

CITY HEALTH

SPRING 2023

TOPICS EXPLORED INCLUDE

HEPATITIS C • CANNABIS LAW • ENTREPRENEURSHIP
SYSTEMS SCIENCE • INCLUSIVITY • RESEARCH

AND MORE ...

AI-assisted precision nutrition



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Dean's welcome

Dear colleagues,

We are delighted to bring to you the 2023 edition of City Health, CUNY SPH's annual magazine highlighting the public health service and scholarship in which our dynamic faculty, students and alumni are engaged.

From eliminating hepatitis C in New York City, to applying an entrepreneurial mindset to public health solutions, to exploring the public health effect of legalized cannabis through the lens of historical injustice, racism and discrimination, impactful research is espoused in our mission. Our faculty and student research extends beyond the scholarly pursuit to provide frameworks for public policies that will result in better health outcomes in our city and beyond.

Public service is essential to public health and as such it is integrated into our curriculum. Taking their studies from the classroom to the field, our students work with organizations throughout our city to develop and implement projects that not only provide real-world public health experience, but can also have an immediate impact on our communities. In the last year, our students have created campaigns to bring health literacy and health insurance coverage to young New Yorkers, made nutritional education and resources more accessible to bilingual and underserved populations and contributed to the city's public health surveillance work by analyzing trends in overdose deaths throughout the city.

We continue to be one of the nation's best and most innovative schools of public health. This year we stand at number 15 out of 202 ranked schools and programs of public health nationwide, marking our rise to the top 10 percent of all schools in less than 10 years! This is a direct reflection of the critical role that our faculty, students and alumni play in partnering with government, policymakers, communities, health care providers and others to help address the pressing public health issues of our time.

We are immensely proud of our accomplishments in the past year and hope you will enjoy reading about them in this latest edition of City Health.

With my very best wishes,



Ayman El-Mohandes, MBBCh, MD, MPH
DEAN



PHOTO BY DMITRI KASTERINE

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The next generation of precision nutrition science

by INGRID FEENEY

In the coming few years, an Artificial Intelligence (AI) center is poised to revolutionize nutrition by enabling the precise tailoring of dietary guidelines based on an individual's genetics, biology, behaviors, social networks, environment and economic factors to better predict an ideal diet.

What is precision nutrition?

Precision nutrition is an emerging field that provides tailored dietary and nutritional recommendations for individuals based on their different characteristics and circumstances to prevent and treat diseases and improve overall health and well-being. Computer-aided approaches like artificial intelligence (AI) and modeling are central to achieving widespread precision nutrition as they can help to understand the complex factors and processes that affect and are affected by a person's diet and health, including genetics, biology, social networks, economics and environment.

CUNY SPH Professor Bruce Y. Lee is at the forefront of the field, applying AI approaches to rigorous precision nutrition science. He is executive director of the AIMINGS (Artificial Intelligence, Modeling, and Informatics for Nutrition Guidance and Systems) Center, which serves as the AI center for the National Institutes of Health (NIH) Nutrition for Precision Health (NPH) Consortium. AIMINGS seeks to implement computational and data science approaches and tools to advance nutrition for precision health in a way that accounts for all the complex systems that cross multiple scales, ranging from genetics, to biology, to individual behaviors, to social connections, to the environment.

"If you think about it, historically, a lot of the nutrition recommendations or dietary guidelines have been very general," explains Lee. "Everyone should be on such-and-such diet—and there's been growing evidence that's just not the case. Different people have different biologies. You have a different biology between different ages. Your circumstances can change what your physiology is like—the amount of exercise that you get, the type of job you have, the amount of stress that you have or where you're living. All these things and everything around you may affect what the ideal diet for you is and how well you can follow certain dietary recommendations. So, you really have to take into consideration everything in and around you, and that's why this precision nutrition initiative arose."



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BRUCE Y. LEE

A brief history of AIMINGS'S inception

In 2017 the NIH Office of Nutrition Research pulled together various experts for a roundtable to offer thoughts on potential nutrition research foci during the decade of 2020-2030. The roundtable, which included Lee, informed the NIH 2020-2030 Strategic Plan for Nutrition Research. Released in May 2020, the strategic plan emphasizes precision nutrition as an opportunity to improve scientific understanding of how individual human biology, environmental, social and behavioral factors interact to influence health, and how individuals respond to different diets.

In January of 2021, Lee was one of three co-chairs of a workshop called "Precision Nutrition: Research Gaps and Opportunities" held by the NIH to review what's known about the complex systems affecting nutrition and health and identify the current research gaps. Shortly after the

workshop, the NIH issued a request for abstracts to establish the NPH Consortium, including an AI center. Dr. Lee and his team applied for, and were awarded, the AI center grant and founded the AIMINGS center in January of 2022.

Who is AIMINGS?

Four leading institutions make up AIMINGS: CUNY SPH, the University of Southern California, the Stevens Institute of Technology, and Johns Hopkins University. The team brings a diverse set of backgrounds, including AI, machine learning and social network analysis across many disciplines in health and public health. Alongside Lee are Samantha Kleinberg, associate professor of computer science at the Stevens Institute of Technology, and Kayla de la Haye, associate professor of population and public health sciences at the University of Southern California, who leads AIMINGS's key projects. Marie Martinez and Jessie

Heneghan, both of CUNY SPH, coordinate AIMINGS's various scientific projects and core initiatives within the center, the NPH consortium and beyond. This mind-meld of team members brings a systems approach to precision nutrition.

What is the NPH Consortium?

The underlying assumption of precision nutrition is that not everyone responds to diet in the same way. Proceeding from that assumption, the aim of the NPH Consortium is to develop models and algorithms that better predict individual responses to food and dietary patterns.

NPH is recruiting a diverse pool of 10,000 participants who are part of the NIH's larger *All of Us* research program to provide data on genetics, microbiome, dietary intake, physical activity, sociodemographics and more.

The data will be collected, analyzed and stored across the NPH consortium's 15 centers around the country. These include clinical centers where participants in the *All of Us* program are recruited and enrolled into the Nutrition for Precision Health study; data generation centers which perform metabolic analyses and genetic analyses of microbiome samples from the human gut; and the *All of Us* Biobank, which receives, processes and stores biosamples and metadata.

The AIMINGS center will then use these data to develop models and algorithms that inform personalized nutrition recommendations.

Why AI?

Twenty years from now, we may look back and remember 2023 as the year the public really started paying attention to AI. With OpenAI's natural language chatbot ChatGPT upending universities and workplaces since the latter half of 2022, even if you lived under a rock, you'd likely have heard of AI by now. But what does "AI" really mean, and why is it necessary to improve nutrition science?

