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Thursday, January 13, 2022

IDEAL RRTC Webinar

Broadband Internet Access: Implications for the Health of People with Disabilities

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Once again, this webinar is being recorded and the recording will be sent via e-mail.

I will now introduce you to Dr. Tiffany Veinot, who will moderate the webinar and assist panelists with any questions and comments. Dr. Veinot is an Associate Dean of Faculty at UM's School of Information. And also Full Professor at the School of Information and Public Health at UM. Her research focuses on community health informatics, or the use of information systems and services to improve the health of marginalized populations and reduce health disparities.

Tiffany, the floor is yours.

TIFFANY VEINOT: So I will now introduce our two speakers for today. The first is Philippa Clarke. Philippa Clarke is a professor in the Department of epidemiology at the University of Michigan's school of public health. She is also research professor at the University of Michigan's institute for social research. Her work examines the social determinants of disability with a particular focus on the built environment for adults aging with disability.

Robyn Rontal leads the Center for Health Research and Transformation or CHRT's data analytics and consulting projects focused on current health care issues and trends, collaborating with local state and national organizations on data acquisition and methods. She has focused experience in the area of healthy aging. We'll now move to our speakers. The first talk that we will hear is called "Broadband Internet Access: Implications for the Health of People with Disabilities." Over to you, speakers.

PHILIPPA CLARKE: Thank you very much and good afternoon to everyone. I would like to move to the next slide, which has the agenda.

ROBYN RONTAL: Today we're going to cover briefly a current state review of broadband Internet access in the United States.

Then Dr. Philippa Clarke will describe new research findings that she has been investigating on broadband access and implications for the health of adults with disability. Then I will discuss some of the recent policy initiatives and next-steps. And

then Dr. Veinot will facilitate discussion to respond to your questions and will provide discussion and answers. Next slide, please.

ROBYN RONTAL: Many of us take for granted our access to fast, mostly reliable, broadband Internet, as we work remotely and participate in webinars such as this one today. When we talk about broadband, we're referring to the high-speed, high-bandwidth communications infrastructure that supports Internet services. The FCC defines this as a minimum of 25 megabits per second and 3 megabits download or upload speeds. And I'd like to note that these speeds support only about two users and up to five devices, so most of us are familiar with higher speeds than this. Next slide, please?

Currently, approximately 19 million Americans lack broadband access. This represents about 6 percent of the total population. However, it's noteworthy that in rural areas nearly a quarter of the population lacks access and in tribal areas nearly a third of the population lacks access. In addition, 30 million Americans live in areas without minimally acceptable speeds for their Internet access. And more than 100 million have access but don't subscribe, primarily because of the high cost of Internet services. Next slide, please.

I want to review the recent infrastructure investment jobs act that President Biden signed into law in November of last year. This Act addresses traditional infrastructure needs such as roads and bridges, but it also provides \$65 billion for nationwide broadband infrastructure development. The majority of these funds will go to the states based on a formula that's going to include the percentage of the country's underserved areas and rural locations. States will be deciding how to distribute these funds based on a grant process, and broadband providers will be required to match at least 25 percent of the funding.

The Emergency Broadband Benefit was established in response to the COVID pandemic two years ago. And this provides discounts up to \$50 for low-income families to afford Internet services and function in ways to support education and remote work. This new program will provide a \$30 discount for families who are under 200 percent of the poverty level. The digital equity inclusion and literacy programs will provide states with funds to develop comprehensive plans for equal access for under-served communities and will also fund projects such as WiFi hot spots and digital literacy

programs. And then finally, this Act requires changes in the communications and labels of Internet products and pricing, to help consumer understanding.

I'm going to now pass to Dr. Philippa Clarke, who is going to discuss her recent research findings on broadband Internet and the health of adults aging with disability. Philippa?

