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NYC IN FOCUS

Health Equity & Literacy

Harlem Strong

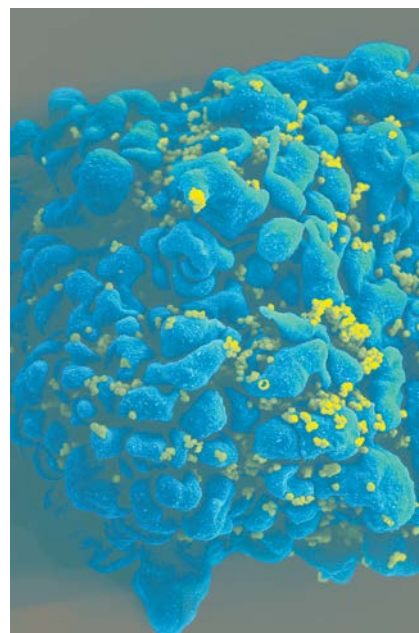
Newborns & Metals Exposure

AND MORE...

Vaccine Communication

HIV Treatment & Equity

Research Briefs



Working to promote and
sustain healthier populations
in New York City and around
the world through excellence
in education, research, and
service in public health

DEAN
Ayman El-Mohandes

EDITORS
Barbara Aaron
Sumana Chandra
Ariana Costakes

COMMUNICATIONS
EDITORIAL MANAGER
Ariana Costakes

DIRECTOR OF
COMMUNICATIONS AND
COLLEGE RELATIONS
Sumana Chandra

CONTRIBUTING WRITERS
Elaine Meyer
Lisa Kosan
Andrea Kott

DESIGN DIRECTOR
Jon Kalish

FACEBOOK, TWITTER,
AND INSTAGRAM
@CUNYSPH



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of Public Health & Health Policy

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55 West 125th Street
New York, NY 10027
sph.cuny.edu

Dean's Welcome

Dear colleagues,

I welcome you to the spring 2022 issue of *City Health* magazine, where we highlight some of the public health scholarship and service of CUNY SPH faculty and students.

Offering ever-expanding opportunities for our students to make an impact on public health has been a priority for CUNY SPH from the start. A student's landmark study on disparities in anti-retroviral treatment for women in Sub-Saharan Africa was made possible by the extraordinary access to data he gained through his faculty mentor's role in an international consortium of AIDS

researchers. A generous scholarship gift from Dr. Michael Apa is creating exciting new avenues for dental health professionals who are committed to expanding oral health for all. And our school's early and comprehensive efforts toward building and optimizing online education have made it possible for working professionals to fit a master's degree into their busy schedules.

Our work addressing vaccine literacy and confidence is ongoing. An example is a national survey that yielded thoughtful insights about how best to communicate with the vaccine-hesitant.

In this issue we also bring our focus closer to home, sharing examples of CUNY SPH partnerships with New York City government, clinical, and community organizations to advance public health across the five boroughs. Faculty researchers collaborated with the New York City Health and Hospitals system to pilot a cheaper and less invasive way to measure metals exposure in NYC newborns. We are partnering with the New York City Department of Health and Mental Hygiene to bring health literacy to vulnerable communities and to assess the well-being of 50,000 New Yorkers through the NYC Neighborhood Wellness Survey. Harlem Strong, with over \$2.5 million in funding from the National Institutes of Health and the Robert Wood Johnson Foundation, is a community-based initiative aimed at nothing short of system transformation in mental health care delivery.

These selected initiatives are evidence of CUNY SPH's dedication to producing rigorous science in the service of health equity and social justice. I could not be prouder of this exceptional community of scholars, and I invite you to learn more about them in the pages that follow.

With my very best wishes,



Ayman El-Mohandes, MBBCh, MD, MPH

DEAN



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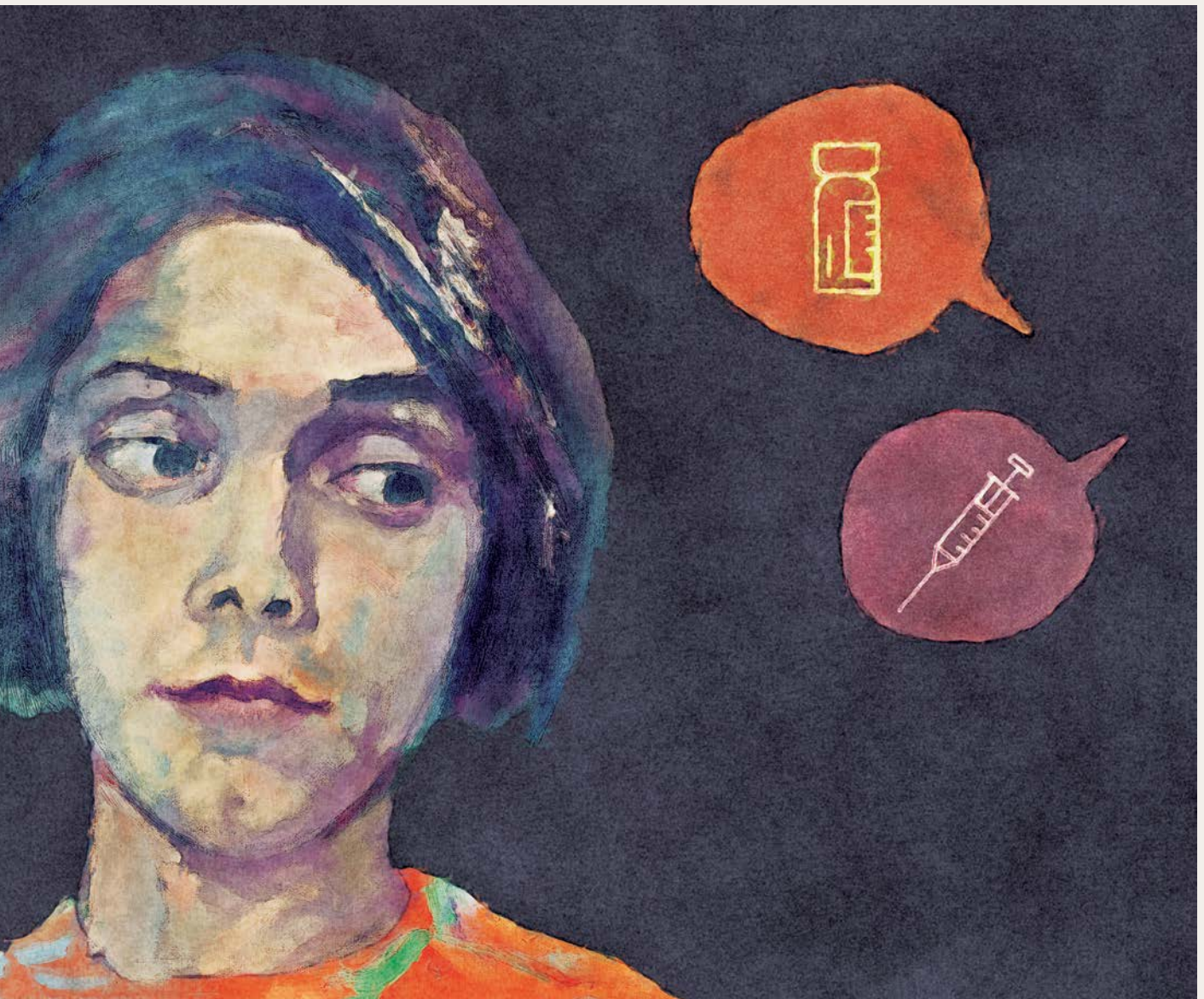
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PHOTO BY DMITRI KASTERINE

Communicating about vaccines in an age of deep mistrust

Respect and empathy for the “movable middle” is essential

by ELAINE MEYER



With persistent vaccine resistance across the U.S. and protests against vaccine mandates both at home and abroad, there is a prevailing understanding among those who believe in immunization against COVID-19 that everyone who has not gotten vaccinated is strongly opposed to it.

But according to Chris Palmedo, a professor of communications at CUNY SPH, it is not quite so simple. In the spring of 2021, Palmedo led in-depth interviews with people who were holding off on getting the COVID-19 vaccine. While affirming the enormous and critical public health benefits of vaccination, Palmedo says that treating the unvaccinated as if they are all extremists has led to communication strategies that fail to acknowledge the institutional mistrust that is often at the root of people's hesitancy.

"The folks we interviewed were smart, they cared about health, respected the virus, and were not highly conspiratorially driven, thinking the virus is a hoax or a scam," says Palmedo, who with his team published the interview results in December in *American Behavioral Scientist*. "Vaccine hesitancy was the tip of the iceberg. Hidden beneath the tip of that iceberg was genuine distrust of institutions, including the media, the government, and the healthcare system—often based on their own experiences."

'Trust that wasn't there to begin with'

Palmedo is a faculty fellow with CONVINCE USA—which stands for COVID-19 New Vaccine Information, Communication and Engagement, an initiative at CUNY SPH dedicated to building support for COVID-19 immunization and the science behind it.

When the vaccine rollout was in its infancy in 2021, he and his team began to interview individuals who wanted to "wait and see" before they got the COVID-19 vaccine, a term they adopted from Kaiser Family Foundation, which has done polling on vaccination views through most of the pandemic. Through a survey, the team recruited 30 participants who indicated they might get vaccinated someday but weren't ready to do so yet. Participants were paid \$60 to take part in a 45-to-90-minute in-depth interview about their thinking around the COVID-19 vaccine, how they seek information, their

general attitudes toward vaccination, and their pre-pandemic experiences with the healthcare system.

Several key themes emerged, according to Palmedo. The first was that the information people were getting during the pandemic was confusing and conflicting—particularly the different messages from different levels of government.

Palmedo says this can be understood in context of the state of the media ecosystem, particularly fracturing media outlets and audiences; the speed at which misinformation is spread; "echo chambers," in which people spend time in social or other digital media spaces that amplify their existing views; and the two-way nature of social media, which provides more ability to question official sources. Because people are flooded with information, they are more likely to focus on media that is consistent with what they already believe.

One of the most cited reasons for mistrust was the government's change in its masking recommendations early in the pandemic. Lauren Rauh, senior program manager of CONVINCE USA who led the interviews for the study, believes people would have been less focused on the changing guidance around masking if there were not already such low levels of trust among Americans in their institutions.

"It's not so much that trust was eroding, but that it wasn't there to begin with," she says. Polling organizations like Gallup and Pew Research Center have consistently found low levels of trust in American

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CHRIS PALMEDO



LAUREN RAUH



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institutions, and those levels have dipped even more in the more recent phases of the pandemic.

Palmedo notes that other democracies are grappling with similar issues, even if the U.S. has a particularly high level of institutional mistrust.

Another frequently mentioned issue in interviews was how people's race affected their experience with the healthcare system. One participant of color recounted the story of a nurse who didn't believe her when she said she was in pain and wouldn't prescribe medication. Reporting from the Association of American Medical Colleges and other academic research has found that Black patients are consistently under-treated for pain.

"Racism clearly is an issue in healthcare today," says Palmedo. "If you were treated poorly and the medical system is now telling you to get vaccinated, your past experiences could very well make you question it. Our interviews weren't the first place that found this, but they certainly confirmed it."

Economic inequality was also a factor. Some participants expressed that the vaccine was meant for wealthier people, who were much more likely to need it for travel

and could afford treatments and time off work if there were side effects.

Their hesitancy didn't mean participants weren't health-conscious and concerned about catching the virus. But they were skeptical that the vaccines would protect them, even when—and sometimes because—they had health conditions, like chronic obstructive pulmonary disease.

"They were hyper vigilant about protecting themselves from COVID-19," says Rauh. "They were cleaning with bleach, were still wiping down groceries, masking even when it wasn't mandated. What was surprising to me was that the vaccine was not seen as protective, but as potentially jeopardizing their health."

A few participants said that their doctors had even advised against getting the vaccine, at least until more was known about it in relation to their specific health concerns.

Communication that helps

The study team emphasizes that these issues of deep mistrust cannot be fixed by communications alone.

"While there are some clear communication recommendations resulting from this

study, the work needed to rebuild trust will be a long journey, and one we will continue here at CUNY SPH and CONVINCE,” says Scott Ratzan, executive Director of CONVINCE USA, distinguished lecturer at CUNY SPH, and member of the study team.

But there are communications strategies that can make a difference. An important implication of the study is that officials should avoid communicating health guidelines as a directive, exhortation, or insult. Palmedo points to when French President Emmanuel Macron said he wanted to “piss off” the unvaccinated, as well as other insulting language that has been present in everyday communication around the vaccines.

