



# Telehealth use by older New Yorkers during the COVID-19 Pandemic

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Accepted: 26 July 2024  
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## Abstract

Telehealth during the COVID-19 pandemic grew expansively and provided patients with care when there were substantial movement restrictions. We examined access to internet and telehealth services as well as factors associated with telehealth use among older New York City residents. From December 2020 to March 2021, we conducted a random digit dial phone survey, calling listed New York City landline phone numbers. A total of 676 individuals 70 years or older were recruited; 62% were ages 70–79 and 38% were 80 years or older. Forty-five percent self-identified as White, 21% as Non-Hispanic Black or African American, 20% as Latinx, and 14% as another race. Sixty-three percent were female and 37% were male. Twenty percent did not have access to internet. During the prior three months, 44% indicated having a phone or video telehealth visit. Compared to White participants, Black participants had 2.15-fold higher telehealth use (CI: 1.33–3.44, *P*-Value: <.001), Latinx participants had 2.27-fold higher telehealth usage (1.19–4.27, *P*-Value: <.001), and those of another race had 3.45-fold higher telehealth usage (CI: 1.67–7.08, *P*-Value: <.001). Older Black, Latinx, and those of another race were more likely to use telehealth than White older New Yorkers. However, overall, a substantial percent did not have access to the internet, limiting their access to telehealth and their ability to seek pandemic related resources.

**Keywords** Telehealth; older adults · COVID-19 · Social determinants of health

## Introduction

The COVID-19 pandemic in the United States precipitated a dramatic increase in telehealth use, defined as telecommunication and remote technology to provide health services (Koonin et al., 2020). Studies have indicated that during the COVID-19 pandemic, telehealth use increased between 154% (Koonin et al.,

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2020) to 4081% nationwide (Whaley et al., 2020), compared to pre-pandemic. The restriction of mobility and limitations in transportation options combined with concerns of getting infected at health facilities (Gupta & Kraschnewski, 2021) motivated telehealth use (Malliaras et al., 2021). In response, the United States government enacted policies to allow for greater adoption of telemedicine, such as regulatory waivers to facilitate telehealth reimbursement through the Medicaid program (“Medicaid Telehealth Policies,” 2020).

Several studies have highlighted the potential for telehealth to help reduce healthcare costs, engage patients, and offer convenience for service recipients (Chunara et al., 2021). However, existing inequities in access to health services have been exacerbated during the COVID-19 pandemic and have been documented in telehealth services (Sachs et al., 2021). Specifically, the in-person health access inequities between Black and Latinx Americans have been identified in telehealth use (Chunara et al., 2021).

Among older adults (60+), telehealth uptake has generally shown to be lower than those under 60 years old (Choi et al., 2022), despite a high level of interest (Li et al., 2023). Factors contributing to this lower uptake include functional limitations (Kim & Ang, 2023), efficacy of telehealth (Turcotte et al., 2023), and a reluctance to utilize video-telehealth (Li et al., 2023). In a systematic review, telehealth was found to be as effective for older adults as usual care in terms of feasibility, chronic disease management, and patient satisfaction (Sahin et al., 2021).

There is a gap in understanding factors influencing telehealth use among older adults (Pang et al., 2022; Sheng et al., 2023). However, to achieve health equity in the digital health sphere, the reasons for failure to access or barriers to telehealth services must be understood (Crawford & Serhal, 2020). This study aims to address this gap by exploring the usage patterns and determinants of telehealth services, as well as to identify factors associated with telehealth use, among older New Yorkers during the COVID-19 pandemic.

## Methods

We conducted a telephone survey using a sample frame of 864,410 landline telephone numbers of community-dwelling older adults aged 70 and older in New York City from December 2020 to March 2021. We selected a stratified random sample of 64,850 telephone numbers. The five boroughs and 18 zip codes with the highest case counts of COVID-19 available in October 2020 made up the six strata for random probability selection.

