludes that these digital divides are increasing even after taking into account that “adoption of new technologies tends to be fairly slow at low penetration levels, faster thereafter, and slower again as it reaches saturation,” with differences among demographic groups analyzed by “penetration lag” rather than by the actual size of gaps between groups.⁹ The widening of gaps makes it unclear how rapidly equal Internet penetration will be achieved.

■ **Potential public access and new technologies.** Our survey addressed computer and Internet use at home, at workplaces, and at schools, but certainly people may use computers in other locations as well. As the number of computers in public places grows, more people may be able to gain access to health information through the Internet, although some libraries limit the length of time one can spend at a computer terminal. It also seems likely that many people would want privacy while looking for health information, which makes public access less appealing. New technologies may make computer ownership far less important in determining who is able to use the Internet. For example, televisions with built-in Internet browsers could enable more Americans to access the Internet at much less cost than is now possible.

■ **A role for government?** There has been recent speculation about whether government transactions through e-mail and the In-

ternet have the potential to make government more efficient and ultimately to reduce administrative costs.¹⁰ However, this would require initial government investment in developing technology for Internet transactions and ensuring their security.

Although we did not ask about interest in conducting such transactions online, we did find that computer use is not uniformly distributed among Americans of differing income and educational levels, among lower-income blacks and whites, or by age. Therefore, the public's ability to conduct any such government transactions with health-related government agencies will be similarly uneven. Since our analysis revealed that once people were online, their health information-seeking behavior varied little by demographic categories, it seems likely that some Americans would be willing to conduct transactions online. However, it also seems clear that security concerns would need to be addressed, and this may be particularly important for black Americans. If systems are developed for government transactions over the Web, it would be useful for the Medicare population to have access. However, the elderly may be especially reluctant to deal with the government online.¹¹

For all citizens to benefit from health information and the potential to conduct government transactions on the Web, there may be a role for government to help ensure access for more Americans. The public appears to be interested in government intervention to help lessen the digital divide. Fifty-seven percent of Americans say that the government should help low-income persons to get access to computers and the Internet, and 78 percent say that the government should help low-income children to get access. It should be acknowledged that interest in government intervention may be somewhat less if cost were mentioned; as a starting point, a majority of the public expressed interest in government involvement in helping low-income adults or children get access to computers and the Internet.

THE EXISTENCE OF THESE DIGITAL DIVIDES has implications for the future of computer-accessible health information. Those who hope to successfully communicate health information on the Web should recognize that some computer users may have relatively low literacy levels and will need materials that can be understood by a wide audience. In addition, for Americans of a variety of races and ethnicities who use the Internet, providing relevant health information and addressing trust and privacy concerns are important. While schools help to reduce divides in access for kids, the potential to provide computerized health information to a wide audience ultimately will depend upon whether and how we can narrow the digital divide for all.

The authors thank Melissa Herrmann and Joann Buono, both of International Communications Research, for their valuable assistance in fielding these surveys.

NOTES

1. The response rate was calculated by using the American Association for Public Opinion Research standard definition RR4 as described in *Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for RDD Telephone and In-Person Household Surveys* (Ann Arbor, Mich.: AAPOR, 1998).
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3. We did not ask people how they used the Internet at work and therefore are not able to address how use at work might differ from use at home. Another random-digit-dial telephone survey of 2,500 U.S. households similarly found that 52 percent of respondents use the Internet to get health information, ranking lower than areas such as e-mail (85 percent), research (78 percent), and education (71 percent). Odyssey, "Half of PC Time Spent Online," *The Big Picture, Traffic Patterns*, 4 October 1999, <cyberatlas.internet.com/big_picture/traffic_patterns/article/0,1323,5931_211381,00.html> (17 September 2000).
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