PHILIPPA CLARKE: Great, thank you, Robyn. Hi everybody. I'm Philippa Clarke and I'm really excited to present today some of the work we've been doing looking at the relationship between broadband Internet access and the health of adults who are aging with disability. I want to make it clear that this is kind of a unique population. Due to advances in medical care and other technology, the average age of people living with disability-associated conditions, such as cerebral palsy, spinal cord injury, or multiple sclerosis, is increasing so that really we're seeing tremendous progress in individuals living into older ages with disabilities acquired at birth, in childhood, or before midlife. This is known as aging with disability. But distinct from people who are aging into disability, as they say, who have been living lives without disability and are just getting older, people aging with disability can experience what is called premature aging, which is that they're more likely to end up with a medical condition such as hypertension, obesity, heart disease, and diabetes. They're also more likely to experience secondary health conditions that are secondary to their primary disability associated condition, such as bone loss, fractures, rotator cuff injuries, and pain.

So this chart is just a quick overview of some of the differences in the kinds of health problems that people aging with disability experience after the age of 40 compared to those without disability. Data comes from the US panel study of income dynamics. And you can see that people aging with disability, which are the dark blue lines in this chart, dark blue columns, they are more likely to have a diagnosis of heart disease, high blood pressure, diabetes, arthritis, than those aging without disability.

Similarly, health behaviors of people aging with disability are often not as good as those who are aging without disability. People aging with disability are more likely to be current smokers, to be sedentary, and to be obese. The reasons why people aging with disability may not be able to take care of their health as well is not just due to individual factors and choices. Some of the work by Rimmer and colleagues back in 2004 shows

that over half of adults with disability do not engage in physical activity due to barriers in their surrounding social environments, such as negative attitudes by persons without disabilities or even inaccessible walking paths and sidewalks. These things create challenges for actually maintaining physical activity and health behaviors when you're aging with a disability. Other social determinants of health that can shape the ability to maintain health with aging are things that are playing out across the life course.

So these data show the proportion of adults aging with disability who are employed, from age 20 up to age 64. Again, from the US panel study of income dynamics. The dark blue line on the bottom are those who are aging with disability and the lighter blue line on the top represents those aging without disability.

You can see that there's a persistent disparity that people aging with disability are repeatedly employed less often than those without disability. And employment has a number of consequences. Lack of employment has consequences for a lack of economic self-sufficiency, it has consequences for isolation, and it prevents also the restriction in building social connections. In addition, a lack of regular and reliable employment over adulthood has consequences for income accumulation, again, over adulthood. And here we see a distribution of the annual household income inflation adjusted to 1979 dollars to reflect long-term trajectories of the people in the study. Beginning in the 20s, the dark blue line on the bottom, those aging with disability are having or experiencing persistently lower levels of annual household income compared to those aging without disability, and that gap just widens over time. So, it becomes clear that the factors that are shaping individuals' ability to maintain their health with aging is something that's not just due to their own choices about engaging in health behaviors. If we think of the upstream social determinants of health, our choices about health behaviors and our choices to be able to maintain health with aging with a disability, are related to factors much higher up in the upstream social determinants of health, including our gender, our race, ethnicity, nativity, social ties, socioeconomic status, and even places like our neighborhoods where we undergo and live out our daily lives.

I like this particular frame to understanding disability. It's the World Health Organization's international classification of functioning disability and health. It's based

on a biopsychosocial framework to consider disability as really a constellation of factors that are interacting together to shape an individual's ability to participate in society. So, an underlying health condition such as spinal cord injury may lead to limitations in body functions and structures such as muscle. This can have consequences for one's ability to dress or to walk or to get across the room. But it can also have consequences for participation in society, for employment, and for social participation.

So what's important about this model is that it recognizes that these are not predetermined pathways. The factors in the environment and factors among individuals can modify the consequences of impairments in body functions and structures for activity and participation. And here we're talking about those environmental factors that are natural in human-made environments, specifically related to the neighborhood environment. And so this work really is consistent with the sociologist Saad Nagi who said over 50 years ago that “disability is not an inherent characteristics of a person, but in fact a function of the gap between a person's capabilities and the demands created by the physical and social environment.”

