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Sociodemographic factors affecting telemedicine access: A population-based analysis



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ABSTRACT

Background: The coronavirus disease 2019 pandemic prompted a surge in telemedicine, with the presumption that patients had computer and internet access. We sought to determine, in a population-based sample, how many Americans were using computers and the internet before the pandemic, and whether disparities existed in this.

Methods: The National Health Interview Survey is conducted annually by the Centers for Disease Control and Prevention and is representative of the entire United States civilian non-institutionalized population. In 2018, questions were fielded regarding computer and web utilization. We evaluated sociodemographic factors associated with this.

Results: Twenty-five thousand and forty-nine people, representing 245,842,992 in the population, responded to these questions. Of the responses, 19% stated they used a computer “never or almost never,” 18% stated they did not use the internet, and 25% did not use email. Over the previous 12 months, 55% of responders stated they had looked up health information on the internet, 11% had filled a prescription online, 16% had scheduled a medical appointment on the internet, and 17% had communicated with a healthcare provider by email. Internet usage varied by region, age, race, education, family income, and insurance status, but not by gender.

Conclusion: As telemedicine becomes more prevalent, sociodemographic factors limiting computer and internet use may disadvantage certain segments of the population.

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Introduction

The concept of telemedicine is not new—indeed, as early as 1879, there were reports of doctors making diagnoses via telephone.¹ In the 1960s, the National Aeronautics and Space Administration had begun performing physiologic monitoring over a distance and, in 1972, had launched the Space Technology Applied to Rural Papago Advanced Health Care system to deliver remote health care to the Papago Indian Reservation in Arizona using 2-way microwave transmission.¹ In 1989, with the creation of the World Wide Web, the possibilities for telemedicine expanded, and in 1999, the Centers for Medicare and Medicaid began covering telehealth consultations for patients in underserved areas.¹ The American Recovery and Reinvestment Act of 2009 included

telemedicine funding, and by 2020, telemedicine was projected to be a \$34 billion industry.¹

While the utilization of telemedicine was not mainstream for most patients, the coronavirus disease 2019 (COVID-19) pandemic caused an abrupt shift toward this modality of healthcare delivery, as many hospitals and clinics shut down, and social distancing was encouraged. Most healthcare systems shifted toward telemedicine in a seamless fashion, with the assumption that the majority of Americans would be able to avail themselves of remote healthcare. Indeed, the Pew Research Center had reported in 2015 that 84% of Americans used the internet.² Still, it remained unclear as to how many people felt comfortable using telemedicine for various tasks, from communicating with a physician to scheduling appointments to filling prescriptions. Were there disparities in terms of computer and internet access that disproportionately put some patients at a disadvantage when it came to accessing healthcare during the pandemic? We sought to answer these questions using data from a national population-based survey conducted in 2018, just before the pandemic hit.

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Methods

The National Health Interview Survey (NHIS) is considered the largest source of health information for the American civilian non-institutionalized population. Each year, the Centers for Disease Control and Prevention conducts a face-to-face survey using a complex sampling scheme that is designed to be reflective of the population. In 2018, questions were fielded regarding individuals' use of telemedicine. In particular, people were asked the following: "During the past 12 months, have you ever used computers for any of the following: (1) look up health information on the internet, (2) fill a prescription, (3) schedule an appointment with a health care provider, (4) communicated with health care provider by email". In addition, people were asked, "How often do you use a computer?", "Do you use the internet?", "Do you send or receive emails?". Of note, there was no question regarding the use of a smartphone (as opposed to a computer); however, the question pertaining to internet use was regardless of device. We evaluated the impact of various sociodemographic factors on the use of telemedicine before the pandemic. While it would have been ideal to evaluate these metrics in 2019, questions regarding telemedicine usage were not fielded by the NHIS in that year; one would not anticipate dramatic changes between 2018 and 2019. Statistical analyses were conducted using SAS-callable SUDAAN software. As these data are deidentified, publicly available, and analyzed in aggregate, this study was deemed exempt by the Human Investigations Committee of Yale University.