“People don’t want to be insulted,” says Palmedo. “You hear things like ‘If these stupid anti-vaxxers just got vaccinated we would be able to get on with our lives.’ Those feelings are understandable from a progress perspective, but the fact of the matter is they don’t work.”

More effective is what Palmedo calls “empathetic communication,” which involves listening to people and acknowledging their concerns, rather than lecturing or labeling people’s questions as unintelligent.

One example is United Airlines, which has done several things right. They acknowledged that some disagreed with their policy to mandate vaccines for employees. They consistently emphasized they were requiring vaccination for

everyone’s safety. They also shared numbers that showed the efforts were working in lowering case numbers and deaths, including a 100-times-reduced hospitalization rate compared to the general U.S. population after the vaccine requirement went into effect. It’s also important to communicate that mandates are issued reluctantly, and are “never anything we should enjoy doing,” says Palmedo.

He also suggests identifying points all sides agree upon, such as that everyone deserves to live a healthy life, rather than statements that people disagree with and that will make them defensive.

Finally, it’s important to identify trusted messengers in communities who can respond to people’s concerns while promoting vaccination, like faith organizations, local clinics, or direct service organizations.

“These organizations are entrenched in communities, and impactful in people’s lives,” says Rauh. “They spend a lot of time listening to people and responding to their needs. Larger institutions can learn a lot from how trust is built at the community-level.”

Looking ahead

None of this work is easy, Palmedo acknowledges: “We’re not going to change people’s views overnight but there is a movable middle, and respect for the people in this group—addressing their questions and

providing evidence-based responses will take time,” he says. “So much of good communication takes a little more work and a little more time.”

With COVID-19 receding at least for now, the team is currently doing work to help “prep for the next time this happens,” says Palmedo. They are working to develop a survey tool called the vaccine trust gauge to measure individual-level trust in vaccination and help communicators including health care providers, public health practitioners, and community-based workforces “meet people where they are” in their vaccine decision-making. They’re also working with the New York City Pandemic Response Institute, in which CUNY SPH is a key partner with Columbia University, to investigate how trust in the public health infrastructure and response is built, and how people make health decisions more broadly.

And whether or not the pandemic is mostly behind us, says Palmedo, the issue of mistrust of institutions will continue to frame society’s most significant challenges.

“Clearly there will be more challenges in the future, and they may be related to another pandemic, or another emergency, like a natural disaster,” says Palmedo. “A lot of the same issues will come up, including distrust based on class, race, and media consumption. We need to explore this issue as thoughtfully as possible now, so we’re more prepared then.”



CRITICAL COMMUNICATION

This poster with a charged tone aimed at the unvaccinated embodies the hard-line communications strategy many frustrated officials have adopted since the pandemic began. The study team’s work indicates such an approach is ineffective.

CHAMOMILE TEA PARTY



Educating for all

CUNY SPH online courses engage students where they live and work

by LISA KOSAN

Long before the first signs of COVID-19 upended traditional modes of education and turned kitchen tables into classrooms, CUNY SPH invested in the people and infrastructure that would support ongoing online learning.

In 2015, faculty attended a four-week training program in anticipation of CUNY SPH's consolidation into an independent graduate school the following year. They developed online courses meant to be taught outside of the comfort zone of lecture halls and labs. They learned best practices to keep students engaged and experimented with various media and techniques based on the most current research.

"We weren't planning on a pandemic," says Sergio A. Costa, Interim Assistant Dean for Digital Learning, Marketing, and Communications and lecturer in the Department of Community Health and Social Sciences. "We were being well prepared to address changing trends."

Today, CUNY SPH offers all five of its traditional MPH degrees in fully online, hybrid, and in-person formats. An additional four MS degree programs and two advanced certificates are also available fully online, and PhD students can choose from a mix of online and in-person formats.

Enrollment in online sections for the spring 2022 semester that just ended were filled within days of opening. The appetite is clear, Costa says.

The groundwork in pedagogical training and online class development has proven to be an important innovation for a school whose students may still be apprehensive about in-person gatherings or prefer to learn remotely. The prep work readied faculty and staff to handle future disruptions and has helped extend the school's reach beyond New York City. Perhaps most importantly, CUNY SPH is equipped to meet the needs of students who want or need to work and require flexibility to manage childcare and other critical family demands.

"This is a big step toward equity and an opportunity for people to take a degree program when they don't think they have

time to do it," says Laura Meoli-Ferrigon, the academic technology specialist in CUNY SPH's Office of Online Learning.

Hannah Stuart Lathan, the 2021 valedictorian and program manager of CUNY SPH's CONVINCE USA and the New York Vaccine Literacy Campaign, earned her MPH in two years despite working full-time. On a recent "Making Public Health Personal" podcast, she told Meoli-Ferrigon that online learning allowed her to engage more fully with the school and pursue opportunities for which she otherwise would not have had time.

Ivonne Quiroz, a doctoral student focusing on community health and health policy, says asynchronous courses provide the flexibility to work at her own pace and manage her ADHD. "Sometimes my brain is just, 'No, we don't want to do that today,'" Quiroz says. "For someone who's neurodivergent and who doesn't really have stable energy every single day, it helps with being able to still be successful at my work and contribute in the way that I want to."

A new approach

Meoli-Ferrigon arrived at CUNY SPH last year during the pandemic. With a background in instructional design and media production, she helps faculty produce courses that blend videos, images, infographics, and other media with interactive learning modules. "There's a new generation of students who learn differently, whose attention spans are shorter," she says. "They don't want to just stare at a professor on screen talking for an hour."

At the beginning of the pandemic, naturally some instructors might have thought they would teach courses on Zoom the same way they had taught in person for the last 20 years. "Those are the classes where



LAURA MEOLI-FERRIGON

they're trying to imitate what's better done in person," she says. "You have to change the way you teach the course to deliver it online. You have to integrate technology, polls, and groupwork. You can't expect it will be the same. That adaptability on the part of professors is what makes a successful online learning experience."

Costa reports that upwards of 70 percent of CUNY SPH faculty are trained and proficient in online teaching. "The faculty who approached us with trepidation are now much more comfortable," he says. "They all upskilled in a way I couldn't have anticipated."

Successful online courses are taught by instructors who have their finger on the pulse of their class, Costa says. They establish a consistent presence and responsiveness that is just as powerful as in-person exchanges. They provide reflection time and curate discussion boards to promote give-and take. They integrate techniques that are increasingly important in the workplace, including time management, negotiation, conflict resolution, organizational, and accountability skills.

"Busy people don't need busy work," Costa says, meaning that coursework should help students achieve their professional goals. In addition to papers and exams, outcomes should include a portfolio that demonstrates a range of deliverables typically encountered in the workplace.

New CUNY initiative

SPH was one of the first CUNY schools to identify the tools and training it needed to build and maintain an optimal online learning environment. But this March, university administrators announced the launch of CUNY Online and the development of up to 10 new online associate, bachelor's, and master's degree programs to begin by spring 2023. The initiative, fueled by \$8 million in federal stimulus funds and directed by the School of Professional Studies, is expected to have 13 to 20 new programs ready by fall 2023.

CUNY Online would represent a hub where prospective and current students can learn about programs offered online, Costa says. It would also provide CUNY administrators and instructors with access to videographers, instructional design experts, designers, animators, and studio recording engineers to help produce the highest quality online courses.

"We've been doing that and following rubrics to ensure quality online courses," he says. "But CUNY Online would provide opportunities to enhance the production of what we've developed for a richer learning experience."

What's next?

With public health top of mind during the pandemic and its long-term implications still unknown, CUNY SPH will take full advantage of the marketing power behind CUNY Online to demonstrate its rigorous approach to online learning. "We have the ability to take the best of CUNY to urban areas outside of New York and around the globe," Costa says. "Our quality programs will no longer be a secret."

Meanwhile, the school is considering the addition of so-called micro-credentialling, or shorter courses, to whet the appetite of potential longer-term students. The courses could teach discrete skills including data analysis, change management, and offer topics such as epidemics and vaccines. The courses could be stackable and lead to a certificate, Costa says.

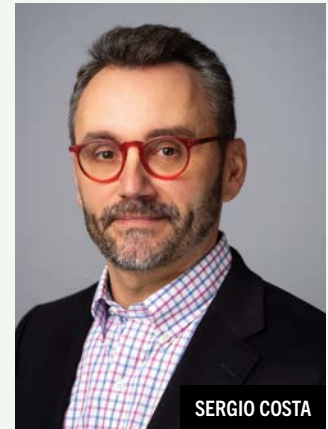
CUNY SPH is also making efforts to utilize more interactive technology so faculty can create interactive learning experiences that would be adaptable to both synchronous and asynchronous learning.

Last October, Costa and three CUNY

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SERGIO COSTA

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SPH faculty colleagues published a commentary in *Frontiers in Public Health* titled “Moving Education Online During the COVID-19 Pandemic: Thinking Back and Looking Ahead.” They argued that public health must meet upcoming challenges “by supporting and training instructors to perform well with new and mixed modalities, by supporting students with new skills and competencies, and by positioning its schools and programs to become more adaptive in the face of emergencies.”

“Online learning won’t take the place of

in-person, nor should it,” he says. “But it’s incumbent upon schools to offer a range of learning opportunities to accommodate students where they are, and that includes their work, professional, and personal lives.” According to the 2021 CUNY SPH annual report, 69 percent of students attend school part-time. Of the 922 students enrolled, 62 percent are employed full-time and 21 percent part-time.

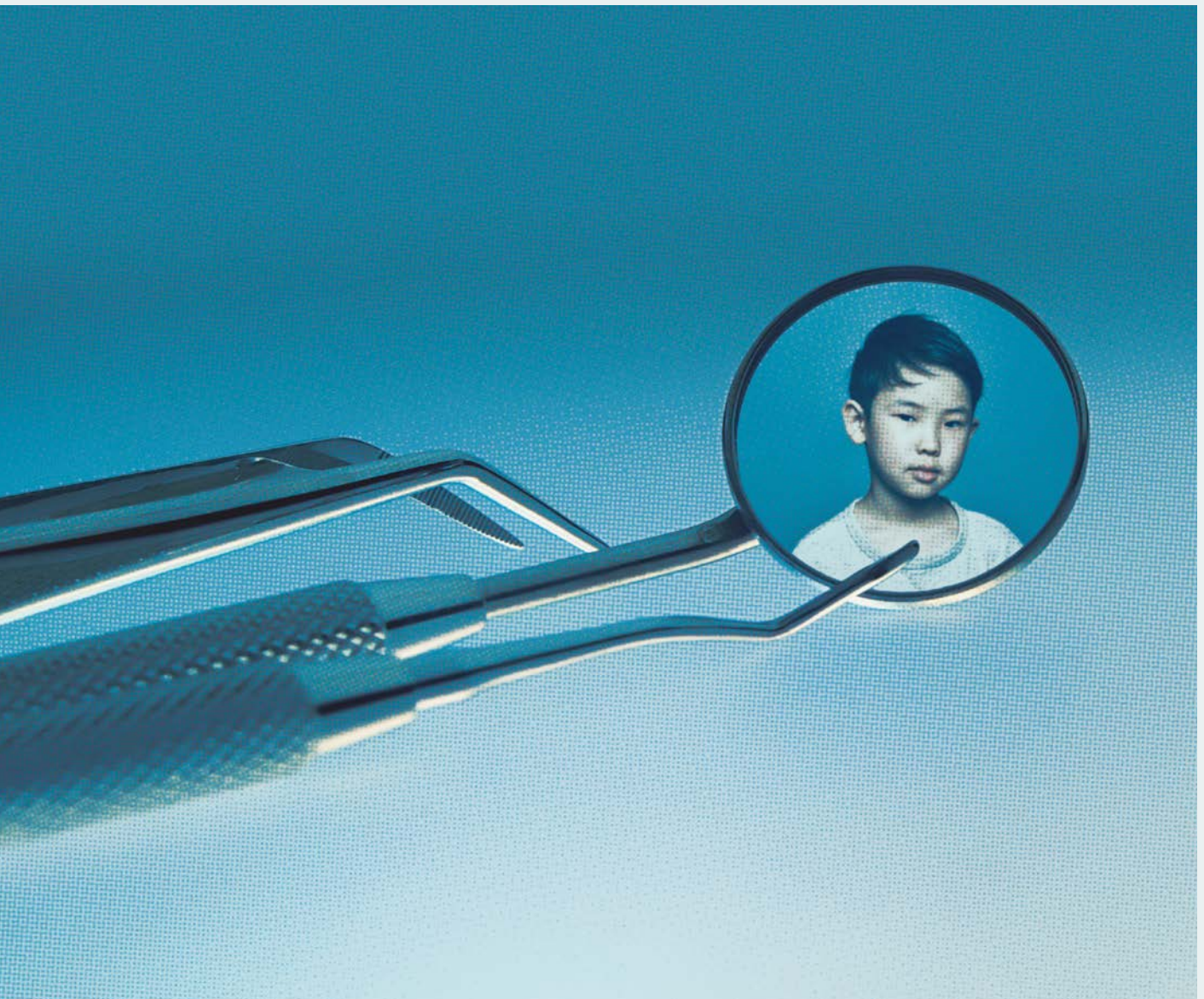
Online learning still requires some myth busting around socialization, isolation, participation, and the inability to read body

language. But one of the biggest benefits is a more democratic way of teaching. “It’s hard to hide that you’re falling asleep in the back row of a classroom when you’re on a screen right in front of the instructor or asked to participate online using a variety of tools and assessments,” Costa says. “This way, you remove the wallflower effect. Everyone has a chance to interact. And professors have a chance to motivate students so they can achieve their best work.”