So what do we mean by the physical and social environment? The built and physical environment includes things like public transportation systems, pedestrian amenities, traffic, also amenities like grocery stores and access to health care or recreational centers. It also includes the social and economic environments such as housing affordability and it includes things like governance and larger determinant policies as well as broadband Internet availability.

The neighborhood environment is important for the health of adults aging with disability. It shapes their ability to access health care, participate in society, obtain employment, engage in physical activity, and make healthy food choices to maintain a healthy weight.

We argue that broadband Internet access may be particularly important for those aging with disability but there's been very little work looking at the role of broadband with this population. Most studies focus on individual characteristics, neglecting the neighborhood context.

So the purpose of our research was to try to look at the role of the neighborhood environment and the risk of developing a particular health condition, which was

cardiometabolic disease, or cardiovascular disease. This is the work of Dr. Anam Khan, who wasn't able to join us today. I'd also like to acknowledge Megan Chenoweth and Robert Melendez, who is responsible for the maps I'll be showing. Others provided additional support for the creation of the neighborhood broadband data and funding came from the National Institutes of Health. The objective of this work was to examine the relationship between specific features of the neighborhood environment and the risk of cardiovascular disease in a large national cohort of adults aging with disability. We know from the general population on average that the neighborhood environment is very much an important factor in the development of cardiovascular disease and maintaining cardiovascular health.

These data come from a sample of middle-aged adults and it's showing the relationship between a greater density of resources in the neighborhood such as favorable food stores, physical activity resources, social cohesion, safety, and as you go from the left to the right of these bars, it's showing that an increase in the availability of these neighborhood amenities is associated with a better cardiovascular health score.

So we know this in the general population. The question is, is it different or does it stand for people who are aging with disability?

So this work used data from a private health insurance payer. One of the greatest challenges in doing work in disability is that we lack population data with disability identifiers. So, we're often having to rely on proxies to try to capture populations of people aging with disability. This work relied on health claims data with over 80 million insured individuals in a plan called the Optum Clinformatics Data Mart. We identified individuals with a diagnosis of a disability-associated condition before the age of 50. I'll tell you a little bit more about that in the next slides.

And then we really followed them up over time, longitudinally, by looking at their health records and seeing if they developed any cardiovascular health outcomes. And we wanted to understand the neighborhoods, so we actually accessed the residential address ZIP code of all of the patients in this database and linked them to indicators like neighborhood characteristics using our neighborhood data archive that I'll explain shortly.

However, before I go on, I want to just make it very clear that health claims data rely on diagnosis of a medical condition which may or may not result in disability or the subjective experience of having a disability. It also is using information that assumes that someone is coming into contact with the health system. And this particular plan, because it's a private health insurance plan, is more likely to be advantaged than those who could potentially be under Medicaid or Medicare. I just want to move on and show you what we did. We identified individuals in this plan using building codes and diagnostic codes for four conditions: cerebral palsy, spina bifida, multiple sclerosis, and plegia or specifically also spinal cord injury in that group as well. We have two congenital conditions and two that are acquired conditions somewhat later in the life course.

There were 26,000 people in the data set, 58 percent with CP or SB, 19 percent with MS, and the rest with plegia. Average age was 44 years, and they were 60 percent female. We then followed them again to look at their outcomes over time. So, thinking about what are the outcomes of people who have these underlying disability related conditions and when do they develop cardiovascular disease?

So we included people that had been followed in the plan for at least four years and hadn't had a previous diagnosis of any of these prior metabolic conditions and we identified, again using codes, any cardiometabolic disease as well as diabetes and hypertension and hyperlipidemia.

To get information about the environments that people who are aging with disability are living in, as I said, we used their ZIP code from the claims data and linked to data on the neighborhood environment from the national neighborhood data archives. I call this NaNDA. It's something we're really proud of. It's a publicly available data resource posted through Open ICPSR at different levels of spatial scale. So, different definitions of what a neighborhood is. There's really no definition of a neighborhood. So, these are different proxies ranging from census tract to county or from data that only has ZIP code, which is what we're using here. We have to rely on something called the ZIP code tabulation area.