Results

The final response rate for the 2018 NHIS was 53.1%; however, this is reflective of the complex hierarchical sampling scheme the NHIS employs (see details here: https://ftp.cdc.gov/pub/Health_Statistics/NCHS/Dataset_Documentation/NHIS/2018/srvydesc.pdf). However, of the sample adults approached (from whom the data for this analysis is based), the response rate was 83.9%. Twenty-five thousand forty-nine people, representing 245,842,992 in the population, responded to these questions. Of the responders, 19% stated they used a computer "never or almost never," 18% stated they did not use the internet within the preceding 12 months, and 25% stated they did not use email. Over the previous 12 months, 55% stated they had looked up health information on the internet, 11% had filled a prescription online, 16% had scheduled a medical appointment on the internet, and 17% had communicated with a healthcare provider by email. Of the 82% of people who stated that they used the internet, only 20% had scheduled a medical appointment online ($P < .001$) within the previous 12 months, and 14% had filled a prescription online within that time frame ($P < .001$). Of the 75% who stated they used email, only 22% had communicated with a healthcare provider using this modality within the past year ($P < .001$).

Sociodemographic factors significantly impacted how often people used a computer (Table I), whether they used the internet and email (Table II), and whether they had looked up health information on the internet, filled a prescription online, scheduled a

Table I
Sociodemographic factors associated with computer use

| Factor | Frequency of Computer Use, % | | | | P value |
|------------------------|------------------------------|-----------|-----------|----------|---------|
| | Never or almost never | Some days | Most days | Everyday | |
| Region | | | | | <.001 |
| Northeast | 16.8% | 11.2% | 6.0% | 66.1% | |
| Midwest | 17.7% | 9.4% | 5.8% | 67.1% | |
| South | 21.8% | 10.7% | 5.0% | 62.5% | |
| West | 17.5% | 10.6% | 5.9% | 66.0% | |
| Age | | | | | <.001 |
| ≤20 | 8.9% | 10.0% | 7.4% | 73.7% | |
| 21–40 | 10.7% | 10.0% | 5.5% | 73.8% | |
| 41–60 | 15.9% | 10.5% | 5.2% | 68.3% | |
| 61–80 | 29.7% | 11.5% | 6.0% | 52.7% | |
| >80 | 66.3% | 9.2% | 3.3% | 21.3% | |
| Race | | | | | <.001 |
| White | 18.4% | 9.4% | 5.6% | 66.6% | |
| Black | 22.6% | 16.8% | 5.6% | 55.0% | |
| Asian | 16.0% | 9.6% | 4.5% | 69.8% | |
| Other | 31.6% | 16.2% | 5.4% | 46.8% | |
| Education | | | | | <.001 |
| <Grade 12 | 1.3% | 14.6% | 2.4% | 26.3% | |
| High school graduate | 0.7% | 15.6% | 6.0% | 48.7% | |
| Some college | 11.6% | 11.3% | 6.9% | 70.2% | |
| Bachelors | 4.8% | 5.3% | 5.6% | 84.3% | |
| Masters | 3.6% | 3.4% | 5.0% | 88.0% | |
| Professional/doctorate | 2.8% | 2.2% | 2.7% | 92.3% | |
| Family income | | | | | <.001 |
| <PL | 39.3% | 16.0% | 4.8% | 39.9% | |
| 1–1.99x PL | 34.9% | 14.8% | 4.9% | 45.4% | |
| 2–3.99x PL | 18.8% | 11.5% | 6.3% | 63.4% | |
| ≥4x PL | 7.0% | 6.3% | 5.6% | 80.6% | |
| Insurance | | | | | <.001 |
| Uninsured | 31.4% | 15.7% | 5.2% | 47.7% | |
| Medicare | 38.6% | 12.4% | 5.6% | 43.4% | |
| Medicaid | 29.9% | 17.6% | 6.3% | 46.3% | |
| Private | 7.0% | 7.5% | 5.4% | 80.1% | |
| Military | 12.0% | 8.1% | 7.9% | 72.0% | |
| Other | 23.5% | 15.0% | 4.8% | 56.8% | |
| Gender | | | | | .299 |
| Male | 19.4% | 10.6% | 5.3% | 64.8% | |
| Female | 18.7% | 10.4% | 5.8% | 65.1% | |

PL, poverty level.