Oral health *is* public health

A scholarship program opens doors for professionals who aim to expand oral health for all

by BARBARA AARON



Diabetes, cardiovascular disease, kidney disease, dementia, and pregnancy complications have one thing in common: they're all associated with poor oral health, as demonstrated by numerous studies.

While oral health has improved in the U.S., inequities are pervasive. One of the social determinants of oral health is the absence of routine dental care. The latter is directly related to lower socioeconomic and racial/ethnic minority status. Poor and minority children are more likely to have untreated tooth decay but substantially less likely to have access to oral health care than their peers—and neglected oral health in childhood can lead to pain, speech difficulties, and poor performance in school, creating obstacles for success in adulthood.

“Restricted access to proper and preventive oral health care is an extension of existing systemic racial/ethnic inequities and a core public health issue,” says CUNY SPH Dean Ayman El-Mohandes.

In the context of the COVID-19 pandemic, poor oral health is an even more pressing problem: recent studies have found that COVID-19 patients with gum disease are more likely to be admitted to the

ICU, to need a ventilator, and to die compared to those who don't have gum disease.

“Making oral health central to public health has never been more urgent, and in fact, now is the time,” says Distinguished Professor Luisa N. Borrell, DDS, PhD. “We need oral health and other health professionals who can conduct research to inform government policy on population oral health and expand access to care for our most vulnerable populations.”

For a school whose mission centers on health equity and social justice for all, expanding education in oral population health is a priority.

In 2021, cosmetic dentist and philanthropist Michael Apa pledged \$350,000 to establish a new focus on the intersection of oral health and population health at CUNY SPH. This investment is supporting a scholarship fund for ten students who aspire to address significant research gaps in the area of oral population health.



LUIA N. BORRELL

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MICHAEL APA

Selected Insights From Apa Scholars

...while I enjoy helping my patients, I want more. I see how lacking the representation is for dentistry in the overall healthcare system for at-risk populations and the homeless, and I want to be part of the solution.

— MARK MAKILING

I specifically chose to pursue a Master's in Public Health in Epidemiology and Biostatistics to develop the tools not only to carry out meaningful research into oral health but also learn how to implement change and make a difference in my community.

— SAHAR HAMID

As a New York City dentist and MPH candidate, my main objective is to implement programmatic initiatives to increase access to dental care and reduce oral health disparities through education and sustainable resources.

— VIVIAN TRINH

A high proportion of Apa Scholars are dentists practicing in NYC. They aim to widen the scope of their expertise to bring increased health to people at the population level.



For Apa, a native New Yorker who practices here as well as Dubai and Los Angeles, this has been an opportunity to make a long-term investment in his hometown, in a field close to his heart.

“With the skills and knowledge that oral population health students will gain from a great public university in one of the greatest cities in the world, they’ll have the power to create actual, meaningful change,” says Apa. “I have full confidence that CUNY SPH is the right place to inaugurate this program.”

“We are elated that Dr. Apa has chosen to invest in CUNY SPH to establish this program,” says Borrell, who leads the program. “These students will be at the forefront of fighting inequities in population oral health, by examining and developing new interventions to improve the oral health of communities in New York and beyond.”

Five Apa Scholars were admitted in fall 2021, and five more in spring 2022. The majority are trained dentists and currently practicing in New York. They are a diverse cohort of three men and seven women, with nine of the ten from under-represented minority groups.

They share a common mission in embarking on this program: a profound desire to go beyond helping one patient at a time, to understand the links between oral health and overall health, and to reshape the healthcare delivery system to incorporate oral health more broadly through their research.

Borrell tapped one of her mentees, doctoral student Parth Shah, MD, DDS, to teach the Epidemiology of Oral Health course to the Apa cohort.

“It’s been one of the most gratifying teaching experiences of my life—I have never encountered a group as hungry for knowledge,” says Shah. “I’m an enthusiastic instructor, and often find myself running overtime and apologizing to the class. But they always urge me to continue, saying, ‘We’re here for this, please go on!’”

Apa’s engagement extends beyond philanthropy: he maintains an active interest in the program and plans to deepen his involvement in the future as a guest lecturer and speaker.

“I couldn’t be more impressed with this cohort of scholars,” he says. “These are experienced professionals who are passionate about advancing the field of oral population health, and it’s been a privilege to share their journey.”

Assia Bourib is completing an MPH in Epidemiology through the Apa Scholarship. As a dentist practicing in hospital settings in Algeria, she observed potential risk factors for oral cancer among her patients but lacked the skills and resources to conduct her own research.

“This is the greatest opportunity I have had since I came to the U.S.,” says Bourib, who is now a naturalized citizen. “I can focus on applying my expertise in oral health to population level research and make a difference on a larger scale.”

She finds it inspiring that Apa, one of the leading cosmetic dentists in the world today, is willing to lend his support to oral public health, “a field that hasn’t been given the attention it deserves.”

“Dr. Apa’s given us all a big chance,” she says. “It’s now up to us to do justice to his generosity.”

Striking the right balance

A doctoral student's landmark contributions on HIV treatment and equity

by ELAINE MEYER

MATTHEW ROMO



In 2018, nations and health organizations around the world suspended use of dolutegravir, the top HIV antiretroviral treatment for women of reproductive age.

The dramatic move came after the World Health Organization (WHO) cautioned about the drug after reporting from Botswana on nervous system defects in newborns of women who had become pregnant while on the therapy.

Yet, even after later data provided reassurance about the safety of the drug, only half as many women as men were accessing it in 2020, meaning millions were still going without it, and still may be.

The fallout from that 2018 statement is the subject of new research published in January in *Annals of Internal Medicine* by Matthew Romo, a CUNY SPH doctoral student in epidemiology and a pharmacist interested in HIV.

“It points to the need to strike the right balance between simultaneously protecting and promoting public health,” says Romo. He notes that in many countries, women were effectively denied access to a best-in-class drug—even if they were using contraception and didn’t plan to have children—based on an extremely low-risk and still uncertain event. “The lesson here is that the affected population, women living with HIV, should have been part of the decision to access the drug.”

Romo’s research is part of a larger body of work around the study of HIV treatment and care at CUNY SPH. Denis Nash, Romo’s dissertation adviser, is principal investigator for the Central Africa region of the International epidemiology Databases to Evaluate AIDS (IeDEA), a consortium of countries in the Americas, Africa, and Asia-Pacific that collect observational data on 2.2 million people living with, or at risk for HIV. Through Nash, Romo was able to access this large dataset and collaborate with international investigators to research the extent of the impact the decision to suspend dolutegravir had on women.

“Matt’s landmark research studies have immediate implications for policy and practice vis-à-vis the persisting disparities in the ongoing global dolutegravir rollout,”

says Nash, who is also executive director of the CUNY Institute for Implementation Science in Population Health (ISPH) and distinguished professor of epidemiology at CUNY SPH. “Matt brought his unique lens from his training as a pharmacist and as an epidemiologist. It allowed him to take a very broad research priority and focus it in some very important and relevant ways,” Nash adds.

According to Annette H. Sohn, Vice President, amfAR, The Foundation for AIDS Research and chair of the IeDEA Executive Committee, “Matt’s research has provided us with valuable benchmarks for early real-world experiences in rolling out dolutegravir treatment using IeDEA data. He successfully navigated IeDEA’s complex consortium, and ably managed our multi-regional data to produce high-impact science.”

Over the last 25 years, improvements in antiretroviral therapy have made it possible for people with HIV to have long, healthy lives and drastically reduced the risk of transmitting the virus. Even in this landscape, dolutegravir, “represents a new era for HIV treatment,” says Romo. Patients on the drug, which is taken once a day as a tablet combined with other antiretroviral medications, are able to more strongly suppress HIV and are less likely to develop resistance, compared to the previous preferred first-line antiretroviral, efavirenz. Individuals also experience fewer side effects, making them less likely to discontinue use. Importantly, because of improved viral suppression, the risk of transmitting HIV is also reduced.

For these reasons, the WHO first recommended dolutegravir as part of first-line antiretroviral therapy in 2016. But in May 2018, a study out of Botswana changed access to the drug for millions of women. In that country, four newborns of 426, or about 0.9 percent, were born to women who became pregnant while on the therapy and had defects in the brain, spine, or spinal cord, known as neural tube defects. In comparison, the risk of neural tube



In 2018, a study out of Botswana reported that almost 1% of children born to mothers taking the antiretroviral drug dolutegravir resulted in neural tube defects. Subsequent, larger studies did not find this risk.



DENIS NASH

MATT’S LANDMARK RESEARCH STUDIES HAVE IMMEDIATE IMPLICATIONS FOR POLICY AND PRACTICE VIS-À-VIS THE PERSISTING DISPARITIES IN THE ONGOING GLOBAL DOLUTEGRAVIR ROLLOUT.

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defects was 0.1 percent among infants born to women taking other antiretroviral regimens at the time of conception.

This kind of event, known as a “post-marketing safety signal,” refers to when reporting has shown an adverse effect in people who take a medicine after it becomes available to the public, but more investigation is needed to determine if the medicine is the cause.

In response, the WHO cautioned against use of dolutegravir for women of reproductive age and called for further investigation. Following the agency’s action, countries and organizations largely restricted access to the treatment for women in that group.

More data from Botswana later showed the risk of neural tube defects was even lower than in the initial report—0.3 percent with dolutegravir vs. 0.1 percent with other antiretrovirals. Additionally, pregnancy surveillance studies from other countries did not identify an increased risk of neural tube defects. According to researchers’ models, dolutegravir’s benefits in reducing both deaths among women and HIV transmission outweighed the low

potential risk of neural tube defects.

This led the WHO to reverse its decision in July 2019 and recommend the drug again for all people living with HIV, but the initial action is still reverberating around the world. (The most recent data from Botswana have shown that dolutegravir is no longer significantly associated with an increased risk of neural tube defects—effectively putting the safety issue to rest.)

Yet, for every 100 men ages 16 to 49 that initiated dolutegravir, only 51 women of the same age did so through 2020, as Romo discovered from analyzing data on 134,672 patients at 87 facilities in Brazil, Cambodia, Kenya, Rwanda, Uganda, Democratic Republic of the Congo, Haiti, Lesotho, Mozambique, Tanzania, and Zimbabwe, through the leDEA registry.

The safety signal had an especially significant impact on sub-Saharan Africa, where women of reproductive age are the population most affected by HIV. According to the Joint United Nations Programme on HIV/AIDS (UNAIDS), young women in the region ages 15 to 24 are twice as likely to be living with HIV than men.