Since ZIP codes are really just postal routes, they don't capture a space, so these are converted to ZIP code tabulation areas through a crosswalk provided by the United

States census, and that information in that crosswalk is available through our NaNDA link.

So, we wanted to capture features of the built environment that were related to -- potentially related to -- cardiovascular health. Broadband was the number of fixed residential connections per one thousand households, data coming from the FCC from 2014 to 2020. We captured information on the density of health care resources, recreational centers, grocery stores, and other amenities, using data from the national establishment time series data, a longitudinal database aggregated in NaNDA to create measures of the count or percentage of these amenities in different neighborhoods. We also have a measure of the density of public parks -- per one thousand population -- parks and the density of transit stops. So, we link these all to the medical claims data we had, based on the ZIP code of residents over time. But there's also things in an environment that are not so good for health, such as things like the density of liquor, tobacco, and convenience stores, and the density of fast-food restaurants, which we also then brought into this analysis.

We included other measures which weren't necessarily of the built environment but more of the social environment. Measures of concentrated socioeconomic disadvantage as well as the inverse, which is the concentrated social capital, or neighborhood affluence.

The analysis we did was the Cox proportional hazards model adjusted for age, sex, and the number of underlying comorbid health conditions that these people had as well as underlying social factors in the neighborhood such as affluence disadvantage in population density. Because we had multiple participants nested in ZIP code population areas we accounted for this in our model as well.

Showing our results, the incidence of cardiometabolic disease over the three years of follow-up we had in this population was relatively high: 40 percent of people developed a diagnosis of any cardiometabolic disease, 10 percent was diabetes, 23 percent hypertension, and 15 percent developed high cholesterol or hyperlipidemia. This graph shows the relationship between the neighborhood features of the built environment in those neighborhoods where people are living and the incidence of any cardiovascular disease. What this graph shows you are the hazard ratios that are

related to living in an area with a higher density of these neighborhood characteristics and the development of cardiovascular disease in the three-year period of -- that we followed them.

Anything to the left of the orange line, so hazard ratios less than 1, show a protective effect. Whereas bars that extend on beyond 1, show a risk. So, you can see that broadband Internet access, living in a neighborhood with higher density of broadband connections, is associated with a lower risk of cardiovascular disease in this three-year period than living in an area with fewer broadband connections.

In fact, it's a 12 percent reduction in risk of all the other neighborhood characteristics and the individual factors as well. Some other things beneficial for cardiovascular health were public transit and rec centers, all associated with over 10 percent relative reduction in risk over the three-year period. Neighborhood disadvantage was associated with a 10 percent increase in crimes. So, living in an area with a greater density of socioeconomic disadvantage was associated with greater risk. And interestingly, access to health care or proximity to a greater density of health care resources was not related to the incidence of cardiovascular disease in this three-year follow-up period.

The results are even more striking and pronounced for diabetes, where many of the factors on the left side of the orange bar, hazard ratios less than 1, actually fall even below 0.7. So, for broadband, living in an area with more connections is associated with 31 percent relative reduction in risk compared to living in an area with low density of connections. Public transit, access to recreational centers and parks is also associated with a reduced risk. Interesting, t grocery stores, greater density of grocery stores, is associated with a higher risk of developing diabetes, perhaps because it's access to food that may not necessarily -- although there is access to healthy food, there could be more access to unhealthy food as well, which is one of the risk factors for diabetes.

Let's think about the implications. We show that broadband Internet access is important for cardiovascular health amongst those who are aging with disability, anywhere from a 12 to 31 percent reduction in risk when living in a high broadband versus low broadband area. There's also importance for things like recreational establishments and parks to maintain health, getting people access, making sure they have access to physical activity opportunities and sharing information is important for

maintaining health while aging with disability. Health care resources were not independently associated with cardiometabolic disease and health-harming features such as liquor and tobacco stores were also not associated. Why does Internet access matter for this population? We don't really know what the reasons are. This would take further work and it's really our next-steps to try to understand the reasons through qualitative interviews or other mechanisms to try to see why broadband matters.