Calls were made by interviewers who used a computer-assisted telephone interview (CATI) software. To increase likelihood of participation, interviewers made calls during various times of the day and all days of the week. Furthermore, interviewers made at least three attempts to contact a household member at each telephone number. Any adult household member age 70+ was eligible to participate in the interview, and if there were two or more eligible household members, the

**Table 1** Socio-demographic characteristics of study participants ( $N=676$ )

| Characteristic              | Number | Percent |
|-----------------------------|--------|---------|
| Race                        |        |         |
| White or Caucasian          | 354    | 44.96   |
| Black or African American   | 160    | 21.3    |
| Hispanic or Latino/Latina   | 82     | 19.96   |
| Another Race                | 65     | 13.78   |
| Age                         |        |         |
| 70–79                       | 436    | 62.14   |
| 80+                         | 240    | 37.86   |
| Sex                         |        |         |
| Male                        | 202    | 39.96   |
| Female                      | 470    | 60.04   |
| Income                      |        |         |
| Less than \$25 k            | 177    | 35.28   |
| \$25 k to less than \$50 k  | 151    | 28.54   |
| \$50 k to less than \$100 k | 130    | 21.53   |
| More than 100 k             | 84     | 14.64   |
| Country of Birth            |        |         |
| Born in the US              | 204    | 47.72   |
| Born in Another Country     | 472    | 52.28   |

participant with the most recent birthday was selected to interview. All interviewers asked participants to verbally consent to participation in the interview. The survey included up to 73 questions and took about 30 min to complete.

Interviews were offered in English and Spanish, and using a simultaneous third-party translator, in Mandarin, Cantonese, and Haitian Creole. Respondents received a \$10 gift card or a check in the mail if they completed the survey. Further details on survey methods were previously described (Greenleaf et al., 2022).

## Measures

Sociodemographic and health information was collected, including age, sex (male or female), borough of residence (Brooklyn, Bronx, Manhattan, Queens, or Staten Island), marital status (married or living together, divorced, widowed, separated or never married), household annual income ( $< \$25,000$ ,  $\geq \$25,000$  to  $\leq \$50,000$ ,  $> \$50,000$  to  $\leq \$100,000$ , or  $\geq \$100,000$ ), country of birth (US born or born in another country), educational attainment (less than high school, high school diploma/GED, some college/university, or college/university degree), employment status (currently working, not currently working), internet availability (cellular data plan, broadband, satellite, dial-up, no internet), and race and ethnicity (See variables in Table 1). The exposure of interest in this study was race and ethnicity (White, Black, Hispanic/Latinx, Another Race). Respondents were asked first if they identified as Hispanic or Latinx. Respondents who identified as Hispanic/Latinx were then

excluded from the following race categories: White, Black, and those of another race. Those of another race included individuals who did not identify as Hispanic, White, or Black. This category included individuals who identified as multi-racial or Asian; the latter a group that made up a very small proportion of our sample. Any difference between race is due largely to societal differences given race represents no biological or cultural differences between groups (Adkins-Jackson et al., 2022). Health status was self-reported on a scale of (excellent, very good, good, fair, and poor). In this analysis, income, internet, and health status were recoded as dichotomous variables. Income was categorized as (\$0-\$50,000, \$50,000+) and health status was categorized as (“Fair or Poor Health”, “Excellent, Very Good, or Good” health status). Internet was categorized as (“No Internet,” “Has Internet”). Anyone who said yes to the following question was considered a telehealth user: “In the past three months, have you had an appointment with a doctor, nurse, or other health professional by video or by phone?”.

### Statistical Analysis

We conducted bivariate and multivariable logistic regression with odds ratios (OR) and 95% confidence intervals in SAS version 9.4. Descriptive analyses were weighted to account for survey design, eligibility, nonresponse rates, and post-stratification. We did not weight the logistic regression.

We ran a crude logistic regression model for our main exposure of interest (race and ethnicity) and our outcome of telehealth use to calculate crude odds ratios, 95% confidence intervals, and *p*-values. We also conducted crude and adjusted logistic regression models individually for each potential confounder (chosen a priori); i.e. age, sex, income, health status and internet access. All significance tests were assessed using a 95% confidence limit.

Effect measure modification was interpreted as an interaction between exposure and outcome that differs between population groups (Lopez et al., 2019). We examined effect measure modification of health status and income in the relationship between race and telehealth usage.