A CLOSER LOOK

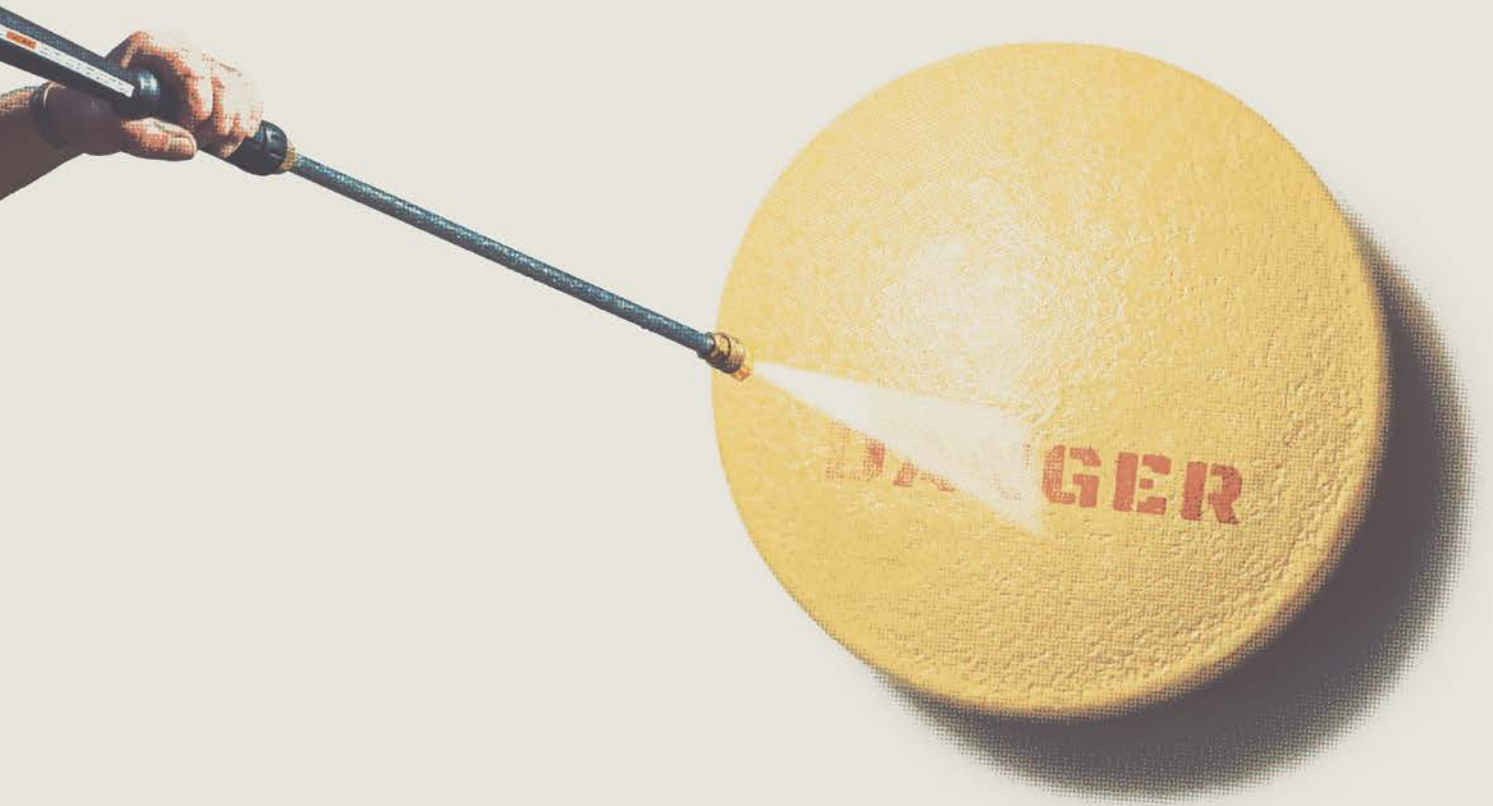
ABOVE: A colorized scanning electron micrograph of an HIV-infected H9 T cell. CREDIT: NIAID

BELOW: Dolutegravir is in a class of medications called HIV integrase inhibitors. They work by blocking an enzyme called integrase that the virus uses to hijack the genetic machinery of a cell. This results in HIV being suppressed to undetectable levels, as it cannot replicate. CREDIT: VIIV HEALTHCARE



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COUNTRIES WERE PRETTY QUICK TO
RESTRICT ACCESS—TO REVERSE THINGS,
IT'S MUCH HARDER. IT TAKES A LONG TIME.



“Countries were pretty quick to restrict access,” says Romo. “To reverse things, it’s much harder. It takes a long time. Policies need to change and countries must figure out how to implement these guideline changes through supply chains. Questions and concerns among clinicians and people living with HIV must also be addressed.”

The study spotlights the consequences of responding to a safety signal too restrictively and leaving those most affected out of the decision-making process.

“Even if there is potentially a slightly elevated risk of birth defects, does this outweigh the known benefits of viral suppression and reduced mortality and HIV transmission?” Romo asks. “The scales were really tipped in favor of the known benefits versus a very small, uncertain risk when considering if access to the drug should be restricted.”

The episode also points to the need for pregnant women to be better represented in clinical trials, where risks could be identified earlier. Leaving pregnant women out of trials is often justified because of unknown risk to the mother or the fetus. But nonclinical reproductive and developmental toxicity studies done before the human subject phase of the trial can help identify whether a drug is potentially unsafe for pregnant women or women who become pregnant, according to Romo.

“Romo and colleagues provide a poignant example of how far we remain from prioritizing women’s decision-making autonomy and health and from having timely, high-quality data for drugs used during pregnancy and breastfeeding,” an editorial published with Romo’s study in *Annals* wrote.

As Romo says, “Women will eventually take the drug in real life, so we owe it to them to provide relevant safety and efficacy data before it comes to market. We need to protect people *through* research not *from* research.”

The question of how to weigh uncertain safety issues with known clinical benefits has also become more pressing with the sensitivity of communication around COVID-19 vaccines.

“It takes a long-time to address concerns and restore trust, even after new, reassuring data comes out,” Romo says.

During his undergraduate studies in 2005, Romo got a job as a research assistant on a clinical trial of new HIV treatments at Cedars Sinai Medical Center in Los Angeles.

“It was a time during the HIV epidemic when treatment was just beginning to be expanded globally,” said Romo. “It was a phenomenon that was saving lives in high-income settings, like the United States, Canada, and Europe, but millions of people globally were not yet on treatment.”

He went on to earn a Doctor of Pharmacy degree at Massachusetts College of Pharmacy and Health Sciences in Boston, and gained experience in HIV clinical treatment through a clinical clerkship at Beth Israel Deaconess Medical Center in Boston and a volunteer opportunity with Fundación Huésped in Buenos Aires, Argentina.

He began a master’s in public health in 2012 at what was then the Urban School of Public Health at Hunter College, (before CUNY SPH became an independent school).

“Matt demonstrated a proclivity for academia even before joining the doctoral program in epidemiology,” says Associate Professor Elizabeth Kelvin, Romo’s MPH mentor. “His coursework while an MPH student resulted in at least four publications in peer reviewed journals that I am aware of; and he has sought out academic opportunities in institutions around the world. I know that he will continue to be an excellent academic and colleague.”

Romo went on to work as a consultant for the New York City Department of Health and Mental Hygiene’s Bureau of Epidemiology Services, and as a visiting researcher at the University of Cuenca School of Medicine in Ecuador. During his doctoral study, which he began in 2016, he has taught epidemiology classes and mentored students at CUNY SPH and The University of Hong Kong, where he lived with his husband for three years before moving back to the U.S. He earned his PhD this spring.

“Matt has great ability to synthesize and present data in a concise way,” says Pui Ying (Polly) Chan, City Research Scientist at New York City Department of Health and Mental Hygiene, who is a friend. “He is also gifted in scientific writing, which is attested by his long list of publications to date.”

Romo defended his doctoral dissertation successfully this February. He’ll stay on with ISPH, work on submitting a National Institutes of Health K01 training grant, and continue to study the effects of HIV treatment on populations. He hopes eventually to be faculty at a university because of his love of research and mentoring students.

“At CUNY SPH, I’ve had the best mentorship I could ask for,” says Romo. “My hope as a researcher is to pass that on to other researchers in the future.”



Maggie Medison, 18, from Malawi, dropped out of school in 2015 because she became pregnant. She represents the group most affected by the safety signal. She now works in her community to raise awareness about the importance of remaining in school and protecting against HIV. CREDIT: JOSH ESTEY/USAID

Advancing health equity in New York through health literacy and big data

NYC IN FOCUS

CUNY SPH partners with NYCDOHMH to enhance the well-being of all New Yorkers

by BARBARA AARON



SASHA FLEARY

As defined by the CDC and NIH, health literacy is the degree to which individuals have the ability to find, understand, and use information and services to inform health-related decisions and actions for themselves and others.

It sounds straightforward, but for a large segment of our population, it can be out of reach. An individual's health literacy may be low because they have fewer experiences engaging with providers who encourage them to be actively involved in their health decisions or their lower literacy skills make it difficult to understand complicated health information and instructions. There may be systemic and cultural barriers to care, or they may have limited English proficiency. These issues often affect older adults, individuals from racial and ethnic minority groups, and those with lower socioeconomic status.

As has been the case with health inequities across the board, disparities in health literacy were made starkly apparent in the wake of the COVID-19 pandemic. One of the many factors contributing to the disproportionate impact of the pandemic on vulnerable populations was the scarcity of effective communication and resources to enable them to protect themselves from the virus.

"Health literacy isn't just about the individual," says Associate Professor Sasha Fleary. "It's an ecosystem that involves families and communities and the organizations providing information and services to them."

In March 2021, the Biden administration announced a \$250 million initiative to support community organizations that work to address gaps in the response to COVID-19. The initiative, called *Advancing Health Literacy to Enhance Equitable*

Community Responses to COVID-19, is run by the U.S. Department of Health and Human Services (USDHSS) Office of Minority Health and has awarded grants to some forty different municipalities across the U.S., including New York City.

In the summer of 2021, USDHSS awarded the New York City Department of Health and Mental Hygiene (NYCDOHMH), in partnership with CUNY SPH, funding to implement the *Community-based Initiatives for Health Literacy and Action* (CIHLA) in New York City.

Fleary, who has devoted much of her career to advancing health equity through health literacy, is leading the CIHLA project on the CUNY SPH side. The school's Harlem Health Initiative and Vaccine Literacy Campaign are also providing support.

"It's absolutely essential for projects like these to engage the affected communities in developing strategies and supports to address the unique challenges each is facing," says Fleary.

Fleary is also partnering with NYCDOHMH to launch another project: one of the largest mental health surveys of New York City residents ever undertaken. The NYC Neighborhood Wellness Survey will collect data from a probability-based sample of 50,000 New Yorkers. The project will be housed within The CUNY Institute for Implementation Science in Population Health (ISPH), where Dr. Fleary is an Investigator.

The project is a massive endeavor that will compile zip code-level data on such issues as adult mental health, substance use, and developmental and intellectual disabilities. It will also examine the factors that shape physical and mental health, such as stable housing, food security, education and job opportunities, and the built environment.



7th Avenue in Manhattan.

"Getting zip code level data about mental health status and access to mental health resources will allow for more informed and equitable distribution of resources," says Fleary. "We need to be more intentional about ensuring that policies and programs truly meet the needs of New Yorkers who are underserved and disproportionately impacted by the multiple pandemics in NYC."

The project will be part of the CUNY ISPH's larger population health portfolio, which includes large scale population health surveys and cohort studies, with research focused on improving population health via better implementation of evidence-based implementation strategies and policies.

"The CUNY ISPH's mission and its long history of collaboration with NYCDOHMH on these types of projects is a key reason why they approached us to collaborate on the design and execution of this large-scale survey on mental health," Fleary says.

"This survey will produce robust knowledge and insights that will provide policy makers and community-based organizations with the information and data needed to develop and implement policies and acquire funding to address the challenges facing the different populations that make up New York City," says Fleary. "The goal is for the data gathered from this survey to be used to inform the implementation of policies and programs not just for mental health and substance use but also important related social determinants of health such as food and housing insecurity. It will be an invaluable tool as we all work together to optimize the well-being of all New Yorkers."

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HEALTH LITERACY ISN'T JUST ABOUT THE INDIVIDUAL. IT'S AN ECOSYSTEM THAT INVOLVES FAMILIES AND COMMUNITIES AND THE ORGANIZATIONS PROVIDING INFORMATION AND SERVICES TO THEM.



System transformation in mental health care

NYC IN FOCUS

Harlem Strong Initiative collaborates with community organizations to build long-term solutions

by LISA KOSAN

At the beginning of the pandemic, Malcolm A. Punter noticed mounting stress among the staff at Harlem Congregations for Community Improvement (HCCI).

The counselors and case managers who were helping people in need had an additional responsibility—to protect their own physical and mental health amid extraordinary grief.

Two years later, an awareness of debilitating stress, anxiety, depression, and trauma throughout the community has led to Harlem Strong, an initiative of CUNY SPH, to integrate mental health screening with existing touchpoints of care.

“COVID-19 exacerbated and exposed the glaring gap between the services people need for mental health care and what they are getting,” says Victoria Ngo, associate professor and director of CUNY SPH’s Center for Innovation in Mental Health (CIMH). “That increased awareness created the momentum for us to do something about it, to pull together the resources, to seek the funds to address these needs and at this scale. That’s what has given birth to Harlem Strong.”

Rather than a single program, the Harlem Strong Initiative is a cooperative of organizations, individuals, resources,

interventions, and trainings to identify signs of compromised mental health and increase the community’s capacity to provide care. The initiative is coordinated through the CIMH and supported by nearly \$2.5 million in grants from the National Institutes of Health and the Robert Wood Johnson Foundation over the next five years.