But some of the reasons could be access to telehealth, access to groceries and ordering online, just simply access to information about where to find healthy food, where to exercise, where to be engaged with people, where to find health information, as well as employment and just simply social connections. These things can all play a role in lowering disease risk for those aging with disability.

The thing about broadband is, who has it? What neighborhoods in the United States have broadband Internet access?

As Robyn said, broadband Internet is really not equally distributed across America's communities. There's been a growth in research recently to try to visually understand how this distribution is uneven. Using data from the FCC is a good way to actually visualize some of these disparities. The FCC, twice a year, requires the Internet service providers report on Form 477 services at speeds exceeding 200 kilobytes per second in at least one direction. And they provide these lists at the census blocks, very small levels of geography, in which they can connect service with a particular location.

Aggregated up to the cash level this is an example of one of these maps showing a lot of heterogeneity in the percentage of households with broadband and what type. The darker color is reflecting greater density, greater percentage of households with access. But the lighter color also means there are many households that don't have broadband of any type. Again, these are counties across the United States.

More recently, Microsoft has also gotten into the game and provided some data that can be mapped at the county level. Here we see that these dark blue areas are counties where less than 15 percent of households have access to the minimum broadband speed of 25 megabits per second.

However, county-level data is often not enough to understand neighborhood, what people are really experiencing in their neighborhood in terms of broadband access. So,

if we zoom in a little bit, we can pull on data from NaNDA, our neighborhood data archive, to look at broadband Internet availability by census tract. I'm looking at Michigan here and you can see that the county-level data completely miss a lot of the differences in the inequality in access to high-speed broadband Internet in these different census tract neighborhoods. Now, these are only at 10 megabits per second, which is well below even the minimum required standard. But you can see there's quite a bit of heterogeneity in what people have access to across Michigan. Zooming in deeper here even to the County of Wayne, you can see a lot of disparity in access to broadband Internet in the city of Detroit, where there are very few census tracts that are red that reflect greater number of residential fixed connections at this speed.

I'm going to just leave that with you and we're going to move on to talking about the policy implications, but I want to remind everyone again to think about the fact that disability is the expression of a physical or mental limitation in a social context. And I'll close with this quote by Hugh Herr that a person can never be broken. Our built environment, our technologies are broken. We the people need not accept our limitations but can transcend disability through technological innovation. And broadband is one of those potential technological innovations.

PHILIPPA CLARKE: So I'm going to pass it off now to Robyn, who will be discussing the policy implications.

ROBYN RONTAL: Thank you, Philippa. I'm just going to highlight that there are many policy impacts related to broadband Internet access for individuals with disabilities, in particular. I'm going to focus primarily on access to telehealth services and touch briefly on employment and caregiver support.

First, for telehealth, I want to identify the definition of telehealth, and there are various definitions. For this review I'm focusing primarily on telehealth as a two-way communication that does include telephonic communication but enables the provision of clinical health care services with a strong preference for audio/video communication due to the better outcomes associated with that. During the COVID pandemic, telehealth has become an essential form of health service delivery. It's important to note that, before COVID, adults with disabilities had a much higher need for physician visits, as noted here, yet they had a much lower access to technology, compared to people

without disabilities. This has impacted their ability to receive services these last couple years, and some of the findings subsequently reflect on this.

I also wanted to highlight some issues related to affordability and racial disparity. As noted earlier, affordability is a key factor in Internet access. For people with disabilities, the percent living at or below the poverty line is more than twice that of people without disabilities, almost 26 percent in 2019. And for African-Americans with disability, this is an even more significant barrier, with 40 percent living below the poverty line.

The pandemic has provided an opportunity to examine both the benefits and challenges of telehealth for the broader population as well as individuals with disabilities. The benefits, as I've highlighted here, include reducing the need for transportation, which has been a longstanding issue and a major factor in social determinants of health for this population.