### Results

The characteristics of the 676 study participants are summarized in Table 1. Sixty-two percent of participants were between the ages of 70–79 and 38% were 80 years or older. Forty-five percent self-identified as Non-Hispanic White, 21% as Non-Hispanic Black/African American, 20% as Hispanic/Latinx, and 14% as another race. Twenty-nine percent lived in Queens, 28% lived in Brooklyn, 22% lived in Manhattan, 14% lived in Bronx, and 7% lived in Staten Island. Sixty-three percent of participants were female and 37% were males. Thirty-five percent of participants had an income of less than \$25 k per year, 29% between \$25 k-\$50 k per year, 21% between \$50 k-\$100 k per year, and 15% more than \$100 k per year. Fifty-two percent of participants were born in another country and 48% were born in the United States.

**Table 2** Bi-variate and Multivariable logistic regression model assessing relationship between sociodemographic characteristics and telehealth use

| Characteristic                    | Crude OR<br>(95% CI) | <i>P</i> -Value | Adjusted OR*<br>(95% CI) | <i>P</i> -Value |
|-----------------------------------|----------------------|-----------------|--------------------------|-----------------|
| <b>Age</b>                        |                      |                 |                          |                 |
| 70–79                             | 1                    |                 |                          |                 |
| 80+                               | 0.89 (0.652–1.24)    | 0.52            | 1.087 (0.719–1.643)      | 0.69            |
| <b>Sex</b>                        |                      |                 |                          |                 |
| Male                              | 1                    |                 |                          |                 |
| Female                            | 0.82 (0.588–1.144)   | 0.24            | 0.808 (0.541–1.207)      | 0.298           |
| <b>Race and Ethnicity</b>         |                      |                 |                          |                 |
| White                             | 1                    |                 |                          |                 |
| Black                             | 1.67 (CI: 1.14–2.44) | 0.38            | 2.15 (CI: 1.33–3.44)     | 0.0014          |
| Latinx                            | 1.67 (CI: 1.14–2.44) | 0.47            | 2.27 (CI: 1.19–4.27)     | <.001           |
| Another Race                      | 1.65 (CI: 0.97–2.82) | 0.56            | 3.45 (CI: 1.67–7.08)     | <.001           |
| <b>Income</b>                     |                      |                 |                          |                 |
| < \$50 k per year                 | 1                    |                 |                          |                 |
| > \$50 k per year                 | 0.966 (0.68–1.372)   | 0.84            | 1.142 (0.752–1.732)      | 0.533           |
| <b>Health Status</b>              |                      |                 |                          |                 |
| Good, Very Good, Excellent Health | 1                    |                 |                          |                 |
| Fair & Poor Health                | 2.11 (1.481–3.007)   | <.001           | 2.186 (1.401–3.411)      | <.001           |
| <b>Internet Access</b>            |                      |                 |                          |                 |
| No Internet                       | 1                    |                 |                          |                 |
| Internet                          | 1.74 (1.15–2.61)     | <.001           | 2.69 (1.568–4.643)       | <.001           |

\*In the Adjusted OR, we controlled for additional confounders: internet, income, health status, age, and gender

Fifty-six percent of participants did not complete a telehealth provider appointment by phone or internet while 44% had such an appointment in the three months prior to the survey. Overall, 20% of participants did not have access to internet at home.

In the adjusted multivariable model, we examined the association of socio-demographic characteristics and use of telehealth (Table 2). After adjustment for various sociodemographic factors, use of telehealth was significantly associated with race and ethnicity: Black (adjusted odds ratio: 2.15, CI: 1.33–3.44, *P*-Value: 0.001), Latinx (OR: 2.27, CI: 1.19–4.27, *P*-Value: <0.001), and those of another race (OR: 3.45, CI: 1.67–7.08, *P*-Value: <0.001) all had higher odds of telehealth use compared to White participants.

Individuals with “Fair or Poor” health status had 2.11 times the odds of telehealth usage compared to individuals with “Excellent, Very Good, or Good” health status (CI: 1.48–3.01, *P*-Value: <0.001). In addition, individuals with internet access had 1.74 times the odds of telehealth usage compared to individuals who did not have internet (CI: 1.15–2.61, *P*-Value: <0.001).

Finally, when examining effect measure modification of health status and income in the relationship between race and telehealth usage, we did not observe statistically significant interaction for the association between health status and telehealth usage ( $P$ -Value: 0.92) and income and telehealth usage ( $P$ -Value: 0.26) at a significance level of 0.05.