“The goal for both of these grants is system transformation,” Ngo says. “We don’t want to make incremental changes in the community and the system. We want to leverage the strengths that are already in Harlem, to rethink how services are provided and how we can better reach community and support community.”

Deborah A. Levine, a clinical psychiatric social worker and director of another CUNY program, the Harlem Health Initiative, hears painful conversations about mental health concerns in the neighborhood right outside the university’s doors. Harlem Strong, she says, will link the people who routinely take the pulse of the community—case managers, health workers, and trusted clergy—to increase the reach of mental health services and minimize barriers to care.

“Harlemites are experts of their own lives,” Levine says. “The lived experiences and expertise of Harlem’s community stakeholders and faith leaders are the backbone of the Harlem Strong project.”

Trust-building is accomplished through institutions that serve the population directly, says Punter, including the more than a thousand houses of worship in Harlem. “Instead of going to a mental health facility, someone might go to their trusted advocates, a pastor or imam or rabbi and lay their burdens on those folks who may not be qualified to help,” he says. “That’s the gap we’re trying to fill by creating a partnership for training, not to try to supplant them.”



MALCOLM A. PUNTER



DEBORAH A. LEVINE

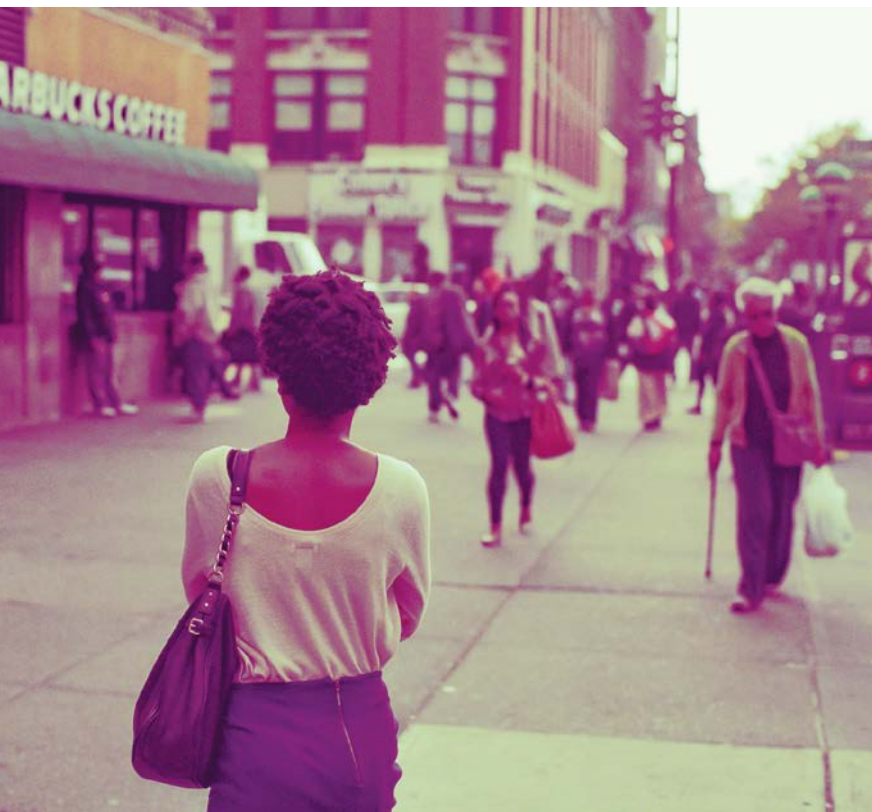
THE LIVED EXPERIENCES AND EXPERTISE OF HARLEM’S COMMUNITY STAKEHOLDERS AND FAITH LEADERS ARE THE BACKBONE OF THE HARLEM STRONG PROJECT

ON THE PRECEDING PAGE

A Harlem subway station mosaic on the platform wall at 125th Street. The strength and heritage represented in the artwork echoes today through the community’s commitment to the Harlem Strong project.

FAITH RINGGOLD, *FLYING HOME: HARLEM HEROES AND HEROINES (DOWNTOWN AND UPTOWN)*, 1996. GLASS MOSAIC ON PLATFORM WALLS.

CREDIT: TROY TOLLEY



Malcolm X Blvd at 125th Street in Harlem.

ADRIEN LEGUAY

Why now?

In 2020 and 2021, at the height of the pandemic, researchers at CUNY SPH found high rates of job, housing, and food insecurity coupled with depression and anxiety rates (35-45 percent) for Black and Latino Americans in New York City. These pandemic-related threats to mental health of Harlemites, coupled with historically poor access to quality mental health care for ethnic minorities, perpetuate poor mental health outcomes.

The pandemic further stressed people, especially those with previous health conditions and front-line service workers in restaurants or delivery businesses. “They’re at greater risk, but if they don’t work, they can’t feed their families,” Ngo says. Add to that the strain of living in small apartments without privacy for a child to do homework or a parent to make work calls.

“All of these very pressing, very real-world problems are impacting work and school and finances,” Ngo says. “That just adds to the mental health risk. If your functioning is impaired and you can’t work, there’s a domino effect. It can cripple a community.”

A work in progress

Two groups are tasked with keeping the initiative on track. The 12-member Harlem Strong community advisory board, chaired by HCCI Executive Director Punter and representing the community, medical, and political fields, held its first meeting earlier this spring. A larger planning council of community stakeholders also helps steer the initiative. Programmatic goals include mapping out community-based organizations and the services they provide, scheduling neighborhood focus groups and surveys, devising trainings for a large cohort of mental health screeners, and developing ancillary service programs to help residents with financial literacy and housing assistance.

The initiative will support the development of a technology platform to provide training, a searchable directory to link clients to care, resources for mental health screening, and self-help management tools. One of the goals of the platform will be to use crowdsourcing techniques to identify technology tools that would be most beneficial for addressing implementation gaps,

which may include electronic referral systems, consumer-facing mental health apps, as well as other client management systems for community-based organizations.

While Ngo and her colleagues will evaluate the program’s ongoing impact and cost effectiveness, she points out, “The best investment is to focus on managing and supporting people to have the skills to deal with stressors that will continue to impact the community.”

Healthfirst, one of New York’s largest not-for-profit health insurers that helped write the funding grants, will identify metrics and strategies for continuous improvement and sustainability. That includes providing data management and analyzing patterns of utilization and care among the 16 or so primary health care practices working with Harlem Strong. Reimbursement claims can be tracked, along with pharmacy use, requests for diagnostic tests, and follow-up visits. “You rarely see these things tracked longitudinally,” says Susan J. Beane, Healthfirst vice president and executive medical director. “I’m excited to see this play out, how the pieces come together and change things over time.”

“Healthfirst will also assess health care providers for biases that contribute to inequitable mental health care, identify how a medical practice responds to patients with mental health needs, and the likelihood of patients to approach a practice for help,” Beane says. Healthfirst will provide different modes of clinical training, including group learning and web-based conferences, to screen patients and know when to make a referral to a specialist.

Training provided by additional partners, including HCCI, is scheduled to begin by late summer 2022 and will extend to case managers, faith leaders, and people committed to learning the program and providing emotional or therapeutic support in one way or another, Ngo says.

For example, under this system of task sharing, a case manager helping a woman find housing might notice that she is highly stressed and likely to abandon what can be a long process. With training, the case manager could screen the applicant for depression and anxiety. “They can let them know that many people are struggling during the pandemic,” Ngo says. “They can explain what depression is and offer ways to help,” including referrals to treatment in the neighborhood and offer to follow up on their care.



SUSAN J. BEANE



VICTORIA NGO



IF NAVIGATING THE HEALTH CARE SYSTEM IS HARD FOR PEOPLE WITH AN EDUCATION AND ECONOMIC STABILITY, WHAT HAPPENS TO PEOPLE WHO ARE STRUGGLING WITH THE ENGLISH LANGUAGE? HOW ARE THEY GETTING HELP?

THEY'RE NOT.

Quality outcomes will be tracked and shared in close to real time to see what works and what doesn't, Ngo says. At the 6 and 12-month marks, researchers will evaluate the impact of Harlem Strong on mental health, social risk, and the outcome of receiving care. At the 6, 12, and 24-month marks, researchers will measure implementation outcomes at housing developments and primary care settings, including provider knowledge, attitudes, skills related to mental health literacy, screening, referral, and coordination of care.

Researchers will also assess the cost-effectiveness of Harlem Strong's neighborhood-based community collaborative care model, where coalition building is facilitated, and implementation challenges are resolved through the network. A control group will receive the same training for integrating mental health care to determine whether investments should be made to neighborhood-based community collaboratives to increase uptake of mental health task sharing.

The network of organizations created by Harlem Strong breaks down the siloed, fragmented approach to health care. "And when you combine that with social services and housing it's crazy making," Ngo says. "If navigating the health care system is hard for people with an education and economic stability, what happens to people who are struggling with the English language? How are they getting help?" Ngo asks. "They're not."

Equity in health care

Data clearly show that length of life differs by neighborhood, ethnicity, language, culture, and gender, according to Beane, who was born in Harlem and grew up in the South Bronx. But the confluence of events around the pandemic and the racial unrest after the death of George Floyd prompted providers "to ask out loud if we can do better," she says. "Harlem has always responded to the needs of its residents. If we can change the trajectory of health for people who are living the legacy of struggle that is Harlem, we can take the lessons learned almost anywhere."

Harlem Strong draws on Ngo's experience over the last decade developing a similar task-sharing approach in her native Vietnam. Under that model, primary care providers screen patients for depression. Ngo also helped create a complementary program that repackages depression care

with small loans to help women with depression through supporting their livelihood. "Most of our patients are so poor... their priority is what to eat tonight, not is their depression treated," she said at the time.

Harlem Strong involves a higher level of community engagement and the development of a network across organizations. It's also a continuation of CUNY SPH's partnerships with New York City, including the Department of Health, Health and Hospitals Corporation, and other agencies that have the potential to scale the program to more neighborhoods.

Ultimately, Ngo hopes Harlem Strong will be sustainable and result in a system that's easier to navigate. Now, if someone gets a referral to a therapy program without an opening, they will likely fall through the cracks. The coalition will provide opportunities to break down the silos, help providers and organizations learn about one another's programs, and support a coordinated referral system that should plug those holes.

"We're working to figure out how the consumer journeys through different service systems, like housing, community-based service organizations, primary care, behavioral health, and where they struggle," Ngo says.

To ensure that members of the community have the loudest voice at the table, Levine and Punter say, they will be asked what they lack now and how health care can best be delivered to them. Whether in the form of surveys or interviews, Harlem Strong needs to hear from burned-out care givers, elderly members of congregations who are too fearful to leave their homes, and owners of failed businesses facing poverty instead of the middle-class life they dreamed of.

"We're asking people with anxiety, depression, insufficient income, and elders who are homebound to help with our survey to come up with a massive plan," Punter says. "But that's five years down the line and now they're sitting at home and can't even eat. We want to help people right now."

The partners in Harlem Strong understand that the program will intentionally take time to develop and assess. Shortcuts just aren't acceptable.

"Our initiative may provide the framework that can be built upon in the future," Punter says. "That's the purpose of scientific inquiry. You don't get to solve the problem in one swoop. I just hope to provide a small contribution that could become a breakthrough."

Investigating metals exposure among NYC newborns

NYC IN FOCUS

Collaborating with NYCHHC to pilot a faster, cheaper, and more comprehensive way to assess in utero exposure

by ANDREA KOTT





BRIAN PAVILONIS

SUZANNE McDERMOTT



The finger-prick, painful but necessary, draws the blood sample that will reveal whether the wailing child has been exposed to lead, a known neurotoxin that can cause permanent intellectual disability in children subjected to it prenatally or in early childhood.

If so, then a venous blood draw will follow to confirm the initial results, as well as further testing, and treatment. The procedures are invasive, costly, time consuming and, according to preliminary research from the Department of Environmental, Occupational, and Geospatial Health Sciences at CUNY SPH, potentially avoidable.

By analyzing meconium from a robust sample of newborns in hospitals across New York City, Associate Professor Brian Pavilonis, Professor Suzanne McDermott, and colleagues found detectable levels of lead, plus nine other metals which, in high concentrations, are associated with a host of biological and neurodevelopmental problems. In addition to using meconium—instead of blood—as a biomarker for measuring women’s prenatal exposures to potentially toxic

metals, the study identified environmental contamination in a few geographic areas of the city. This will help establish a baseline of metal concentrations among representative populations in the city which, in turn, may help healthcare providers and mothers of newborns catch elevated environmental exposures early enough to minimize and even avoid their effects.