Table II
Sociodemographic factors associated with internet and email use

| Factor | Internet Use, % | P value | Email Use, % | P value |
|------------------------|-----------------|---------|--------------|---------|
| Region | | .002 | | <.001 |
| Northeast | 82.1% | | 73.9% | |
| Midwest | 83.7% | | 76.6% | |
| South | 79.9% | | 71.8% | |
| West | 83.1% | | 77.6% | |
| Age | | <.001 | | <.001 |
| ≤20 | 93.7% | | 83.5% | |
| 21–40 | 92.1% | | 85.5% | |
| 41–60 | 84.5% | | 77.0% | |
| 61–80 | 68.7% | | 61.1% | |
| >80 | 32.0% | | 26.9% | |
| Race, % | | <.001 | | <.001 |
| White | 82.7% | | 75.4% | |
| Black | 76.8% | | 69.2% | |
| Asian | 84.7% | | 79.0% | |
| Other | 70.5% | | 59.5% | |
| Education | | <.001 | | <.001 |
| <grade 12 | 46.8% | | 35.1% | |
| High school graduate | 72.2% | | 60.5% | |
| Some college | 88.7% | | 81.9% | |
| Bachelors | 94.9% | | 91.5% | |
| Masters | 96.0% | | 93.6% | |
| Professional/doctorate | 96.7% | | 95.2% | |
| Family income | | <.001 | | <.001 |
| <PL | 63.8% | | 53.9% | |
| 1–1.99x PL | 68.3% | | 58.5% | |
| 2–3.99x PL | 81.7% | | 73.3% | |
| ≥4x PL | 92.5% | | 87.6% | |
| Insurance | | <.001 | | <.001 |
| Uninsured | 74.7% | | 63.4% | |
| Medicare | 59.9% | | 51.5% | |
| Medicaid | 72.2% | | 62.0% | |
| Private | 93.6% | | 88.0% | |
| Military | 88.6% | | 82.3% | |
| Other | 78.5% | | 67.3% | |
| Gender | | .136 | | <.001 |
| Male | 81.4% | | 73.3% | |
| Female | 82.3% | | 75.8% | |

PL, poverty level.

medical appointment on the internet, or communicated with a healthcare provider via email (Table III). On multivariate analysis, age, race, education, income, and insurance were independent predictors of internet use ($P < .001$); region was no longer significant ($P < .001$) (Table IV).

Discussion

These data highlight systemic inequities in the population that could have a significant impact on the delivery of telehealth services. With the recent pandemic, there was a near-ubiquitous switch to healthcare delivery via telemedicine. Underpinning this, however, was the assumption that patients had access to a computer and to the internet. Our data from the 2018 NHIS demonstrate that a significant proportion of the US population was not well-equipped for this transition—with nearly 20% of people stating they “never or almost never” used a computer, and 18% who stated they did not use the internet. Older minority populations, who were of lower-income, less well-educated, and without insurance, were least likely to report using the internet, and these disparities persisted regardless of the geographic region of residence.