## Discussion

While much of the COVID-19 literature has focused on the disproportionate morbidity and mortality in older adults, few studies have examined health-seeking behaviors in this population. In this study, we found that older New York City residents 70 years or older who were Black, Latinx, and those of another race were more likely to have telehealth visits by internet or phone compared to White participants, even when adjusting for health status. Poor health status and internet access was also associated with telehealth use.

Studies have shown that older adults face greater barriers to telehealth use compared to their younger counterparts. For example, in one study, adults 65 years of age or older have decreased telehealth uptake compared to younger adults due to factors such as limited access to internet, technology literacy, and low socio-economic status (Zhai, 2020). In New York City, 42% of adults over the age of 65 in 2017 lacked access to broadband internet, compared to 23% of adults ages 18–64 (Kalicki et al., 2021). In our study, 22% of participants 70 year or older and 34% of those 80 years or older did not have access to the internet (Greenleaf et al., 2022). Furthermore, other factors beyond internet access have been noted to create challenges in use of telehealth by older adults. These include lack of a caregiver to assist with technology, cognitive decline, impairments in vision, dexterity, and refined motor skills (Kalicki et al., 2021). Nonetheless, increasing internet access and fluency could increase telehealth use. Several programs in New York City have worked to bridge the digital divide through educational programs to support older adults in accessing internet and computer technology, which has shown to support overall engagement of older adults within the community (Weil et al., 2021; Finkelstein et al., 2023).

The higher usage of telehealth by Black and Latinx participants in our study may be due to the disproportionate impact of COVID-19 on such communities (Don Bambino Geno Tai et al., 2021). Beyond the impact of COVID-19, communities of color have been noted to be at higher risk for chronic health conditions (Selvin et al., 2014). This may have motivated increased telehealth use among this population, consistent with our finding of higher reported telehealth use among those reporting poorer health status. Future telehealth research should better capture multilevel and multidimensional structural racism, helping better explain differences in use by race and ethnicity (Adkins-Jackson et al., 2022).

The study had several strengths. This included the use of random-number dial sampling of persons 70 years or older residing at home in New York City. We also conducted the survey using multiple languages which allowed for inclusion of a diverse population. Finally, we analyzed our data in a variety of ways including

exploratory, interaction, and confounding analyses. The study also has some limitations. In this study, telehealth use was defined as contact with a provider either through internet or phone contact, rather than distinguishing a narrower definition of telehealth, such as telephone-only visits versus video-only visits, as done in other studies (Chunara et al., 2021; Kalicki et al., 2021; Rivera et al., 2021; Smith & Bhardwaj, 2020). Therefore, it is important to note that variations in how researchers define telehealth may affect the findings from the various studies. The racial and ethnic groups are representative of New York City, except that Asian participants were under-represented; an additional limitation. Among New York City residents over 65, 44% identify as Non-Hispanic White, 22% identify as Non-Hispanic Black/African American, and 21% identify as Hispanic/Latinx (New York City Department of Health & Mental Hygiene, 2019). Asian individuals proved to be difficult to reach through landline survey and made up only 3% of our sample compared to the 12% in New York City (New York City Department of Health & Mental Hygiene, 2019). The other demographic characteristics we examined reflected the population over 65 in New York City.

## Conclusions

The study findings demonstrate that telehealth use differs by race and ethnicity, health status, and internet availability among older adults in New York City. These determinants of telehealth use provides important insights for increasing telehealth access among older adults. Future research should explore reasons telehealth was used rather than in-person care, accessibility of telehealth for older adults and satisfaction with telehealth.

**Acknowledgements** The authors would like to acknowledge the study participants who participated in the survey that made this research possible.

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**Funding** The study was supported by the New York Community Trust, the Samuels Foundation, and an anonymous donor.

**Data Availability** The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request

**Code Availability** The code, created in the statistical program SAS, is available from the corresponding author on reasonable request

## Declarations

**Ethics Approval** The Columbia University Irving Medical Center and Research Triangle Institute institutional review boards approved the protocol and data collection tools.

**Consent to Participate** Interviewers read a verbal consent over the phone to participants.

**Consent for Publication** Not applicable.

**Conflict of Interest** The authors have no competing interests to declare that are relevant to the content of this article.