“The study adds to the literature a cheap, easy, and effective way to measure metal concentrations in newborns, and to identify early exposures that can allow you to do an intervention,” Pavilonis says. “Right now, we do not know what constitutes ‘elevated’ levels of metals in meconium, and that is one of the goals of the project: to determine average concentrations of metals in NYC so in the future we can detect outliers.”

Meconium, a thick, dark green or black substance, is the first stool that newborns pass. Its production begins early in the second trimester of pregnancy, and so it reflects several months of accumulated maternal-fetal environmental exposure, explains McDermott, who has extensively studied and written about the relationship between toxic environmental exposures and neurodevelopmental disabilities, including intellectual disability and autism. “Meconium captures the past three to six months of maternal-fetal exposure, unlike cord blood, which captures the past week’s,” she says.

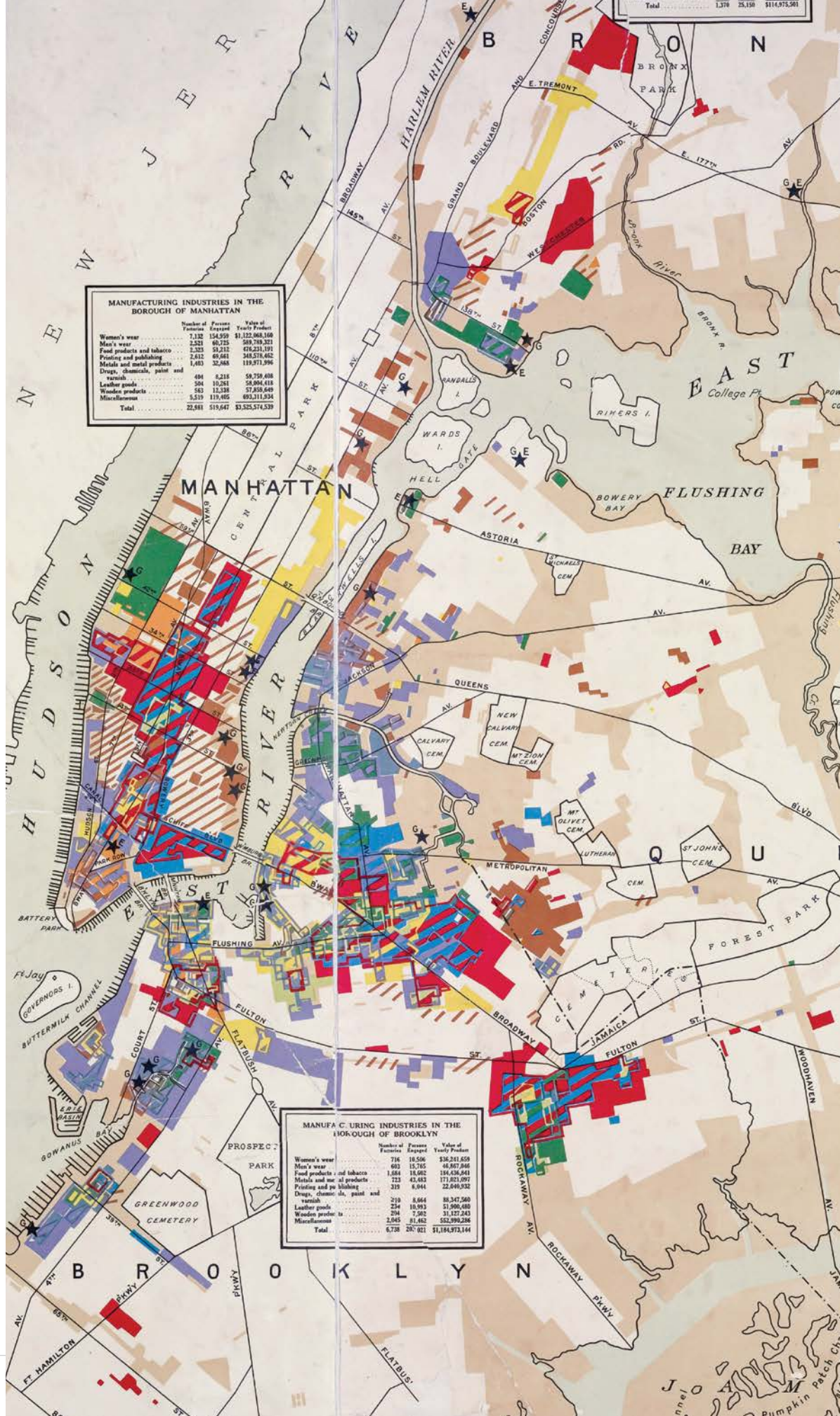
The cross-sectional pilot study, which the researchers conducted in cooperation with physicians from the New York City Health and Hospital system (NYCHHC), analyzed meconium samples from 124 newborns within the first 24 hours of delivery at five NYCHHC hospitals: Elmhurst and Queens hospitals in Queens; Jacobi Hospital in the Bronx; Kings County Hospital in Brooklyn; and Metropolitan Hospital in Manhattan. The study team provided special diapers for meconium collection and helped to recruit the mothers and gain their verbal consent to participate in the study. The mothers spoke a range of languages that reflected the ethnic and language diversity in the hospitals’ catchment areas. All qualified to participate, regardless of their primary language, as long as their infant had not passed its first feces. If English was not a

INDUSTRIAL MAP OF NEW YORK CITY

Published by the Merchants' Association of New York in 1922—this map shows the various types of industry that once existed across the city. This deep history of manufacturing is one of the reasons why elevated metal levels can be detected in soil samples across the boroughs.

CREDIT: NEW YORK
PUBLIC LIBRARY

- WOMEN'S WEAR
- MEN'S WEAR
- FOOD PRODUCTS AND TOBACCO
- METALS AND METAL PRODUCTS
- PRINTING AND PUBLISHING
- DRUGS, CHEMICALS, PAINT, AND VARNISH
- LEATHER GOODS
- WOODEN PRODUCTS
- MISCELLANEOUS INDUSTRIES
- AVAILABLE FOR INDUSTRIAL DEVELOPMENT
- MIXED FACTORIES, BUSINESS, AND DWELLINGS
- ★ GAS PLANTS
- ★ ELECTRIC POWER STATIONS



woman's first language, then a closed-circuit hospital phone translator explained the study and obtained her consent.

Most of the quantifiable meconium samples came from full-term infants, and only a small number came from those born pre-term, before 37 weeks. All study subjects remained anonymous. The only personal data that researchers gathered was the zip code where each mother lived during her pregnancy, and each infant's gestational age and birthweight.

Of the 124 samples, 116 had enough meconium to conduct analytical analyses. In the meconium, researchers found detectable levels of nine metals: cadmium, chromium, copper, iron, manganese, molybdenum, nickel, lead, and zinc. Possible sources for elevated levels of these metals, in addition to diet, include emissions from power plants and waste incineration, exhaust from trucks and cars, deteriorating housing, and nearby brownfields. All but two samples contained measurable amounts of lead, while approximately half contained measurable levels of cadmium.

The study also identified "hot spots" for various metal combinations. For example, in the meconium of southeast Brooklyn newborns, researchers detected copper, zinc and iron; they found cadmium, chromium, and nickel in the meconium of babies born in eastern Queens; and they found aluminum and molybdenum in the meconium of babies born in south Queens. In the south Bronx, they found increased concentrations of lead.



A vacant lot in NYC. Deteriorating buildings and vacant lots/brownfields are possible sources for elevated metal levels in meconium.

CREDIT: NILS AGRELL



The Brooklyn-Queens Expressway in NYC. Vehicle exhaust is another possible source of elevated metal levels.

CREDIT: PAUL MCGEIVER

"Numerous studies have measured metal concentrations in meconium samples, but this study was unique due to the large number of metals it quantified, with different sources and biological need, among a convenience sample from a large urban population," Pavilonis, McDermott, and their team wrote in a paper that will appear in an upcoming issue of the *Environmental Research Journal*. "The fact that 39.7 percent of the samples had concentrations of the ten metals above the laboratory limit of

detection suggests that metal exposures are abundant in NYC," they wrote.

New York City, once a major industrial and manufacturing center, has a long history of metal contamination, Pavilonis explains. Over several decades, industrial byproducts, and other contaminants have accumulated to create the currently elevated levels of copper, zinc, and lead in soil citywide.

Most people are exposed to some level of the metals that the study found in meconium, says Pavilonis, an environmental health scientist and certified industrial hygienist. In fact, some metals, like copper, iron, manganese, molybdenum, and zinc are nutritionally necessary trace elements for pregnant women and their fetus. "During different phases of fetal growth, different nutrients are needed for development, so we do not want to completely eliminate exposure," he says. "Copper, manganese, zinc, iron, and chromium are all nutritionally necessary for growth and development."

At high concentrations, however, these metals are associated with a host of problems, including decreased birthweight, gestational diabetes, preeclampsia, preterm birth, intellectual disability, and autism.

"Neurodevelopmental disabilities are all multi-factorial, but we believe these metals are in the pathway that causes genetic

NEW YORK CITY, ONCE A
MAJOR INDUSTRIAL AND
MANUFACTURING CENTER,
HAS A LONG HISTORY OF
METAL CONTAMINATION.

”



changes that are associated with intellectual disability and autism,” McDermott says.

For example, the study found an association between lead concentrations and decreased birthweight. Lead, in particular, competes with calcium in the body. When women are exposed to lead, it enters their bones in the same way that calcium would, McDermott explains. During pregnancy, the normal process of drawing calcium from maternal bones to support fetal development also draws lead from these exposed women. Thus, in utero exposure to lead can lead to cascading physical and mental outcomes, including neurodevelopmental disabilities that are associated with reduction in the infant’s intelligence quotient (IQ). In addition to lead, aluminum and cadmium are toxic to the human body, and can cause permanent brain damage, she adds.

The problem is that there is no baseline data for what constitutes ‘elevated’ or ‘dangerous’ levels of individual metals. “It’s important to figure out when a metal that your body needs becomes too much of a good thing,” McDermott says. “We don’t know what those levels are. We’re trying to figure it out.”

Moreover, there is no data on the biological effects of metal combinations.

“Metal mixtures are always problematic,” Pavilonis says. “With a mixture comes the potential synergistic or additive health

effects that can occur at lower concentrations than those resulting from individual metals,” he says.

The study found some of the highest metal concentrations in some of New York City’s most socially and economically distressed geographic areas, which typically have high rates of racial and ethnic disparities in health and health care. For instance, Pavilonis notes, “Increased lead concentrations were detected in the South Bronx area, which also has a long history of poor health outcomes and racial, ethnic, and economic disparities.” The mothers in the study largely had low incomes and either government-subsidized or no health insurance, McDermott says. “The babies were most likely to have had exposures because of their parents’ occupations, the place where they lived, or natural disadvantage,” she says.

Linking socioeconomically disadvantaged neighborhoods with toxic environmental exposure is a major benefit of the study, as it may eventually help health-care providers offer patients ways to lower their risk of exposure by asking the health department to inspect their homes for lead, keeping their floors free of dust, which often contains breathable metal particulate, and using a HEPA filter at home to reduce airborne dust.

“Ideally a child should never be exposed to lead, but you want to catch the exposure

as early as possible to try to remediate situation, so you might send mom home with tips on how to lower lead exposure,” Pavilonis says. “If elevated mercury is found, then an individual should consider changing their diet and consuming less fish.”

One of the study’s greatest values is its identification of meconium as a reliable biomarker for measuring fetal exposure to toxic contaminants, says neonatologist Nadine M. Lahage one of the study’s NYCHHC co-researchers.

“This study has shown that metals are detectable in the meconium of NYC newborns, indicating exposure during the pregnancy via transplacental passage,” Dr. Lahage says. “Mothers can be exposed through various sources such as food, water or maybe skin products. Refining these results and correlating with neonatal health outcomes may help us find ways to prevent adverse neonatal outcomes related to metal exposure in NYC.”

Analyzing meconium is also more cost efficient than analyzing blood. Whereas a traditional approach to researching metal exposure would entail, among other things, paying a trained phlebotomist to draw blood and subjecting an infant or child to a blood test, meconium analysis is neither costly nor invasive.

“It’s easy for a trained individual to collect, which improves subject participation and decreases collection costs,” Pavilonis says.

He and his team have applied for funding from the Environmental Protection Agency to expand their current study into one that looks specifically for associations between metal mixtures and potential changes in the mother and child’s genetic code. They are also working on a grant to study whether fetal exposure to disinfectants increased during the height of the pandemic, when so many people were isolating at home. Pavilonis is also collaborating with Associate Professor Andrew Maroko on a study that examines how blood lead levels from specific zip codes correspond to lead in the soil.