Our data do have some limitations. For example, the data we present come from the 2018 NHIS survey, arguably over a year before the pandemic, and there may be concerns that the pandemic caused a remarkable increase in the use of digital technology. While the Health Information National Trends Survey (HINTS), which was conducted between 2017 and 2019, did show an increase in

utilization over this time period, there remained ~15% of the population in their study in 2019 who still did not have internet access, mirroring our findings.³ Arguably, while we evaluated whether people “used” a computer or the internet, this does not necessarily imply “access”; in other words, it is possible that they did not use the internet before the pandemic but still had access to it, and were then able to avail themselves of telemedicine when forced to do so. However, it is likely that some of these individuals did not have access to devices or the internet at all, and this fueled some of the disparities that were seen. While the NHIS did not specifically ask about smartphone use, it did inquire about internet use, and presumably, those who used their smartphone to access the internet would have been captured in these questions. Still, the fact that the NHIS captured data over 25,000 individuals in a survey designed to be representative of the entire US civilian non-institutionalized population is a tremendous strength of the study and provides insight into the population’s use of technology in healthcare just before the pandemic and their readiness for the dramatic transition that occurred.

The concept that these populations had poor computer and internet access was not previously unknown. In a study of access to e-health tools from 1999–2002, Hsu et al demonstrated that while access and use of e-health services grew rapidly over these 3 years, a “digital divide” persisted among non-white patients and those of low socioeconomic status.⁴ Yang et al, using data from the HINTS study between 2017 and 2019, similarly found that patients on Medicaid were significantly less likely to report having access to the

Table III
Sociodemographic factors associated with online healthcare-related activities within the past 12 months

| Factor | Look Up Health Information, % | <i>P</i> value | Fill A Prescription, % | <i>P</i> value | Make An Appointment, % | <i>P</i> value | Email With Provider, % | <i>P</i> value |
|------------------------|-------------------------------|----------------|------------------------|----------------|------------------------|----------------|------------------------|----------------|
| Region | | <.001 | | <.001 | | .039 | | <.001 |
| Northeast | 57.2% | | 9.7% | | 16.7% | | 15.6% | |
| Midwest | 58.0% | | 13.1% | | 16.4% | | 16.3% | |
| South | 52.4% | | 10.7% | | 15.7% | | 14.5% | |
| West | 55.9% | | 12.5% | | 19.3% | | 21.1% | |
| Age | | <.001 | | <.001 | | <.001 | | <.001 |
| ≤20 | 51.2% | | 2.7% | | 13.2% | | 6.9% | |
| 21–40 | 62.8% | | 10.4% | | 20.6% | | 16.9% | |
| 41–60 | 58.5% | | 14.1% | | 18.1% | | 19.3% | |
| 61–80 | 46.7% | | 12.5% | | 12.7% | | 16.5% | |
| >80 | 19.1% | | 4.5% | | 3.3% | | 5.9% | |
| Race | | .001 | | .001 | | <.001 | | <.001 |
| White | 57.1% | | 12.5% | | 17.2% | | 17.6% | |
| Black | 46.7% | | 6.6% | | 13.3% | | 11.3% | |
| Asian | 54.6% | | 9.7% | | 22.3% | | 19.1% | |
| Other | 41.1% | | 6.6% | | 8.2% | | 7.1% | |
| Education | | <.001 | | <.001 | | <.001 | | <.001 |
| <Grade 12 | 22.3% | | 2.3% | | 3.7% | | 2.6% | |
| High school graduate | 40.8% | | 7.0% | | 8.5% | | 8.7% | |
| Some college | 59.1% | | 11.8% | | 16.3% | | 16.1% | |
| Bachelors | 72.7% | | 16.6% | | 26.0% | | 25.2% | |
| Masters | 76.7% | | 19.7% | | 32.3% | | 32.6% | |
| Professional/doctorate | 78.0% | | 19.2% | | 32.1% | | 35.1% | |
| Family income | | <.001 | | <.001 | | <.001 | | <.001 |
| <PL | 39.5% | | 4.9% | | 8.8% | | 6.7% | |
| 1–1.99x PL | 42.1% | | 5.3% | | 7.7% | | 8.0% | |
| 2–3.99x PL | 54.1% | | 10.2% | | 14.9% | | 13.8% | |
| ≥4x PL | 66.3% | | 16.9% | | 24.3% | | 25.0% | |
| Insurance | | <.001 | | <.001 | | <.001 | | <.001 |
| Uninsured | 42.7% | | 3.7% | | 6.2% | | 4.7% | |
| Medicare | 40.7% | | 10.7% | | 10.8% | | 14.3% | |
| Medicaid | 45.4% | | 5.4% | | 9.0% | | 8.4% | |
| Private | 65.4% | | 14.0% | | 22.6% | | 21.2% | |
| Military | 61.0% | | 20.9% | | 21.5% | | 23.0% | |
| Other | 52.8% | | 7.3% | | 13.9% | | 9.1% | |
| Gender | | <.001 | | <.001 | | <.001 | | <.001 |
| Male | 49.4% | | 9.5% | | 14.3% | | 14.3% | |
| Female | 60.9% | | 13.3% | | 19.3% | | 18.9% | |