"The rationale is that if you think about nutrition, diet and health, it's a rather complex system," explains Lee. "It's not as simple as say, 'You have this characteristic; therefore, you eat this.' You have to consider many different types of factors and whenever things are more complex like that,



it's difficult for humans unaided to understand. So, the thought is that you could use computational approaches, like AI, to really help break down the complex system of interconnected factors and relationships in a meaningful way."

Lee notes that AI isn't one specific technology, but rather a broad term which essentially means you get a computer to do something that a human brain would normally do.

"The term 'AI' can cover many different things—simple decision making or very complex decision making, or a whole range of behaviors," he says. "That's one of the reasons why we really have to ask, 'What's going into this AI algorithm?'"

The AIMINGS center promotes an ethos of transparency in an emerging field where obfuscation is the norm. Lee continues, "There are many companies that have been coming out with these apps that tell you, 'Oh you should eat this.' And many times, we don't even know what's behind those apps to make such recommendations that can directly impact a person's well-being. This is why the NIH felt that we really need to advance these algorithms that are being developed in a way that everyone understands, is more transparent and clearer and upholds scientific accuracy and rigor."

In the case of AIMINGS, the use of AI enables a systems approach to nutrition, allowing a level of analytical complexity that Lee hopes will improve people's everyday lives and well-being in a concrete way.

"Our systems approach incorporates all these different factors and processes both within the body and outside the body," he says. "Some of these 'nutrition' apps will focus on very specific biological mechanisms within the body and ignore what's happening outside the body like accessibility, education and social networks—or sometimes the reverse is true. And we really want to look at the whole spectrum of things, both inside and outside the body."

The future of precision nutrition

One of the potential benefits of a computer-aided systems approach to nutrition science could be to provide more individualized and culturally sensitive care to people from diverse racial and ethnic backgrounds and in a variety of socioeconomic situations.



"The one-size-fits-all nutrition paradigm has failed many people," Lee observes. "For example, if you tell someone who is living in a low-income environment, 'You have to eat fresh organic vegetables every day!' Well, that's not realistic for many people. So, precision nutrition can take into account these different things to offer more appropriate and realistic recommendations."

Additionally, by using a systems approach, the team at AIMINGS is proactively combatting biases that can often seep into simpler or more opaque algorithms. If algorithms are trained using the old categories of racialized medicine, they carry the risk of exacerbating, rather than ameliorating existing disparities. When properly used, however, they can help us move past superficial categories to dig deeper and see what's really affecting nutrition and health.

"You don't want to clump everyone together," Lee says. "All women are not the same. All people of certain races and ethnicities are not the same. We don't want to mistakenly ascribe connections to things like demographic variables because that

can worsen racism and disparities. When we mistakenly attribute health issues to demographics it makes it seem like these things are baked into people's demographics when in fact it's something else that's happening. There has to be a real focus on the mechanisms that link dietary intake and nutrition and health, on really understanding what those mechanisms are and then the factors that affect them."

Precision nutrition embarks to revolutionize the way we approach food and health. In the coming years, this emerging field will become more mainstream and accessible as the costs of genetic testing and data analysis continue to decrease. The cutting-edge work being done today at the AIMINGS center sets the groundwork for a near future wherein technological advances and the increasing availability of personalized health data will enable healthcare professionals to provide patients with individually tailored dietary guidance, leading to more effective disease prevention and management and broad improvements in health outcomes and overall well-being.

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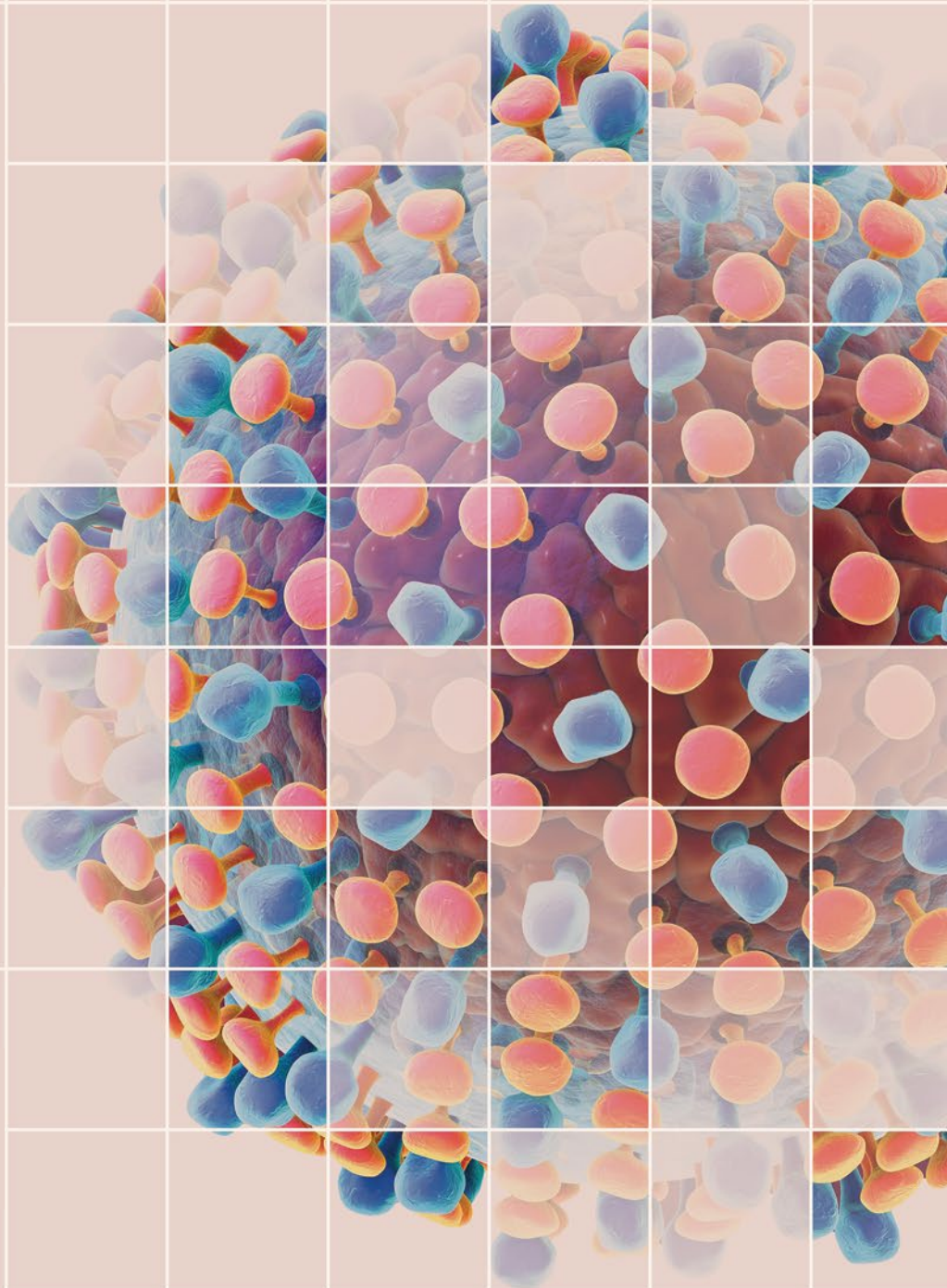
NYC

ELIMINATE

HCV?