For the present, however, they hope their establishment of meconium as a non-invasive, low-cost, and more comprehensive biomarker than blood for measuring maternal-fetal exposures to metals will give women the information they need to reduce theirs. Says Pavilonis, “We need to develop tools that are cheap and can be done quickly to assess fetal exposure to metals, and this is a good way to do it.”

RESEARCH BRIEFS

1



APRIL 2009



OCTOBER 2017

Measuring the impacts of gentrification on food environments

ABOVE: A corner grocery store at East 142nd Street and Brook Ave in the Bronx.

GOOGLE MAPS STREET VIEW

Research has shown that gentrification and its associated socioeconomic changes can be a factor in destabilizing food environments, affecting food access and health.

A new article by Associate Professor Nevin Cohen and University of Toronto colleagues Olivia Caruso and Michael Chrobok adds to the emerging literature on gentrification's effects on food environments.

The authors used Google Street View to record changes to all food stores in the Bronx between 2008 and 2017. During this period, the total number of food retailers grew by 11.4 percent, from 2,231 to 2,486 stores. By 2017, 619 new food stores had opened where food retail did not exist in 2008. Supermarkets increased from 161 to 190 while dollar or discount stores grew from 119 to 171.

To assess whether these changes differed in lower income, gentrifying, and more affluent neighborhoods, the researchers calculated the odds of food retail change by census tract type. They first analyzed all forms of food retail

instability, and then tested a novel index that weighted store openings and permanent closures more heavily than store name or retail segment changes.

The researchers found that while lower income and gentrifying census tracts had significantly higher odds of food retail change overall, there was no significant relationship between census tract type and instability when openings and closures were weighted most heavily.

The methods used in this study can be applied in other locations to track the status of retailers over time and across neighborhoods.

"Understanding which neighborhoods are most vulnerable to unstable food environments can help policymakers prioritize support for existing food businesses, identify emerging business segments, like dollar stores, that account for large changes to food environments, and ensure that zoning and development projects that alter the commercial landscape do not hinder food access for longstanding residents," Dr. Cohen added.

Olivia Caruso, Michael Chrobok & Nevin Cohen (2022): Gentrification and Food Retail Instability: A Census Tract Analysis of the Bronx, New York, 2008 and 2017, *The Professional Geographer*, DOI: 10.1080/00330124.2021.2000440

Occupational stress in marginalized care workers and the implications for societal health

The demand for home care aides is projected to grow by more than 30 percent over the next decade, making it one of the fastest growing occupations in the United States. Despite the demand, low wages and challenging working conditions have made it difficult to attract and retain these essential workers, a dynamic made worse by the COVID-19 pandemic.

CUNY SPH Associate Professor Emma Tsui and colleagues have conducted a series of studies over the last two years to further understand occupational stress, particularly around patient death, among home health aides and its impact on worker well-being and employee retention, resulting in five recently published articles.

“It is well known that home health aides often form strong relationships with their patients, which benefits patient care,” Professor Tsui says. “We found that aides often play a significant role in the end of a patient’s life, providing both practical and existential support, but often without being adequately informed about their patient’s health status or robustly trained for the emotional labor the end of life requires.”

The team’s research suggests that improved aide training on end-of-life issues, supervisor training for supporting aides, and dedicated paid time off following client death could meaningfully shift aides’ work stress related to client death.

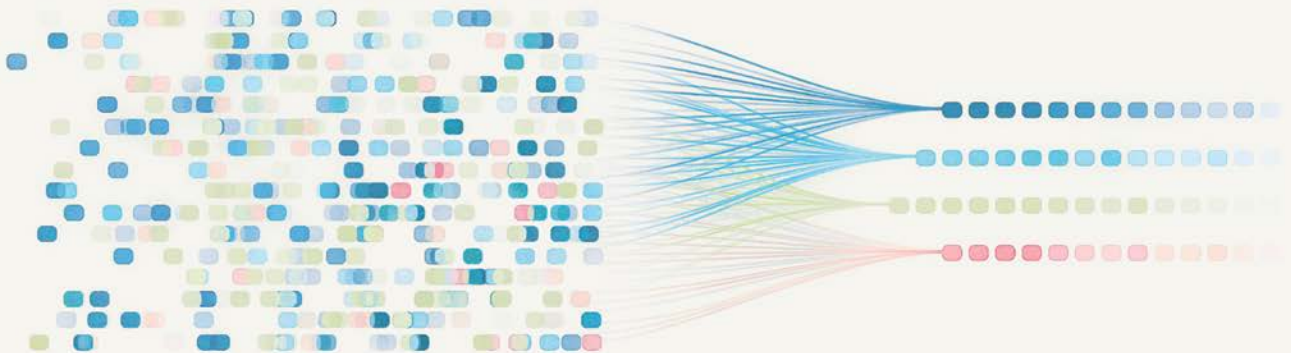
The published work includes: “Expanding the Conceptualization of Support in Low-Wage Carework: The Case of Home Care Aides and Client Death” published December 2021 in *International Journal of Environmental Research and Public Health*, Supplement: Work, Health, and Equity; “We want to hear your problems and fix them: A Case Study of Pandemic Support Calls for Home Health Aides” published February 2022 in *Home Care Services Quarterly*; and “Awareness, Acceptance, Avoidance: Home Care Aides’ Approaches to Death and End-of-Life Care” published March 2022 in *OMEGA – Journal of Death and Dying*.

Furthering the impact of this work, Professor Tsui and her collaborators published both a recent commentary in *New Solutions* calling for a new



EMMA TSUI

model for societal health that recognizes care-workers of all kinds and an invited editorial in the *American Journal of Public Health* highlighting important directions for public health research on worker well-being.



CUNY SPH researchers develop reporting guidelines for human microbiome research

The interdisciplinary nature of human microbiome research makes organization and reporting of results a challenge, while inconsistent reporting can make it difficult to replicate results and determine the comparability of independent studies. To address this problem, CUNY SPH Associate Professors Heidi Jones and Levi Waldron, along with doctoral candidate Chloe Mirzayi, led the development of a checklist to guide the preparation and review of manuscripts in human microbiome studies.

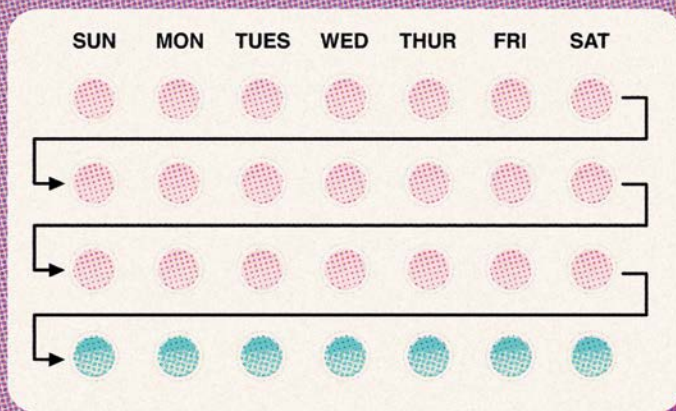
For the study, which was published in *Nature Medicine*, the researchers built a consortium of 101 authors from 89 institutions in 17 countries to refine and agree on the Strengthening The Organization and Reporting

of Microbiome Studies (STORMS) checklist and develop a consensus statement on the need for it. The consortium authors included nine faculty, staff, students, and alumni from CUNY SPH and the Institute for Implementation Science in Population Health (ISPH). Use of the checklist has been adopted by the *Nature* family of journals as a requirement of publication.

“I’m thrilled to see the field recognize that inconsistency of reporting in publication is a barrier to progress, and to see us take this first step towards improving that,” says Dr. Waldron. “This project actually started as a result of another ongoing project at our school to create a standardized database of the published

literature on relationships between the human microbiome and disease. I’ve supervised dozens of students who have reviewed and standardized the information from more than 500 published papers, and we’ve been forced to appreciate the difficulty often in understanding even the most basic elements of Methods and Results from published manuscripts. Once you get past the Abstract and Conclusions, it can be like the Wild West.”

Mirzayi, C., Renson, A., Genomic Standards Consortium. et al. Reporting guidelines for human microbiome research: the STORMS checklist. *Nat Med*. 2021 Nov;27(11):1885-1892. doi: 10.1038/s41591-021-01552-x. Epub 2021 Nov 17. PMID: 34789871.



First wave of pandemic kept many New Yorkers from obtaining needed contraception

During the first wave of the COVID-19 pandemic, many Americans encountered delays to medical care, including sexual and reproductive health services, prompting concerns over patients' ability to access contraception and maintain control over their reproductive lives.

To investigate factors associated with delays to obtaining contraception during the COVID-19

pandemic, CUNY SPH faculty Meredith Manze, Diana Romero, Glen Johnson, and doctoral student Sarah Pickering led a study published Friday in *Sexual & Reproductive Healthcare*.

Meredith Manze, Diana Romero, Glen Johnson, Sarah Pickering, Factors related to delays in obtaining contraception among pregnancy-capable adults in New York state during the COVID-19 pandemic: The CAP study, *Sexual & Reproductive Healthcare*, Volume 31, 2022, 100697, ISSN 1877-5756.

For the primary study, the researchers conducted a cross-sectional, web-based survey among individuals in New York State examining experiences with pregnancy during the pandemic, compared to those who were pregnant prior to the pandemic. The current analysis restricted the sample to all those not pregnant at the time of the survey and who reported seeking contraception.

Nearly 40 percent of these respondents reported delays in obtaining contraception due to COVID-19. The most frequently reported delays were new prescriptions for the pill, patch, or ring.

Health care and public health institutions should prioritize ensuring access to contraception during pandemics and other crises, the researchers say. Potential solutions include offering and promoting telemedicine visits, allowing prescription refills for a full year, dispensing several months' supply at a time, and allowing for the provision of contraception from pharmacies or online companies. Reducing financial barriers that help individuals maintain their housing and living necessities is also imperative, they conclude.

"Given the considerable changes in pregnancy desires during the pandemic, access to contraception is vital," says Manze. "It is essential for individuals to be able to control their own fertility, particularly in light of increasing restrictions on access to abortion."

Study: bullied children more likely to have asthma

Children with asthma are vulnerable to being bullied, but there is little research on whether being bullied might be associated with greater prevalence of asthma.

In a study published in *The Annals of Epidemiology*, CUNY SPH doctoral alumna Sharon Joseph, Distinguished Professor Luisa N. Borrell, and colleagues examined the association of being bullied within the past year with the prevalence of lifetime childhood asthma. Using nationally representative data on children ages six to 17 years from the 2018 National Survey of Children's Health, they also tested interactions of bullying with sex and selected socioeconomic indicators.

In adjusted analyses, the researchers found that children who experience bullying have a significantly greater probability of having asthma. The probability of childhood asthma increased with the frequency of bullying. The

association did not differ with the sex of the child or selected socioeconomic indicators.

"As a stress experience, bullying may trigger a physiologic reaction that may trigger asthma onset," Joseph explains. "For instance, studies have shown that exposure to stress can cause increased inflammation and airway obstruction leading to episodes of cough and wheeze—two cardinal diagnostic symptoms of asthma."

"Studies such as this one provide important information on the management of asthma to providers in primary care pediatric clinics and school health services as well as school administrators and educators when dealing with children with asthma who experience bullying, a non-traditional risk factor," Borrell says.

Joseph SP, Borrell LN, Lovinsky-Desir S, Maroko AR, Li S. Bullying and lifetime asthma among children and adolescents in the United States. *Ann Epidemiol*. 2022 Feb 22;69:41-47. doi: 10.1016/j.annepidem.2022.02.001. Epub ahead of print. PMID: 35202781.



Pandemic brings increased risk and decreased access to services for people who inject drugs

People who inject drugs are particularly vulnerable to the impacts of major events like pandemics, but there is little research to date that gauges the impact of the COVID-19 pandemic on this population.

For a study in the *Harm Reduction Journal*, CUNY SPH Accessible Care Project Director Yesenia Aponte-Melendez, Associate Professor Pedro Mateu-Gelabert, and colleagues examined how COVID-19 has affected people who inject drugs in New York City across four domains: substance use, risk behaviors, mental health, and service utilization.

As part of a randomized trial to improve access to hepatitis C treatment for people who inject drugs, the authors recruited 165

participants. For this analysis, the authors conducted follow up interviews with a subsample of 106 participants from March 2019 to March 2021. This time period was selected to ensure an equal duration between the pre-COVID-19 and COVID-19 periods to assess the impact of the pandemic.