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**Publisher's Note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

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healthcare and developing methods to operationalize health equity. Monique earned her MPH in epidemiology from the George Washington University Mailman School of Public Health. She is currently pursuing her PhD in epidemiology from the CUNY Graduate School of Public Health and Health Policy.

**Andrea Low** Following an extensive career in clinical medicine, research, and public health, Dr. Andrea Low joined ICAP in 2015, attracted by its international network of collaborative public health projects and the opportunity to work with other Columbia University centers, such as the Earth Institute, to pursue an interdisciplinary approach to global health challenges. Originally a student of marine biology, Dr. Low has a keen appreciation for how ecology impacts public health. She sees the growing threat of climate change driving drought and food insecurity that increases vulnerability in populations, triggering displacement and disrupting health care access. She worked on a study of the impact of severe drought conditions in rural Lesotho on adolescent girls and others, and found possibly higher rates of HIV as a consequence of the complex interplay of poverty, reduced educational opportunity, early marriage, and transactional sex. Since then, she has extended that analysis to another 5 countries in sub-Saharan Africa, and has found an association between food shortages and HIV acquisition in women, in a similar pathway as what was identified in Lesotho. During her medical training in internal medicine and infectious diseases, Dr. Low did clinical work in New York and in the United Kingdom. Dr. Low also worked as a Clinical Scholar at the Rockefeller University, where she studied drug resistance in HIV variants. However, the scale and impact of global health combined with a strong commitment to health care as a human right drew her to pursue a PhD in epidemiology, focusing her research on HIV transmission and reproductive health in female sex workers in Burkina Faso. Dr. Low's research interests continue to include HIV acquisition in vulnerable populations and the heterogeneity of infection and risk, as well as common co-infections impacting people living with HIV. Now at ICAP, all the threads of Dr. Low's education, interests, and professional experience support her role as the Clinical and Scientific director of the Population-based HIV Impact Assessment (PHIA) project. This multi-county project works in partnership with in-country ministries of health to conduct nationally representative surveys that capture the state of the HIV epidemic in severely-affected countries. Dr. Low is also studying health system resilience to climate change with colleagues in Mozambique and at the Earth Institute, and is using innovative ways to track COVID-19 infections for surveillance, collaborating with her colleagues at ICAP to tackle the challenge of a new pandemic.

**Shannon Farley** Dr. Shannon Farley an epidemiologist with more than a decade of experience leading evaluations of policies and programs in New York City. She is the director of the Survey Unit at ICAP, where she oversees the strategic direction, leadership, and overall performance of a robust portfolio of general population surveys, biobehavioral surveys of key populations, and other specialized surveys focused on HIV, HIV-related conditions, and other health priorities that utilize optimized survey design and innovative methodologies. Dr. Farley joined ICAP in 2019 as the Strategic Information Director of the Population-based HIV Impact Assessment (PHIA) Project. Prior to joining ICAP she was a leader in the field of tobacco control, helping to develop novel tobacco control and chronic disease prevention policies and programs and evaluating their impact at the New York City Department of Health and Mental Hygiene. These findings have been utilized to support other tobacco control and chronic disease prevention efforts both nationally and internationally. Dr. Farley is also an assistant professor of Population and Family Health. She received her doctorate in epidemiology from the Graduate Center at CUNY and her MPH in reproductive and adolescent health from Mailman School of Public Health at Columbia University.

**David Hoos** David Hoos, MD, MPH, is a board certified internist, and Project Director of ICAPs PHIA Project, which is conducting population-based HIV impact assessments to measure HIV incidence and viral suppression in 15 PEPFAR-supported countries. He was Senior Implementation Director at ICAP from 2004 to 2013 and was the Director of the Multicountry Columbia Antiretroviral Program (MCAP) an eight-year cooperative agreement funded by the CDC, which supported the scale-up of HIV prevention, care and treatment in eight sub-Saharan African countries. Dr. Hoos was an initial member of the MTCT Plus Secretariat at Columbia's Mailman School of Public Health and was responsible for establishing the procurement system for antiretroviral and other HIV-associated medications and diagnostics for the program sites. Dr. Hoos has been recognized as a technical expert in a number of areas related to HIV policy and programming. He served as a member of the Technical Review Panel for the Global Fund for AIDS, TB and Malaria (GFATM), as well as a co-chair for the Procurement and Supply Management

Advisory Panel to the GFATM on procurement-related policy and country guidance. He has been a member of several WHO technical panels. Dr. Hoos earned his medical degree from New York Medical College and holds a Master of Public Health degree.