PL, poverty level.

internet than non-Medicaid patients, although access increased for both groups across the 3 years of the study (69.7% vs 84.1%, $P < .001$ for 2017; 75.2% vs 86.8%, $P < .001$ for 2019).³ These data echo our findings that 72.2% of Medicaid recipients stated they had used the internet within the preceding 12 months.

Beyond computer utilization and internet use, we evaluated whether people engaged in telehealth activities, such as looking up health information on the internet, filling a prescription online, making an appointment online, or emailing with their doctor. Across all of these activities, we found disparities based on age, gender, race, and socioeconomic factors. Yang et al evaluated 3 similar composite variables: Online Patient-Provider Communication (OPPC), which included metrics of whether patients used electronic means to communicate with their doctor, Social Media for Health Information (SMHI), which included whether patients used the internet to participate in an online forum or support group or watch a health-related video on YouTube, and Buy or Refill Medication (BRM), which assessed whether patients bought or refilled prescriptions online.³ In 2018, they found that Medicaid recipients had a lower score for OPPC and BRM than non-Medicaid patients ($P < .001$ and $P = .08$ for OPPC and BRM, respectively) but a higher rate of SMHI ($P = .01$). In our study, we found that those who were uninsured or had Medicaid insurance were less likely to engage in any of these behaviors, although we analyzed multiple types of health insurance rather than the dichotomous variable of Medicaid versus non-Medicaid.

While we found significant disparities in terms of computer, internet, and telehealth use between racial groups, this has not been a universal finding. Kontos et al, for example, in their analysis of online adults, found no differences in the use of various telehealth services by race.⁵ On the other hand, Jacobs and Ellis found that Black patients were less likely to have at least 1 computer, tablet, or mobile device (57.4% vs 82.2% for Whites, $P < .001$),⁶ and that while telemedicine increased during the pandemic across all groups, the rate of rise was lowest among Black patients ($P = .007$).⁶

Several studies found, similar to us, that those of lower socioeconomic status were less likely to use telehealth services. For example, Kontos et al found that those with a high school education were significantly less likely to communicate with a doctor or doctor's office by email compared to those with a college degree (odds ratio [OR]: 0.46; 95% confidence interval [CI]: 0.29–0.72), and those earning less than \$20,000 per year were roughly one-third as likely to have bought medicines or vitamins online compared to those earning more than \$75,000 per year (OR: 0.34; 95% CI: 0.12–0.95).⁵ Chang et al found that those living in high social vulnerability index areas were significantly more likely to lack reliable internet or an appropriate device to engage in telehealth activities.⁷ While we were not able to assess the impact of rural versus urban location on the availability of telehealth resources, some authors have found that this is another significant factor impacting telemedicine use⁸; others, however, have not found this to be the case.⁹