*Two CUNY SPH
professors think
it's possible —
piece by piece*

by INGRID FEENEY



Globally, it is estimated that 58 million people live with chronic hepatitis C (HCV), with 1.5 million new infections occurring each year.

The blood-borne pathogen is most frequently spread through sharing needles or other equipment used to inject drugs, or through exposure to contaminated blood during medical procedures.

The hepatitis C virus can produce inflammation which may over time lead to scarring of the liver tissue (fibrosis), liver failure and liver cancer. While there is no vaccine for hepatitis C, treatment with direct-acting antiviral (DAA) therapy can cure the infection in more than 95% of cases. However, in many areas, and for certain populations, access to diagnosis and treatment remains low.

Given the high morbidity and mortality attributed to HCV, the World Health Organization (WHO) set a goal of eliminating the virus as a public health threat by 2030. This goal, launched in 2016, is now part of the WHO's broader Global Health Sector

Strategy on Viral Hepatitis, HIV and Sexually Transmitted Infections.

While significant progress has been made since 2016, the COVID-19 pandemic presented a tremendous setback for HCV elimination initiatives around the world. Currently, the U.S. is not counted among the 11 countries on track to meet the WHO goal, despite committing themselves to it at the World Health Assembly in May 2016. However, infectious disease experts at CUNY SPH believe that New York City is well positioned to eliminate hepatitis C as a public health threat by 2030.

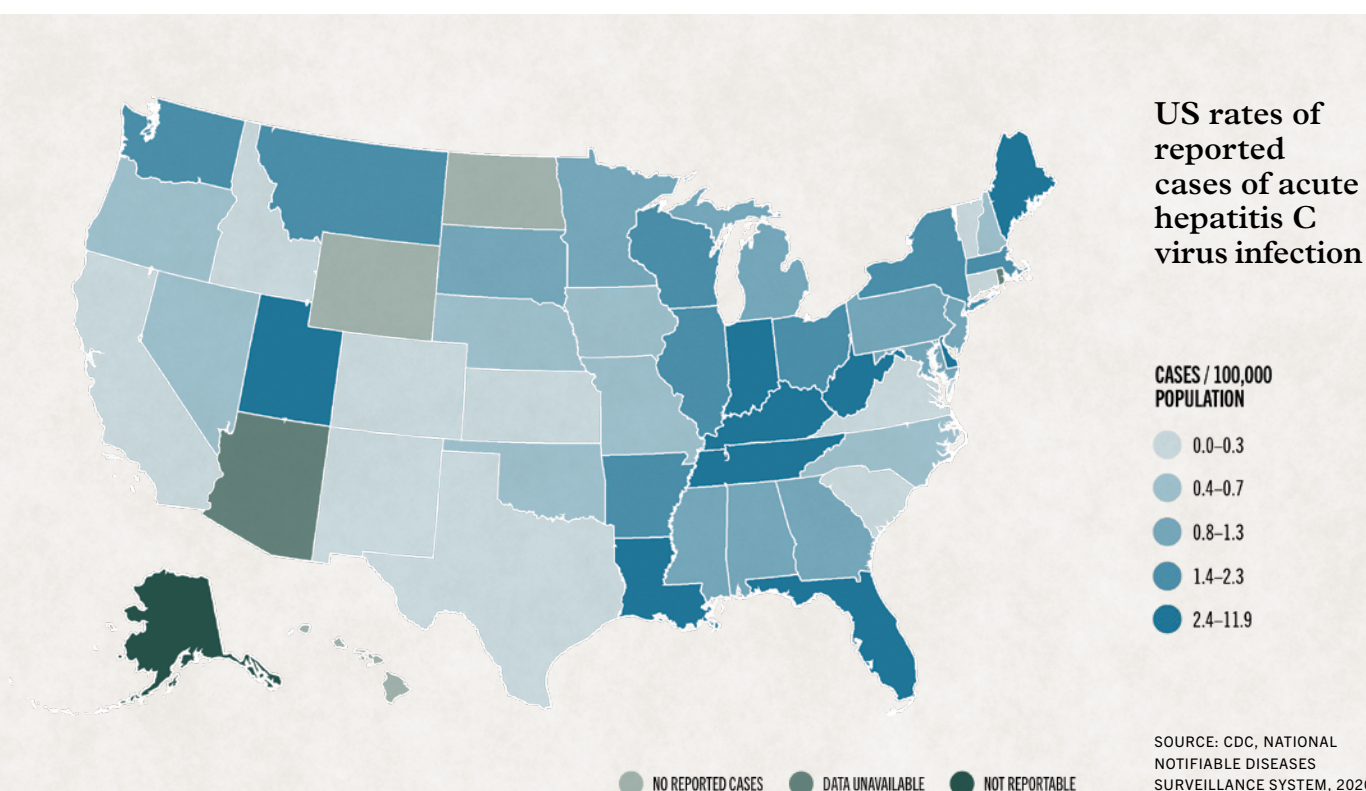
Dr. Jeffrey V. Lazarus, who joined CUNY SPH as professor of global health in January 2023, has on-the-ground experience in viral hepatitis elimination efforts in multiple European and African countries, including from the decade he spent working at WHO.

"There are estimates of over 90,000 people living with hepatitis C in NYC," he says. "That's a lot of people. But I have a good idea of what's possible and what the barriers are. I think hep C elimination is absolutely possible in the world by 2030, and in NYC much faster—particularly among certain populations and particularly in our hospitals."

Estimates indicate that over 1% of people treated in emergency rooms in New York City have hepatitis C.

"Improving testing in ERs, as well as among other populations who are already in our care is a good place to start," Lazarus continues. "For example, if you have HIV and are on antiretrovirals and being treated in a hospital in NYC and haven't been tested for hep C, that's a problem that we can address. A multi-pronged elimination plan can start in our hospitals by asking a series of questions, like 'should anyone pass through our hospital system with undetected hepatitis C?' I think most health care providers would say 'No.'"

Professor Lazarus' proposed strategy of addressing HCV infections in hospitals is an example of the micro-elimination approach that he developed while serving as vice-chairman of the board of the EASL International Liver Foundation. The approach focuses on particular





PEDRO MATEU-GELABERT



JEFFREY V. LAZARUS

populations, particular geographies, or sometimes a particular population within a particular geography.

“We launched the micro-elimination approach in 2017,” he explains. “It was really a response to countries saying it was going to be too complicated to eliminate hep C, and too expensive. So, we said, ‘Well, we need to start somewhere, so let’s focus on those with the highest prevalence.’”