Compared to the pre-COVID-19 sample, those interviewed during COVID-19 reported higher levels of mental health issues, syringe reuse, and alcohol consumption and greater reductions in syringe-service programs and the use of buprenorphine, a medication used to treat opioid addiction.

Placing dispensing machines of harm-reduction supplies in communities where people who inject



TRINN SUWANNAPHA / WORLD BANK

drugs live and increasing secondary exchange, mobile services, and mail delivery of supplies may help maintain access to lifesaving supplies during big events, such as COVID-19, the authors say.

“These findings highlight the need to support people who inject drugs and to expand mobile services to the communities where they live and congregate,” says Aponte-Melendez.

Aponte-Melendez Y, Mateu-Gelabert P, Fong C, Eckhardt B, Kapadia S, Marks K.

The impact of COVID-19 on people who inject drugs in New York City: increased risk and decreased access to services. *Harm Reduct J*. 2021 Nov 24;18(1):118. doi: 10.1186/s12954-021-00568-3. PMID: 34819070; PMCID: PMC8611635.

Study examines racial/ethnic disparities in exposure to COVID-19

Since the onset of the COVID-19 pandemic, researchers have noted a disproportionate burden of COVID-19 infection, hospitalization, and death among Black and Hispanic individuals in the United States. In March 2020, the CDC reported that twice as many Black individuals were hospitalized with COVID-19 than were proportionally represented in the U.S. These disparities may be attributed to long-standing health and social inequities.

To examine the influence of racial and ethnic differences in socioeconomic position on COVID-19 outcomes within a large U.S. national cohort, a team of CUNY SPH researchers including Institute for

Implementation Science in Population Health (ISPH) Investigator McKaylee Robertson and Distinguished Professor Denis Nash led a study published this month as a preprint in *medRxiv*.

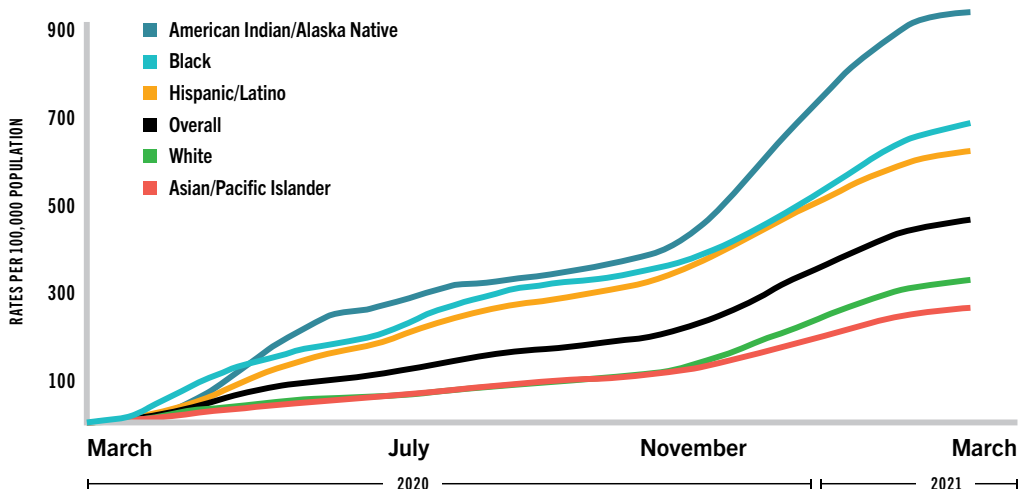
The researchers created three indices to assess socioeconomic position: ability to social distance as a measure of exposure to COVID-19, susceptibility to severe COVID-19, and healthcare access. The findings suggest that non-white participants have more exposure risk and more difficulty with healthcare access

than white participants. More exposure risk increased the odds of COVID-19 seroconversion. More underlying susceptibility and more difficulty with healthcare access increased the odds of hospitalization.

“This may explain the disproportionate burden of COVID-19 infections and complications among these populations,” said Robertson, the study’s lead author. “Prevention efforts should take into consideration disparities in COVID-19 exposure, vaccination, and treatment.”

This research builds on the authors’ earlier work with the CHASING COVID Cohort Study that showed persistent racial/ethnic disparities in seroconversion risk as well as elevated risk among essential workers.

Robertson MR, Shamsunder M, Brazier E, Mantravadi M, Rane MS, Westmoreland DA, Parcesepse AM, Zimba R, Maroko AR, Kulkarni SG, Grov C, and Nash D. Racial/ethnic disparities in exposure to COVID-19, susceptibility to COVID-19 and access to health care—findings from a U.S. national cohort. *medRxiv* 2022.01.11.22269101



Cumulative Rates of COVID-19-Associated Hospitalization by Race/Ethnicity

SOURCE:
THE CORONAVIRUS
DISEASE 2019
(COVID-19)-ASSOCIATED
HOSPITALIZATION
SURVEILLANCE
NETWORK (COVID-NET)



Exploring the role of COVID-19, race, and social factors on pregnancy experiences

“Pregnant women are particularly vulnerable to the pandemic’s effects on health care access.”

The COVID-19 outbreak and response disrupted all facets of everyday life, especially health care service delivery. Pregnant women are particularly vulnerable to the pandemic’s effects on health care access, and research shows that community-level traumatic events may impact maternal mental health and some perinatal health outcomes.

The pandemic has also illuminated the myriad health disparities that exist within the U.S. as communities of color across the country have been disproportionately affected.

In a study published in *Behavioral Medicine*, CUNY SPH faculty Diana Romero, Meredith Manze, Glen Johnson, and alumna Dari Goldman explored the association of race and various social factors on pregnancy-related behaviors among women in New York State, comparing those who were pregnant prior to with those who were pregnant during the pandemic.

Multivariate analyses revealed that individuals who were pregnant during the pandemic, lived in New York City, participated in social welfare programs, lacked health insurance, and/or were essential workers were more likely to report delays in prenatal and postpartum care and/or more changes or negative experiences around such care. Delays in accessing prenatal and postpartum care was between 20 and 30 times greater among those pregnant during the pandemic. In bivariate analysis, the team found race/ethnicity to be significantly associated with numerous health care access/utilization and other disparities, but the effect of COVID proved to obscure those events in multivariable analysis, necessitating further examination.

“These findings underscore the need for universal health insurance and improved social welfare programs, as well as improved access to prenatal and postpartum care for essential workers going forward,” Dr. Romero says.

Romero D, Manze M, Goldman D, Johnson G. The Role of COVID-19, Race and Social Factors in Pregnancy Experiences in New York State: The CAP Study. *Behav Med*. 2022 Apr-Jun;48(2):120-132. doi: 10.1080/08964289.2021.1997893. Epub 2021 Nov 8. PMID: 34743679.



Health Policy (CUNY SPH) along with a team from the National School of Tropical Medicine at Baylor College of Medicine. The team developed a computer simulation model of the entire U.S. that simulated the spread of Covid-19 coronavirus, subsequent outcomes of infection (e.g., symptoms, hospitalizations), vaccination, face mask use at the levels seen in the U.S. from March-July 2020, and the associated costs along the way.

"The messaging about face mask use has been inconsistent throughout the pandemic as there has been back and forth about the use of face masks," says Dr. Lee, executive director of PHICOR and the study's senior author. "There has been a tendency to focus on one intervention at a time. Instead, as long as the pandemic is continuing, there's a need to consistently layer multiple interventions on top of each other since each complement and enhance each other."

Sarah M Bartsch, Kelly J O'Shea, Kevin L Chin, Ulrich Strych, Marie C Ferguson, Maria Elena Bottazzi, Patrick T Wedlock, Sarah N Cox, Sheryl S Siegmund, Peter J Hotez, Bruce Y Lee, Maintaining face mask use before and after achieving different COVID-19 vaccination coverage levels: a modelling study, *The Lancet Public Health*, 2022, ISSN 2468-2667

Continuing face mask use could save U.S. billions of dollars

A study published in *The Lancet Public Health* by CUNY SPH Professor Bruce Y. Lee and colleagues suggests that consistently maintaining face mask use until reaching various vaccination coverage thresholds could not only

prevent a substantial number of cases, hospitalizations, and deaths but also end up saving businesses, the health care system, insurance companies, taxpayers, and others money. For example, maintaining face

mask use until the reproductive number of the virus (e.g., how contagious and infectious the variant is) is five and 80 percent of the population is fully vaccinated, we could save a total of \$2.9 billion in direct medical costs, the researchers say.

The study was led by the Public Health Informatics, Computational, and Operations Research (PHICOR) team at the City University of New York Graduate School of Public Health and

Study reveals reluctance among New York City parents to vaccinate young children for COVID-19

Almost 40 percent of New York City parents are hesitant to vaccinate their young children for COVID-19, according to a new study by researchers at the CUNY Graduate School of Public Health and Health Policy (CUNY SPH).

For the study, which was published last month in the *American Journal of Public Health*, Assistant Professor Chloe Teasdale and colleagues surveyed 2,506 New Yorkers with kids ages five to 11 years, two weeks after the FDA granted emergency use authorization of COVID-19 vaccines for school-aged children. In the representative survey, 12 percent reported that their child was already vaccinated and 51 percent reported being very or somewhat likely to get their child vaccinated. The survey also showed that eight percent of parents were not sure and 29 percent of parents reported they were not very likely or not at all likely to vaccinate their child.

This is concerning, says Teasdale, but the findings also yield information that can inform efforts to increase vaccine acceptability. One key result is that more than half of vaccine-hesitant parents do not believe children need COVID-19 vaccination, suggesting that greater awareness is needed about the risk of COVID-19 infection in children and their role in spreading the virus.

Enhanced efforts to increase parental awareness about the safety and efficacy of COVID-19 vaccination are needed in order to foster vaccine confidence, acceptance, and uptake, the authors say.

"It's been six months since the CDC recommended use of the Pfizer COVID-19 vaccine for



five to 11 year olds but currently only 40 percent of kids have been fully vaccinated in NYC," says Teasdale. "We need to do a lot more to get all school-aged kids vaccinated in order to protect them from infection and prevent severe disease. We hope that our findings with contribute to those efforts."

Teasdale CA, Ratzan S, Rauh L, Lathan HS, Kimball S, El-Mohandes A. COVID-19 Vaccine Coverage and Hesitancy Among New York City Parents of Children Aged 5-11 Years. *Am J Public Health*. 2022 Apr 14:e1-e6. doi: 10.2105/AJPH.2022.306784. Epub ahead of print. PMID: 35420899.



Study: Climate change may impede efforts to control ground-level ozone in urban areas

ABOVE: Ozone (O_3) is a highly reactive gas composed of three oxygen atoms. It is both a natural and a man-made product that occurs in the Earth's upper atmosphere.

Ground-level ozone (O_3) negatively impacts human health across life stages, natural ecosystems, and climate. Exposure to O_3 in early childhood affects the growth and function of developing lungs. O_3 exposures have also been consistently shown to increase asthma medication use, mortality, emergency room visits, and hospitalizations by exacerbating asthma and chronic obstructive pulmonary disease (COPD).

In a study for the journal *Atmosphere*, doctoral candidate and recipient of the 2021 Dean's Scholarship award Subrahman Singh and Professor Ilias Kavouras examined spatiotemporal patterns of ground level O_3 concentrations in the New York City metropolitan region between 2007 and 2017, together with local emissions of O_3 precursors and the frequency of wildfires.

The analysis showed increasing O_3 concentrations in sites within urban areas while concentrations in the areas surrounding the city have been declining.

"Unfortunately, ozone formation depends on the ratio of nitrogen oxides and volatile

organic compounds (VOCs) in a non-linear fashion," Kavouras explains. "Without considering VOCs composition and atmospheric conditions, reductions may lead to more O_3 . This is the case here."

Because of strategies and technologies aiming to reduce nitrogen oxides from cars, the relative abundance of nitrogen oxides (NO_x) and volatile organic compounds changed in a way that ozone production is now favored within urban areas, where ozone used to be low, and restricted in areas where ozone used to be high. In simpler terms, the mixture of air pollution within urban areas today is comparable to what suburban areas experienced in the past that led to ozone pollution.

These findings indicate that smart and targeted strategies are needed to effectively reduce the levels of all air pollutants.

"To mitigate increasing O_3 levels in densely populated areas, future emission control strategies should also consider the compounding global and regional effects of climate change," Singh says.

Singh S, Kavouras IG. Trends of Ground-Level Ozone in New York City Area during 2007–2017. *Atmosphere*. 2022; 13(1):114.

ADVANCING
IMPROVED HEALTH
AND SOCIAL
JUSTICE FOR ALL