Access to telehealth obviates the need for transportation for many services. Increasing the access to specialists, especially behavioral health specialists, has been significant, with 30 percent or more of services provided by behavioral health providers being provided through telehealth over the past couple years. This also supports independence and empowers self-management in many situations, which is another benefit.

Challenges. There are numerous challenges related to telehealth. In addition to the challenges of access to broadband Internet, for individuals with disabilities that affect communication, video may be inaccessible. For many people, they need assistance from a caregiver to utilize telehealth services, so the availability and knowledge of a caregiver is essential in those situations. And we need to keep in mind that not all care can be provided by telehealth.

In particular, there is still a strong need for in-person services and care to allow many individuals to stay in their homes and receive the proper supports, or for services that require direct provider contact. And then finally, there are privacy considerations in settings where telehealth is used, and that's something that is also noteworthy and needs to be considered as well.

This slide represents the analyses that were done by CHRT, the Center for Health and Research Transformation, where I work. This comes from a survey of licensed

physicians in April and May of 2021. There were about 2,200 physicians that responded, 2,188 to be exact. And they highlighted technological challenges for patients as the top challenge reported by physicians. And reimbursement factors, which vary considerably from state to state and payer to payer, as the most commonly-reported barriers for continued use of telehealth.

And before I move off this slide, I want to share a quote with you from one of the physicians that responded.

"I'm in a rural area. Many patients lack a PC or smart phone. They have low-tech flip phones and in many cases are elderly and not tech savvy. I use audio or FaceTime only, and many don't have or understand FaceTime."

You know, this is a barrier as reflected by the providers. During the first year of COVID, there was wide variation in the rate of telehealth across states. This reflects the Medicare population, with the highest use being in the northeast and the lowest being in the south and central north states. These differences are largely due to differences in state regulations for telehealth. Provider acceptance. And also Internet access, as we've been discussing.

Looking at this same data, within the Medicare population, younger beneficiaries with disabilities, often dual Medicare beneficiaries, had higher rates of visits. Which is good. However, keep in mind this group also has a higher need for services pre-COVID.

Prior to March 2020, when the public health emergency was put in place, Medicare and other payers paid for telehealth under only very limited circumstances. It was often restricted to rural and professional shortage areas and established patients and very limited types of providers.

With the public health emergency to allow for continued provision of health care as safe manner, the federal government removed many restrictions for the Medicare program. This included location, delivery modalities such as audio-only, and remote monitoring, expanding the number and types of eligible providers, expanding the reimbursable services, and paying for these services more than had been paid in the past, adding nonmedical services such as home community-based service assessments, wheelchair education and so on, allowing providers to cross state boundaries, and reducing or waiving cost sharing.

COVID pandemic created an urgent need for telehealth, and it is very likely that telehealth will be here to stay. I do want you to keep in mind that programs such as Medicaid and commercial insurance are defined and monitored at the state level, for the policy and reimbursement arrangements, and that Medicare policy is governed at the federal level. So, the steps being taken are occurring at both state and federal levels to maintain changes that have been put in place with the public health emergency.

I also want to talk briefly about employment, and then caregiver policy items. With employment, the pandemic has impacted the employment of people with disabilities more severely than those without disabilities. And you can see the statistics here. A loss of employment by 20 percent versus 14 percent for those without disabilities. And past trends indicate that the rate of job recovery will also be slower.

Access and affordability for Internet services is a major factor in job recovery and the ability to work remotely. For caregivers, there is much evidence that caregivers benefit greatly from broadband Internet access. There's been a lot of study of the educational benefits, but also interaction with other caregivers.

A study back in 2015 reported significant outcomes showing improvements with digital health technologies and caregivers related to their ability to support the individuals that they were caring for. And this is another area that gets neglected but certainly needs attention, from a policy perspective.