**Wafaa El-Sadr** Dr. Wafaa El-Sadr is the founder and director of ICAP and an international expert in infectious diseases and public health with extensive experience in epidemiology and research on the prevention and management of HIV, tuberculosis, malaria, and emerging infections, among others. She is also the director of Columbia World Projects and director of the Mailman School's Global Health Initiative (GHI), which mobilizes the university community to address critical challenges in global health. For over four decades, she has advocated for families and communities most impacted by health challenges and championed a collaborative, multidisciplinary approach to confronting the global epidemic. Based at Columbia University, she leads ICAP's portfolio of projects in more than 30 countries and manages a global team of over 2,000 staff. Under her leadership, ICAP has become a global leader in addressing global health challenges and health systems strengthening. Dr. El-Sadr began her career as the HIV epidemic took hold in the United States. As chief of the Division of Infectious Diseases at Harlem Hospital, she developed successful methods for responding to HIV/AIDS through groundbreaking research and innovative models of care in her own community. Dr. El-Sadr became a leader in the global fight against HIV by arming health care systems around the world with effective strategies for confronting the impact of various health challenges and leveraging investment to strengthen health systems. She is the principal investigator for numerous ICAP-led research initiatives and a principal investigator of the NIH-funded HIV Prevention Trials Network (HPTN). Dr. El-Sadr received her medical degree at Cairo University, a master's in public health (epidemiology) from Columbia University Mailman School of Public Health, and a master's in public administration from Harvard University Kennedy School of Government. She joined the faculty of Columbia's College of Physicians and Surgeons in 1988 and became a professor of epidemiology and medicine at the Mailman School of Public Health. In 2013, she was appointed University Professor, Columbia's highest academic title. She also holds the Dr. Mathilde Krim-amfAR Chair in Global. She is a MacArthur fellow, as well as a member of the National Academy of Medicine, the Council for Foreign Relations, and the African Academy of Sciences.

**Melissa Reyes** Melissa Reyes MPA serves as research coordinator for ICAP at Columbia University's SILVER study and senior program officer with the Mailman School of Public Health. In the SILVER Study, she supported data collection, management of the Columbia University IRB review process, and monitoring of study to ensure compliance with protocol.

**Abigail Greenleaf** Dr. Abigail (Abba) Greenleaf is a public health demographer whose research focuses on collecting data in low- and middle-income countries where using cell phones to survey populations is an increasingly viable methodology. In the United States, phone-based surveys have been common since the 1980s. In areas such as Africa, until recently there was not sufficient cell phone ownership to create valid phone-based health estimates, and researchers like Dr. Greenleaf have been assessing the reliability of this increasingly popular approach to data collection. Dr. Greenleaf currently works with ICAP's Population-Based HIV Impact Assessment (PHIA) project. Carried out under the leadership of national ministries of health, PHIA data benchmark a country's progress towards controlling the HIV epidemic. Dr. Greenleaf enjoys this rigorous research because it is efficient, cost-effective and produces high-quality data that can inform targeted policies and programs. As COVID-19 epidemic restraints slowed progress with the PHIA project in several countries, Dr. Greenleaf became part of a team that quickly catalyzed PHIA data and participants in Lesotho to begin a phone-based surveillance system for coronavirus-like symptoms. This real-time data creates weekly estimates infection levels for the national ministry of health. After a public health class in college introduced her to the field, Dr. Greenleaf joined the Peace Corps to understand public health in a global context, and she spent two years in Cameroon. She then pursued an MPH at Columbia and after she worked for Centers for Disease Control as an Allan Rosenfield Global Health Fellow in Ethiopia and Cameroon. She earned her PhD in the Population, Family and Reproductive Health Department at Johns Hopkins Bloomberg School of Public Health before coming back to Columbia. In addition to her research, Dr. Greenleaf spends a portion of her time teaching. She co-teaches "Research Design and Data Collection" for public health graduate students and she mirrors her own educational path by co-teaching an undergraduate class, "Data Science and Health Equity in New York City". The undergraduates learn how to use data science to unpack health inequities in New York City.

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