Taking a micro-elimination approach doesn’t mean giving up on the broader goal of elimination. Lazarus says the ability to clearly demonstrate small successes is useful for generating the political momentum needed to eliminate the virus at a larger scale.

“We have incredibly effective drugs that cure more than 95% of the people who receive them,” he says. “The tools are there. It’s a matter of political will. The micro-elimination approach is a strategy to focus on small wins—and this can be particularly helpful in mobilizing hospital administrators and political leaders.”

Moving out of the hospital and into the community, a micro-elimination approach entails focusing efforts and resources on

populations already identified as having a high prevalence of HCV.

Dr. Pedro Mateu-Gelabert, a sociologist and associate professor of community health and social sciences at CUNY SPH, has been working with precisely such populations for over 25 years. An expert on opioid use among youth, he works on multiple interdisciplinary research projects focused on HIV and hepatitis C prevention among people who inject drugs (PWID) in New York, Puerto Rico, Colombia and across Latin America.

Mateu-Gelabert has sat on several committees on hepatitis C elimination organized by New York state government. Like Lazarus, he is optimistic about the prospects of eliminating the virus.

“Not only New York City but New York State has the goal of hep C elimination and I think that’s very commendable, and the plan is very aware of the necessity of specifically addressing hep C among people who inject drugs,” he says.

Dr. Mateu-Gelabert highlights the importance of increasing access to behavior change programs and harm reduction services across New York State to prevent new

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A hepatitis C rapid test showing a positive result.

HCV infections among PWID overall, and specifically emphasizes the need to focus on those between the ages of 18 and 29.

“Young PWID are becoming the new repository for hep C,” he says. “We need to facilitate and expand access to behavior change programs and harm reduction services that are more geared towards young people. Currently harm reduction programs are not fully reaching young people.”

One such innovative behavior change program geared towards young PWID is the Staying Safe (Ssafe) Intervention: Preventing HCV Among Youth Opioid Injectors. Mateu-Gelabert and Research Associate Professor Honoria Guarino are co-principal investigators of the ongoing NIDA funded research project.

Ssafe is based on four years of research among PWID in areas of high HCV prevalence to find out how some individuals remain virus free.

“After years of injection, there are some very proactive aspects to [some PWID’s] behavior that leads to them preventing hep C in a place where most people get it,” Mateu-Gelabert explains. “So, we did that research for a good four years and then I decided to package the content of this investigation, all those extremely savvy practices, and turn them into an intervention.”

The intervention consists of five sessions of 2.5 hours each, in which participants are provided with practical knowledge about HCV and overdose prevention. In addition, Ssafe participants have access to a mobile app.

“We created this app as a support system for young people, and now we’ve realized that it has huge potential to reach PWID across areas of the United States and the rest of the world where they are stigmatized, where harm reduction doesn’t reach or is prohibited by law,” Mateu-Gelabert says.

This innovative digital tool, which in its early stages is already reaching PWID in 15 states, is an example of the kind of decentralized healthcare services that can break down persistent barriers to HCV diagnosis and treatment posed by geographic isolation or social stigma.

Barriers to elimination?

Both Lazarus and Mateu-Gelabert acknowledge that while eliminating HCV in New York City is feasible, it will be neither simple nor easy. Mateu-Gelabert points out that it will necessitate addressing the problem in other areas.

“New York State is not isolated,” he says. “We know there is a lot of circular migration among PWID in New York and other parts of the US and other countries. The prevalence of HCV among PWID in Puerto Rico, for example, is completely off the chart—as high as 60%. If hep C is high elsewhere, that will have an impact in New York State.”

Lazarus advises that, when thinking about elimination as a target, it’s useful to remember that it doesn’t mean zero infections. “It’s always going to be a challenge in a city where there’s a lot of turnover in

the population,” he says. “But elimination doesn’t mean there are no new cases—it means pushing it down to a very low level. And once you have the system in place [to comprehensively test, diagnose and treat] it won’t be as hard to maintain, simply because there won’t be as many cases.”

Post-COVID opportunity

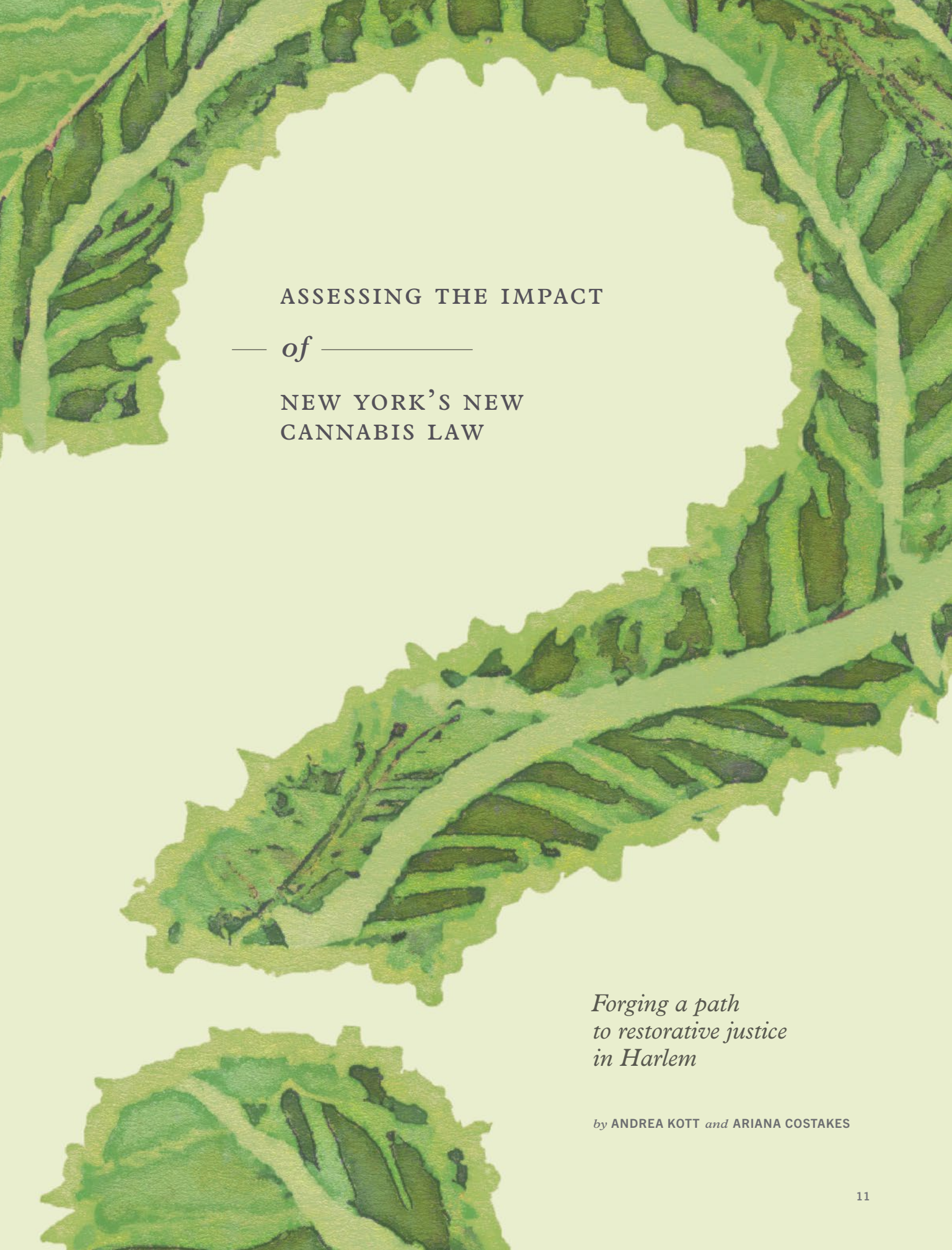
While COVID-19 has hindered HCV elimination efforts worldwide, it has also presented opportunities. The pandemic has highlighted the importance of investing in public health systems and led to greater recognition of the need for universal health coverage. There have also been efforts to leverage existing healthcare infrastructure to provide hepatitis C testing and treatment services alongside COVID-19 services.