In closing, I wanted to stress that in advancing health equity and other benefits of technological innovation, we need to assure that we don't leave those living with disabilities behind, and that we include their voices in the decision-making process. While the influx of dollars from the infrastructure act will jumpstart continued policy and support -- I'm sorry -- will jumpstart near-term access to broadband Internet for underserved communities, continued policy maker support and oversight will be needed. And as noted, the pandemic has helped confirm the need for permanent changes in telehealth regulations at both the federal and the state level. Together these opportunities can help many people, especially individuals with disabilities and their families and caregivers, improve health, secure employment and education, and benefit from services and connections across all geographic areas and communities.

I've provided -- Philippa and I have provided -- various references that you can access when you receive these slides. And our contact information as well. We'd be happy for you to contact us.

I want to draw your attention to our next webinar, which will be Thursday April 14th, from 2-3PM on "Reimagining Primary Health Care for Individuals with Disabilities," presented by Dr. Michael McKee.

And finally, I also wanted to acknowledge that the content of this webinar has been developed with a grant from the National Institute on Disability, Independent Living, and Rehabilitation Research, within the Administration for Community Living. And that the contents of this webinar do not necessarily represent the policy of these organizations. And I'm going to pass this to Dr. Veinot to respond to your questions.

TIFFANY VEINOT: Thanks very much. So, for your questions, I want to just ask you to please type in your questions using the Q&A box on the bottom of your Zoom window. If you must use your audio, please click the hand icon at the bottom of your Zoom window to raise your hand, which lets us know that you'd like to speak. Someone will unmute you to ask your question if that's the case, and a prompt might appear to ask you to unmute yourself. This action will temporarily turn on your microphone so you can ask your question.

Okay, so, I will start off with a question from me. This is a question for Philippa. So, some of the built environment issues that you talked about, like recreation center density and grocery store density, and definitely broadband Internet access, tends to be concentrated in urban or suburban areas, outside of high-poverty areas. Do you have any thoughts about an interaction between your analyses and mortality?

For example, do these neighborhood characteristics help to explain rural health disparities in cardiovascular health or perhaps in cardiovascular mortality in more people?

PHILIPPA CLARKE: Thanks, Tiffany. Yeah, that's a good question and it's something that comes up often in this kind of work. And just to clarify, we did adjust for population density in our models to try exactly to get around -- to try to address that, but it is true that there is potentially a different piece in rural versus urban. I do think it's important to think about trying to find specific data that would better capture challenges

in rural areas because I think the Optum data really is clustered in urban areas. So, I don't know if we have the ability to kind of look at the differences by rural or urban status, but I think it's a really important area for further research.

TIFFANY VEINOT: Thank you. Very interesting work. So, our first question from the audience is: To what extent do you think the relationship between broadband and health of disabled people found in this work represents an ecologic effect?

PHILIPPA CLARKE: Thanks, Kara, so great to have you on the broadband webinar. So, good to hear you here. Yeah, this is a question that we also get as well, which is, you know, just to make sure that I'm understanding you correctly, you're asking, you know, are these really just associations but not causal? Could it be that people aging with disability who have cardiovascular health problems are more likely to live in areas without broadband Internet access? Versus, is it that broadband is actually playing an important role in preventing cardiovascular health problems?

I think this is the limitation that any kind of neighborhood research has. We don't know really if there's a true causal effect. But I do think this analysis tries to be a little bit more rigorous in that it's looking kind of prospectively at access to these resources and then subsequent incident conditions. But it's a really good methodological question that surfaces a lot and I think we need to do more to look into the causal relationships and I think that's one of the areas we could find out by asking people qualitatively, what is the role of broadband for you, how challenging is it, and what impact does it have on your health?

TIFFANY VEINOT: And then another question from a different person: Why do you think access/concentration to grocery stores lowered cardiovascular health? How could this be captured?

PHILIPPA CLARKE: Yeah, this was interesting for us as well, and I think there was another question by Stephanie who also noted that it just could be that an area with a higher density of grocery stores is also just a more dense urban development area and that could actually come with additional features that add to the risk of cardiovascular health. So, it could be more access to pollution or more traffic or things that also could be causing a risk just simply because you're in a more density-populated area. So, again, these are things that are important to think about, and then kind of teasing out

what are the individual effects and different roles of these different features. We tried to do that as best we could by looking at multiple different features, but, yeah, further research to really dig into that and find out more.