Table IV
Multivariable analysis of sociodemographic factors associated with internet use

| Factor | OR (95% CI) | P value |
|------------------------|---------------------|---------|
| Region | | .350 |
| Northeast | Referent | |
| Midwest | 1.12 (0.93–1.35) | |
| South | 1.02 (0.85–1.23) | |
| West | 1.15 (0.95–1.39) | |
| Age | | <.001 |
| ≤20 | Referent | |
| 21–40 | 0.45 (0.29–0.69) | |
| 41–60 | 0.16 (0.10–0.25) | |
| 61–80 | 0.07 (0.04–0.11) | |
| >80 | 0.02 (0.01–0.03) | |
| Race | | <.001 |
| White | Referent | |
| Black | 0.71 (0.60–0.84) | |
| Asian | 0.67 (0.54–0.83) | |
| Other | 0.63 (0.47–0.85) | |
| Education | | <.001 |
| <Grade 12 | Referent | |
| High school graduate | 2.70 (2.34–3.12) | |
| Some college | 7.32 (6.27–8.55) | |
| Bachelors | 14.84 (12.13–18.16) | |
| Masters | 20.17 (15.05–27.03) | |
| Professional/doctorate | 29.36 (18.97–45.44) | |
| Family income | | <.001 |
| <PL | Referent | |
| 1–1.99x PL | 1.31 (1.11–1.55) | |
| 2–3.99x PL | 1.95 (1.64–2.32) | |
| ≥4x PL | 3.39 (2.78–4.13) | |
| Insurance: | | <.001 |
| Uninsured | Referent | |
| Medicare | 0.94 (0.76–1.16) | |
| Medicaid | 0.96 (0.77–1.20) | |
| Private | 1.97 (1.62–2.40) | |
| Military | 1.42 (0.85–2.39) | |
| Other | 1.03 (0.54–1.95) | |
| Gender | | <.001 |
| Male | Referent | |
| Female | 1.40 (1.26–1.56) | |

CI, confidence level; OR, odds ratio; PL, poverty level.

The COVID-19 pandemic resulted in a dramatic increase in telemedicine visits, with some reporting a 20-fold increase in the same.¹⁰ While some found that this rapid expansion eliminated many pre-existing disparities,^{11,12} others found that these were only exacerbated.^{6,10,13} Certainly, for some patients, for whom access to healthcare was difficult due to transportation issues, taking time off work, finding childcare, etc., access may have improved with the shift to telemedicine. However, for the most vulnerable populations who lack computer and internet access, the inability to see their physicians in a face-to-face manner due to the near-universal switch to telemedicine may have, in fact, worsened disparities in terms of access.

Clearly, there may have also been provider-based factors that may have played a role as well in terms of which were able to offer telemedicine options and the mechanisms for this (eg, by phone alone versus video), and patient perceptions regarding the security and confidentiality of telemedicine options may have played a role in uptake. There may be particular cultural groups for whom technology is verboten (eg, certain Amish groups), but we were unable to analyze this in the NHIS dataset.

In conclusion, the lessons learned from the pandemic have highlighted the socioeconomic disparities that affect health care provision and underscored the need in the modern era to be digitally connected. Efforts to expand telemedicine access and reimbursement, along with plans for a wider provision of

broadband internet coverage, promise to help improve access, although it is unlikely that this alone will be sufficient. Our findings that nearly two-thirds of octogenarians and over one-third of people with incomes below twice the poverty line report “never or almost never” using a computer are significant. There have been some creative attempts to address these issues. For example, emergency physicians at the University Health Network in Toronto initiated a program called PHONE-CONNECT (Phones for Healthier Ontarians in EDs—COVID Needs met by Cellular Telephone), in which they provided phones to patients as a point-of-care intervention to overcome the “digital health inequity.”¹⁴ Others have suggested “telemedicine booths” in community settings that may be able to improve access.¹⁵ While these creative solutions may be part of the answer to improving access, ultimately, it behooves us to be cognizant of the impact of socio-demographic factors on healthcare access—whether in person or through telemedicine—and proactively seek universal remedies, particularly for the most vulnerable among us.

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Discussion



Dr Sergio J. Bardaro (Case Western Reserve University Department of Surgery): As we all know, the COVID-19 pandemic increased the use of telemedicine significantly. The prompt use of telemedicine was based on the assumption that adequate access to technology and internet connectivity was previously established in the general population. This study assessed how many Americans actually had those resources based on previous information from the national health interview survey. As you mentioned before, the last survey was from 2018, but for the purpose and objective of this study, I think it is still adequate data.