“I think it’s an exciting and empowering time because the public now realizes that health-related quality of life is something they want,” says Lazarus, who recently convened 400 scientists from 100 countries to publish the Global Consensus Statement on Ending COVID-19 in the leading multidisciplinary scientific journal *Nature*. Lazarus sees the massive change wrought by the pandemic as an opportunity to expand the kind of decentralized healthcare services and infrastructures necessary to tackle HCV.

“Decentralized care is possible,” he continues. “It’s a change in thinking because we’re used to hospitals and clinics. It’s hard to walk down the street in New York and not see a rapid COVID-19 testing station. The rapid HCV antibody tests look very much like a COVID antigen test. They’re just as easy to use. We know that we could set up rapid antibody testing sites across the city. They’re cheap, so why don’t we do that for hepatitis C? That’s a political question. That’s an awareness question.”

Lazarus is new to the city and eager to collaborate with those already involved with hepatitis C elimination efforts.

“It’s exciting to be here and start meeting with the people already engaged in this,” he says. “So, I’ll be looking forward to collaboratively setting reasonable targets for the city including having the right policies in place. This is about unifying, convening, bringing people together and saying, ‘we can actually do this in NYC and set an example.’”



ASSESSING THE IMPACT

— *of* —

NEW YORK'S NEW
CANNABIS LAW

*Forging a path
to restorative justice
in Harlem*

by ANDREA KOTT and ARIANA COSTAKES

As part of its Marijuana Regulation and Taxation Act (MRTA), which legalized adult possession and use of marijuana and created a pathway for recreational sales, New York State will grant the first retail dispensary licenses to individuals with documented marijuana offenses. This provision will ostensibly bring revenue, equity and restorative justice to people and communities historically impacted by racially charged drug laws.

Yet this bold new law, which has thus far granted only provisional retail licenses, has triggered concerns about the potential impact on communities like Harlem, where an oversaturation of tobacco and alcohol outlets have historically undermined public health efforts. Fueling these concerns are the dozens of unlicensed dispensaries that have popped up in neighborhood grocery stores and bodegas since the law passed.

While city and state officials are working to manage the industry rollout in a manner that accounts for historical injustices, public health concerns remain, as cannabis poses demonstrated risk to children, adolescents and pregnant women.

To address these concerns, Assistant Professor Sean Haley, Harlem Health Initiative Director Deborah Levine and CUNY SPH students Ashima Mahajan and Tomisha Hicks launched an exploratory, multi-year study to assess community perceptions of the potential health, social and economic benefits and harms of cannabis, as well as perspectives about justice, racism and discrimination. The study will create a baseline of information to help the researchers and Harlem residents better understand how the legalization of cannabis might impact their community.

"Reliable data is the bedrock of any good public health program design, implementation and evaluation," says Mahajan. "I have heard from many people that there is a proliferation of unlicensed smoke shops that sell cannabis in Harlem. But without actual

SEAN HALEY



DEBORAH LEVINE



ASHIMA MAHAJAN



TOMISHA HICKS





Jasmine Burems and King Aswad, co-owners of Claudine Field Apothecary farms in the Hudson Valley, walk through their farm as they give a tour to the NYS Office of Cannabis Management (OCM).

The farmers received a Conditional Cultivation license and are one of the first Black farmers in the legal adult-use cannabis industry. The OCM was created following the passing of the Marijuana Regulation and Taxation Act in March, 2021. The office upholds a framework for the production, licensing, packaging, marketing, and sale of cannabis for both medical and adult use in New York.

PHOTO BY MICHAEL M. SANTIAGO/GETTY IMAGES

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data, it is difficult to highlight the gravity of the situation. That’s what this study is doing, bringing clarity with data that would inform future interventions.”

The cannabis law

Federal law prohibits the manufacture, distribution, dispensation, and possession of cannabis, which it classifies as a Schedule I drug, meaning it has no currently accepted medical use and a high potential for abuse. This classification, along with cannabis law enforcement, for years contributed to structurally racialized disparities and inequities, especially among Black, Indigenous and People of Color through arrests and convictions, taking a serious social, economic and psychological toll on communities.

New York’s MRTA makes it legal for adults aged 21 and older to possess up to three ounces of cannabis and up to 24 grams of concentrated cannabis for personal use. In addition to wiping cannabis convictions from individuals’ records, the law created the New York State Seeding Opportunity Initiative, which prioritizes 50% of the first licenses to operate legal adult-use retail dispensaries and sell cannabis products grown by New York farmers for individuals and communities who were disproportionately affected

by cannabis criminalization, including minority-, women-, service-disabled veteran owned businesses, distressed farmers and nonprofit organizations that support the formerly incarcerated. The law also waives, reduces or defers license fees; awards grants to nonprofit and community-based organizations in communities that suffered disproportionately from cannabis prohibition and develops and implements statewide public education campaigns and substance use disorder treatment programs for youth and adults.

Even though the Cannabis Control Board, the regulatory arm of the MRTA, has approved numerous provisional licenses, only a scattering of recreational dispensaries exist. Thus, there is a sizeable knowledge gap about how a sanctioned cannabis marketplace might affect communities like Harlem.

“Part of the public health concern about authorizing cannabis dispensaries comes from what we have learned about tobacco and alcohol, especially the relationship between greater availability and early use by young people whose brains are still forming,” Haley says. “The relationship between alcohol outlet density and harms is another part of the concern. Now that cannabis is legal, what number of dispensaries per population represents a tipping point? And how does greater cannabis



Smacked Dispensary NYC's owner Roland Connor is shown products by his son Darius Connor as he prepares to make the store's first purchase on January 24, 2023 in New York City. Smacked Dispensary NYC is the second legal recreational cannabis dispensary to open in NYC after its owner Roland Connor was granted a Conditional Adult-Use Retail Dispensary. The dispensary is also the first to be owned by a person with a prior marijuana conviction.