TIFFANY VEINOT: One thing I was thinking about, Robyn, also, is that many of the larger grocery stores are located quite near highways at this point. So when talking about traffic and air pollution, certainly there's a documented relationship between pollution and cardiovascular disease.

Another person has asked: What is the implication of health care in an area being neutral-to-negative on a neighborhood?

PHILIPPA CLARKE: Proximity to health care, having more health care resources, we felt, was not associated. And there are two things I can say about that. This is looking at prevention of a cardiovascular event, which is not so much accessing health care that's important for that. It's really preventing things like the risk factors for a cardiovascular event, being able to access healthy food, being able to engage in physical activity. Those things are preventive. And so it's sort of getting at what are the resources in the neighborhood that actually are important for preventing disease, so before you even have to access health care. So, these are really sort of upstream preventive measures, I think.

TIFFANY VEINOT: Okay. Somebody who hasn't asked a question yet has asked: Access to broadband in rural areas is one step; is there any discussion to access to technology so people with disabilities in rural areas, likely to have economic barriers, can access the Internet?

It's tough to get on the Internet superhighway without a vehicle. Perhaps this is premature since we want to focus on getting broadband out first. So this might be a question for Robyn.

ROBYN RONTAL: Yes, I can jump in here. And this is very relevant because the Infrastructure Act is going to support a contribution to the cost of Internet service once it's available, for people in rural areas, or other areas without the infrastructure.

However, there is still all the other aspects of access which include access to a computer or a smart phone and so on. So, it's not as simple as just supplying, as you indicate, the superhighway without the vehicle. I think that is why we're going to need

continued review and support from policymakers, to truly make this equitable and accessible, to all people, like our phone service is and has been for years and years, particularly back in the days of the land line.

The broadband Internet has been thought of in a similar fashion, where it's something that should be available to everybody and not just those who can afford it.

TIFFANY VEINOT: Thanks. Another question: In terms of caregivers, are you also considering the unique considerations for Internet access and people living with a disability who are part of the sandwich generation, i.e., they may also be caregivers for their parents and children, as well as having a caregiver... and somehow I lost it on my... okay, as well as having a caregiver. And this may tie into your statistics on people living with a disability, 60 percent female, and I also think there was a drop in income when people are in their 40s. Sandwich generation so I think this is....

ROBYN RONTAL: I can respond to this and answer, yes. When you're talking about caregivers, we're talking about informal caregivers largely, who are often family members but, in many cases, may be friends or other support people who are available to the individuals in need of caregiving. So the sandwich generation is a major factor because of all the stressors involved.

And what we found through some other research that we've done that looks at caregiver stress is that this is one of the major factors for stress and ability to provide appropriate services to the individual in need, and that it's amplified when those individuals are also low-income and don't have access to services to provide education and support and connections with other people to allow them to maintain lower levels of stress and provide the care that's needed. So, it compounds upon itself and it's a major consideration because, as we look ahead into the future, I know this webinar is not on caregivers, but there are going to be many fewer caregivers for the volume of people in need of care, including this population that we're looking at, individuals with disabilities.

TIFFANY VEINOT: Okay. So, it's 3:00 now, so we will be wrapping up shortly, but wanted to end with stressing how important this question is with respect to neighborhood environment and aging with a disability when we look at these kinds of health outcomes and when we think about as we have a massive influx of money coming through the Internet access and jobs act, it's going to be quite important thinking

about how we can thoughtfully allocate those funds and how we can ensure that as there are investments, that we're helping to lift all boats, and that we are increasing access for people with disabilities as well as those without disabilities in the population.

So, I will let the people whose questions are outstanding know that our speakers will be following up afterwards with answers to your questions. But thank you so much for attending today. It's been a really informative and important presentation and discussion. Thank you.