The analyzed data elucidated that the pandemic and the lack of readiness, once again, increased the health care disparities in America. I have several questions for you.

Your study was based, as we said, on the survey with a 53.1 percent response rate from 2018. Even though this was above what would be considered the minimum necessary rate, about 33%, do you still think that there is a potential for sampling bias? The survey inquired about computer use. If the survey had asked about SmartPhone use, do you think the result would have been different? You included in your analysis different regions of the country. Do you have any data comparing urban versus rural areas? And the final question, have you had an opportunity based on these results to provide recommendations or ideas to your local or national health authorities about potential solutions to the important health access disparities you identify in this study? What would these recommendations be?

Dr Chagpar: First, to clarify, the 53.1 percent response rate was the final response rate, so, as I mentioned, the NHIS has a very complicated hierarchical sampling scheme. They take households out of those households. They look at families out of the families. They look at adults. The actual final response rate for the sample adult population was 89 percent. However, given the fact that they didn't get all of the households and all of the families, when you multiply all of that out, you get the 53.1 percent. Regardless of that, the NHIS is designed to be representative of the whole U.S. population, and, therefore, I don't really think that there would be a lot of sampling bias in terms of how the survey was structured. I actually think that that's one of the strengths of the NHIS.

Your point with regards to smartphones is an excellent one. They did not ask specifically about smartphones. I think that that would have been interesting to look at; however, I think that the fact that they asked about internet use gives us some insight. In the question in regards to internet use, they did not specify whether a computer or a smartphone was used, and so that gives us insight. And as I demonstrated, there were still disparities.

We did not have data with regards to urban versus rural. I think that that would have been interesting to look at. Certainly, others have looked at telemedicine in the urban versus rural population and have found mixed results.

Your final question, however, is the one that I think is most pertinent and the most poignant. I think that we can see from these data things that we've already known for a long time; disparities exist. They exist not only in telemedicine access, they exist in access to health care, they exist in screening, they exist in education, they exist in almost everything that touches the public's life. What recommendations would I have? Well, if I was to wave a magic wand, I would say, let's get rid of poverty. Let's make sure that our population is well educated. Let's have universal health insurance no matter how you pay for it, and I know there are different political views on how we can do that. But I don't have a magic wand. And so, what I can tell you is that while I would like to see those disparities eliminated by lofty goals, I think that this is something that is going to take painstaking effort. There have been some creative solutions that have been tried, so, for example, people are starting cafes where there is free access to computers and internet. However, when the next pandemic hits, those cafes will be closed as well, and so what are we going to do then? I think that these are big issues and certainly they will take big ideas to solve.

Dr Sergio J. Bardaro: Seeing there is no other question, I will offer encouragement rather than a question. I think this presented very well a lack of readiness, but I think the next presentation is going to present a great sense of adaptation that all of us, physicians, patients, our community, we have in these terrible things. I think we faced a crisis, and I believe that despite the bad things the crisis will also bring improvement.

Dr Chagpar: Yeah, absolutely. So, to clarify, sadly, I also have no input into what questions the NHIS fields, but hopefully they will field some questions with regards to telehealth access again. I do think that, as you say, this pandemic has brought a lot of good things along with the bad things. I think that telemedicine is here to stay.

I do think that it has had some favorable impacts in terms of reducing disparities potentially, so people who lived far away who had difficulty getting in to see us could do so more conveniently. With access to telemedicine may have helped, you know, that patient who was working three jobs and couldn't find childcare would now simply hop on to a computer and have a telemedicine visit with us. But I do think that it may have exacerbated other disparities, as well. For the patients who don't have access to a computer, don't have access to the internet, whose only source of getting health care was to come in to see the doctor when the doctor's office is closed, what happens then? It will be interesting to see how the population actually flexes with the pandemic, and what lessons did we learn in how we move forward, and, hopefully, policy-makers and all of us as health care professionals do our bits and move the needle. (Applause)