PHOTO BY MICHAEL M. SANTIAGO/GETTY IMAGES

OVER TIME,
THIS STUDY WILL
SHOW WHAT
HAPPENS WHEN
WE ACTUALLY
DO THE WORK OF
GIVING BACK TO
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HOW THEY CAN
BE REVITALIZED.
WHAT WILL CRIME
AND ECONOMIC
GROWTH IN
HARLEM LOOK
LIKE OVER TIME?

”

Images captured from a recorded livestream of a walk through Harlem between 145th and 135th streets via Broadway (June 3, 2022).

LIVESTREAM BY
YOUTUBE USER
@WALKRIDEFLY



availability interact with increasing alcohol availability or tobacco, especially in neighborhoods that have been over-saturated?

To kick off the study, Haley enlisted his Policy Analysis students to assess how the MRTA compared to evidence-based public health practices gleaned from other states and conduct key informant interviews and equity analyses to devise a policy brief with recommendations. In a subsequent course, Holly Anger and Britany Nkashama, students from the Survey Methods class, developed a survey instrument that included items about perceptions of equity, discrimination and cannabis use and its perceived pros and cons.

Hicks serves as project manager and liaison between the CUNY SPH study staff and the community boards and nonprofit organizations they are interviewing, while Mahajan curates the data.

“Right now, there is a lot of misunderstanding about what cannabis legalization looks like,” Hicks says. “What is a legal dispensary? Where can they be located? What kind of advertising can go on a package of cannabis? Will these perceptions change over time?”

After collecting initial data—survey findings about community perceptions of cannabis—the study will observe how it changes once legal dispensaries are in place and operating.

“A huge part of New York’s cannabis legislation is the social and economic equity piece, giving back to these communities by granting them dispensary licenses as well as through tax revenue,” Hicks continues. “Over time, this study will show what happens when we actually do the work of giving back to communities and how they can be revitalized. What will crime and economic growth in Harlem look like over time? This study will inform social and equity policy and even how government creates the policy.”

The Cannabis Consortium

In light of New York’s new law, the Harlem Health Initiative (HHI) at CUNY SPH, under the leadership of Director Deborah Levine, saw a need for partnership among community groups, elected officials, and academic institutions to develop avenues for community-responsive cannabis education and resources. Together with the Manhattan Boro President’s office, Manhattan

Community Board 10, the Harlem Business Alliance, the nonprofit Marcus Meets Malcolm and the for-profit FOY, CUNY SPH students and faculty founded the Cannabis Consortium to meet these goals and, most importantly, to ensure that Harlem community members are at the forefront of cannabis conversations. Together these players are working to understand Harlem neighborhood cohesion, community perspectives, and community health related to cannabis, by way of scientific research, webinars, workshops, and community outreach. This work will inform development of education and resources for community groups, help legislators understand saturation of cannabis dispensaries in Harlem, encourage collaboration among groups for advocacy efforts, and ensure equity and community voices are prioritized in cannabis legalization work.

“What has made this project a success so far is the exchange of in-kind contributions between the CUNY SPH staff, partners, and graduate students,” says Levine. “These in-kind contributions aid in improving the sustainability of the project in various ways. By working on the project, graduate students bridge the gap between theory and practice by applying the public health knowledge and skills learned in the classroom in the real world.”

In the Cannabis Consortium, students gain real-world exposure to the collaborative process with the community by working with the projects partnerships to develop key deliverables that will be used by the community. The project enables students to recognize firsthand the historical impact of power and its subsequent systems have on the social determinants of health of marginalized communities.

The Gil Addo Harlem Health Fellowship

Sponsored by RubiconMD CEO and co-founder Gil Addo, the Gil Addo Harlem Health Fellowship gives CUNY SPH students the opportunity to engage with the community through outreach for a variety of community-based research projects and initiatives under the Cannabis Consortium umbrella. Working as project managers for the Cannabis Consortium, fellows can streamline their data gathering, analysis, database assembly, and database management skills. Fellows support and

communicate directly with community partners, assist with research on health and wellness indicators for Harlem, and develop health communication materials.

“The role of the fellows as project managers has been extremely crucial to the project and the student’s workforce development,” Levine says. “Acting as a liaison between the project and community members, leaders, organizations, elected officials and other capstone students, fellows monitor project progress, encourage collaboration between stakeholders, and participate in community outreach events.”

To graduate with an MPH in Community Health and Social Sciences at CUNY SPH, students must complete a two-semester long Capstone project based on experiential education. The Capstone students are a crucial group to the success of the Consortium, Levine says.

“They have played an integral role in mapping Harlem’s current landscape of cannabis dispensaries and developing surveys for community members and will conduct research to understand community-level impacts of cannabis on neighborhood and individual health,” she says.

By centering community engagement principles in their work, the students learn the history of cannabis and cannabis-related laws in Harlem and their impact on public health, how to center community members in public health work, methods for advocating for equity in public health, and how to be flexible and adaptive when working with many stakeholders.

“This work with HHI has guided me to an understanding that the public health knowledge I am gaining can be applied in a variety of ways in a multitude of industries,” says Hicks, a Gil Addo Fellow. “It has also shown me the importance of having public health workforce representation in these industries promoting community collaboration. This subsequently aids in us moving toward our goal of health equity.”



***FIREFLY
INNOVATIONS***

***TRANSFORMING
PUBLIC HEALTH
THROUGH
ENTREPRENEURSHIP***

by MARGARET W. CRANE

Traditionally, the worlds of public health and entrepreneurship don't significantly overlap, but Professor Terry Huang has set out to change that through a bold initiative called Firefly Innovations. The platform, a marriage of public health expertise and the entrepreneurial mindset, is based at CUNY SPH and extends outward to a growing network across the globe.



The entrepreneurial mindset is about leadership, bold ideas and a willingness to take risks. TED Talk star Brené Brown, in her recent film on the theme of “courage,” quotes President Theodore Roosevelt, who said that courage, a key component of risk-taking, means “daring greatly.” And that in turn means allowing yourself to fail.

Huang agrees. Embracing the challenge of innovation means failing often and rapidly, learning from our failures and finding our way to solutions that work.

It all started in 2019, when Huang and Alessandro Ciari, a CUNY SPH student at the time, met serendipitously one evening off-campus. Ciari introduced himself and mentioned that he had worked on a waste management startup prior to doing his MPH degree. Huang was pleasantly surprised that an MPH student had entrepreneurial experience and proceeded to describe his own vision of creating an entrepreneurship program at the school. He invited Ciari to sit down with him to sketch out what such an initiative would look like.

During several conversations, the two men found common ground. Tackling today's complex and seemingly intractable problems in public health, they agreed, would require an all-hands-on-deck approach that engages the public, non-profit and private sectors, as well as people with lived experience in affected communities. These latter innovators, Huang says, often become some of the most passionate, effective entrepreneurs of all.

What is Firefly Innovations?

The goal of Firefly Innovations is to “identify, cultivate and accelerate impact-driven public health ventures.” Instead of the top-down approach that is often integral to the public health paradigm, Huang advocates a bottom-up strategy that places patients and others with lived experience at the center of the process.

Huang named the platform “Firefly” because the tiny creature's many diverse species echo the diversity of the startup founders the organization serves. As well, the firefly is universally recognized as a symbol of light, hope and inspiration.

Firefly Innovations, a unique public health entrepreneurship platform housed within CUNY SPH, offers courses, trainings, fellowships and a Summer Accelerator, which Huang describes as “an intensive eight-week session during which we work with competitively selected public health startups.” The idea is to prepare them to access the market and scale up their ventures for maximum impact. After participating in the accelerator, many ventures have gone on to successfully secure new business, contracts, funding, partnerships and team members.

Launched officially in 2020, Firefly Innovations has a strong focus on solutions that advance health equity. It has been particularly successful at drawing in women and minority startup founders. Of the roughly 50 ventures that have been actively supported

or accelerated, over 90% have at least one minority founder and half are women-led.

Ciari served as a program manager and later as an assistant director for the platform until early 2023, when he joined a private company, called coLab, that consults for venture funds and helps accelerate innovative solutions for corporations. This year, Firefly Innovations contracted with coLab to assist in operating the 4th annual CUNY Public Health Innovation Accelerator, centered on the theme of health equity.

The professional connector

With growing momentum, and with a focus on scaling Firefly's impact and ensuring the platform's long-term sustainability, Huang recruited entrepreneur W. Michael Short to serve in the newly created position of Managing Director. Huang and Short met in late 2022 while serving as judges of a pitch competition at the New York Artificial Intelligence Summit and Short started his new



W. MICHAEL SHORT

role with CUNY SPH in January of this year. With a background in economic development, community engagement, and scaling organizations and ventures, Short brings a lot to the table, Huang says, including a holistic view of creating lasting change.

"He's the one able to make connections and put together all the disparate pieces of a public health venture to optimal effect," says Huang.

"Terry and I share a firm belief in the entrepreneurial ingenuity of the American people and by supporting community entrepreneurs with bold ideas, market-based solutions, and unwavering determination, we can solve the cascading crisis of public health challenges that we face," said Short. "Entrepreneurship has the power to revolutionize public health by driving innovation and fostering collaboration in order to create a healthier and more resilient nation and world."

Short sees connections and opportunities wherever he looks. For example, the software used by a dating service turned out to be just the ticket for a new app that matches startups with funding opportunities. Accustomed to thinking big, he's always on the lookout for linkages and interdependencies between public health and other sectors that might at first seem unrelated but are connected at a deeper level.

In addition to his entrepreneurial ventures, Short's new role with CUNY SPH builds on his existing work with CUNY at Medgar Evers College School of Business where he served as Managing Director of the International innovators Initiative, which was a joint initiative of CUNY, the City

of New York, and NYC Economic Development Corporation that focused on recruiting the most promising entrepreneurs throughout the world to relocate to NYC and to work with CUNY campuses.

The shortcomings of traditional public health

"With all our expertise, public health is traditionally slow to act. We're dependent on grants, for one—and that's fine when it comes to funding research and formulating policies based on our findings, but it isn't a sustainable approach," Huang says.

Short seconds that view, saying "grants are fine in certain circumstances, but public health solutions need to have viable business models that can be scaled up."

Ultimately, all initiatives, whether non-profit or for-profit, need to generate sufficient resources to be viable, Huang adds. While public funding is critical, it is simply not enough to meet the needs of public health.

The systems-level change the two men have in mind will require the active engagement of academics, communities, government actors and the private sector to spur investment in public health. Aligning the interests of these diverse stakeholders is at the heart of the way Firefly Innovations operates.

An urgent need to scale up public health solutions

In an article published in *Frontiers in Public Health* in May 2022, Huang and his co-authors use obesity as a prime

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example of a population health problem whose complexity has foiled all of his field's best policies and interventions. In the U.S. alone, the prevalence of obesity grew from 30.5% in 1999-2000 to 42.4% in 2019-2020. As a major contributor to cardiovascular disease, diabetes, respiratory disease and some cancers, obesity is a greater scourge than ever.

It can take more than a decade to scale up public health innovations, and most of our research never gets that far, Huang says. That's unacceptable. What's needed is a way to scale up innovative interventions and practices so that these are adopted quickly at a systems level.

"To create systems change, we need an army that sits across all the different sectors of society and can be summoned to take action," says Huang, whether on the obesity front or elsewhere on the battleground of public health.

An inside-outside strategy

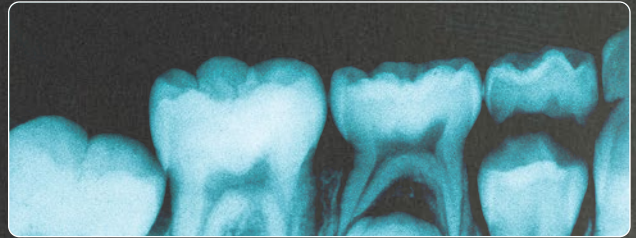
Huang considers himself an "intrapreneur"—an entrepreneur who works from within; in his case, inside the public health academy.

In addition to the Summer Accelerator, Firefly Innovations has also designed courses and opportunities that provide hands-on experience for students, taught by faculty with deep experience in design thinking and startup ventures; faculty like Bruce Y. Lee, professor of health policy and management, who teaches a semester-long class on public health entrepreneurship. By integrating courses into the traditional public health curriculum, CUNY SPH is setting itself apart from its peer institutions by sending a new generation of public health graduates out into the world who are uniquely equipped to step into leadership roles and transform the organizations where they work.

Public health students and experts urgently need entrepreneurial skills, Huang says, but the converse is also true: businesses need the "public health lens"—the lens on health equity and the social determinants of health—as well as public health skills such as impact monitoring and evaluation. Embodying the principle and practice of innovation, Firefly Innovations is itself poised for growth, both inside and outside the academy.

SUCCESSFUL VENTURES

Here are just a few of the ventures that have gotten off the ground in a big way, thanks to Firefly's Summer Accelerator program:



KELLS provides accessible, high-quality dental screening by combining clinicians and AI, making world-class dental care far more accessible. The company secured two significant contracts with health plans and won the New York Artificial Intelligence Summit pitch competition in December 2022.



Flextrapower is developing a multi-layer, graphene-infused textile mask for blocking COVID-19 viral particles. The startup received a \$4 million grant for further research and development.



Mendū is a mental health platform that offers therapeutic audio-based prompts and exercises for underserved women. The startup has recently added seven new team members, plus they will soon launch the second iteration of their platform with additional features and functionality.

DATA FOR THE PEOPLE

by
MARGARET W.
CRANE

A CUNY SPH
RESEARCH TEAM
IS USING SYSTEMS
SCIENCE TO HELP
MITIGATE THE
OPIOID CRISIS

Associate Professor
Nasim Sabounchi,
pictured in front of
a causal feedback
loop diagram.



Since 1999, there has been a 400% rise in drug overdose deaths, and 70% of that increase occurred in 2019 alone. Then, in the early phase of the COVID-19 pandemic, from April 2020 to March 2021, the incidence of opioid overdose deaths increased by 32%.

That is the alarming context for a potentially game-changing research project at the CUNY SPH Center for Systems and Community Design led by its director, Professor Terry Huang, and Associate Professor Nasim Sabounchi. The team has been capturing the complexities of the opioid crisis in real time and in real communities. Their first set of findings were published in the March 2023 issue of the journal Research on Social Work Practice (Vol 33 Issue 3).

The work is part of the HEALing Communities Study, in which CUNY SPH researchers are collaborating with their counterparts at the Columbia University School of Social Work in an effort to reduce opioid overdose and deaths across 16 communities in New York. The study is part of a congressionally mandated program across 67 communities in four states (Kentucky, Massachusetts and Ohio in addition to New York) to mitigate the opioid crisis, administered by Substance Abuse and Mental Health Services Administration (SAMHSA) and the National Institute on Drug Abuse (NIDA).

Representing the New York State arm of the study, Professors Huang, Sabounchi and colleagues have developed a systems science simulation model that differs sharply from the traditional, linear approach. The latter is valuable for analyzing the relationship between two single variables—say, a drop in price for a certain product and the number of units sold. But the opioid crisis is nothing if not complex. Accordingly, the CUNY system dynamics model takes into account the relationships and interdependencies between evidence-based practices, diverse community stakeholders, social determinants

and, importantly, social forces such as stigma—all of which may change and interact in unforeseen ways.

“We see our model as a virtual laboratory, where different community interventions can be tested,” Huang says. “Our methodology may be generalized to other public health topics and settings. That’s the beauty of the systems science approach.”

The role of communities in the process

While the list of stakeholders may vary from community to community, it typically includes law enforcement, criminal justice agencies, first responders, health professionals, patient advocates, families, social service organizations, clinical sites,

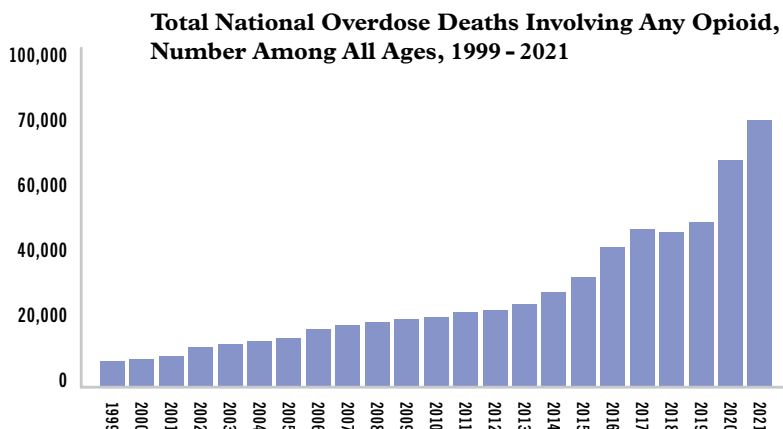
emergency departments, local officials and people with lived experience.

Some or all of the above were invited to join community coalitions in eight of the 16 communities in New York State during “wave one” of the study. Wave two, still underway, will focus on the eight remaining communities. Also in wave two, the researchers will shift from qualitative to quantitative modeling.

In both waves, community coalitions are the indispensable research partner and, hopefully, the ultimate beneficiary of any reduction in opioid overdose and deaths, both during the data-gathering period and after the project comes to a close. Via interviews with coalition members plus meeting notes, the research team collected the data that would inform their model and shared their discoveries regularly.

Originally, the researchers planned to go into the communities in question. That would have allowed the team to pursue a more participatory approach to systems modeling, “but COVID made that impossible,” says Associate Professor Nasim Sabounchi, the study’s first author. “However, we found other ways to solicit input from stakeholders that led to real-time revisions in the model at every stage.”

“For instance, the supply of opioids changed radically with the shift from prescription opioids to heroin and, most recently, to fentanyl,” Dr. Sabounchi continues. “Fentanyl is so potent that it’s equivalent to a huge increase in supply.



SOURCE: CENTERS FOR DISEASE CONTROL AND PREVENTION, NATIONAL CENTER FOR HEALTH STATISTICS. MULTIPLE CAUSE OF DEATH 1999-2021 ON CDC WONDER ONLINE DATABASE, RELEASED JANUARY 2023.

More deaths occurred in 2022 than in 2021, which was the worst year of the opioid epidemic thus far. That increase had everything to do with the flood of fentanyl into communities.”

As Huang explains, “Our model showed that the uptick in deaths during the pandemic would likely have happened anyway, due to the vastly greater potency of fentanyl, although a proportion of the increase in deaths is also linked to social isolation and deteriorating mental health early in the COVID pandemic.”

Evidence-based practices

Specialists have long advocated for the three best practices used to stem the tide of unintentional overdose and death: opioid overdose education and naloxone distribution; medication treatment for opioid use disorder and safe prescribing of opioids.

What became clear to all concerned was the interconnectedness of the community system underlying the opioid crisis. A collective and cross-sectoral approach will be needed to address its complexities.

A siloed approach—one that focuses on one group or one treatment modality—is doomed to fail, the researchers say. The systems model results by the CUNY SPH team shows that in order to succeed in reducing opioid use disorder, overdose and deaths, all three of the evidence-based practices listed above need to be provided in tandem, along with much greater prevention efforts to reduce opioid exposure, as they work synergistically.

Causal feedback loops

The interrelationships between complex variables have been visualized in causal loop diagrams based on the input and collaboration of eight communities during wave one of the study.

When depicted visually, these diagrams can look like tangled webs with arrows pointing every which way. That, the researchers say, is what life looks like as well. For ease of use, the research team synthesized eight diagrams into one generalized image.

Feedback loops are extremely valuable for anticipating unintended consequences. For example, what if more people with opioid use disorder start entering treatment—a desirable outcome on the face of it—but the community has limited capacity to

treat them? Should that be the case, communities might be motivated to advocate for new policies and increased funding for treatment centers.

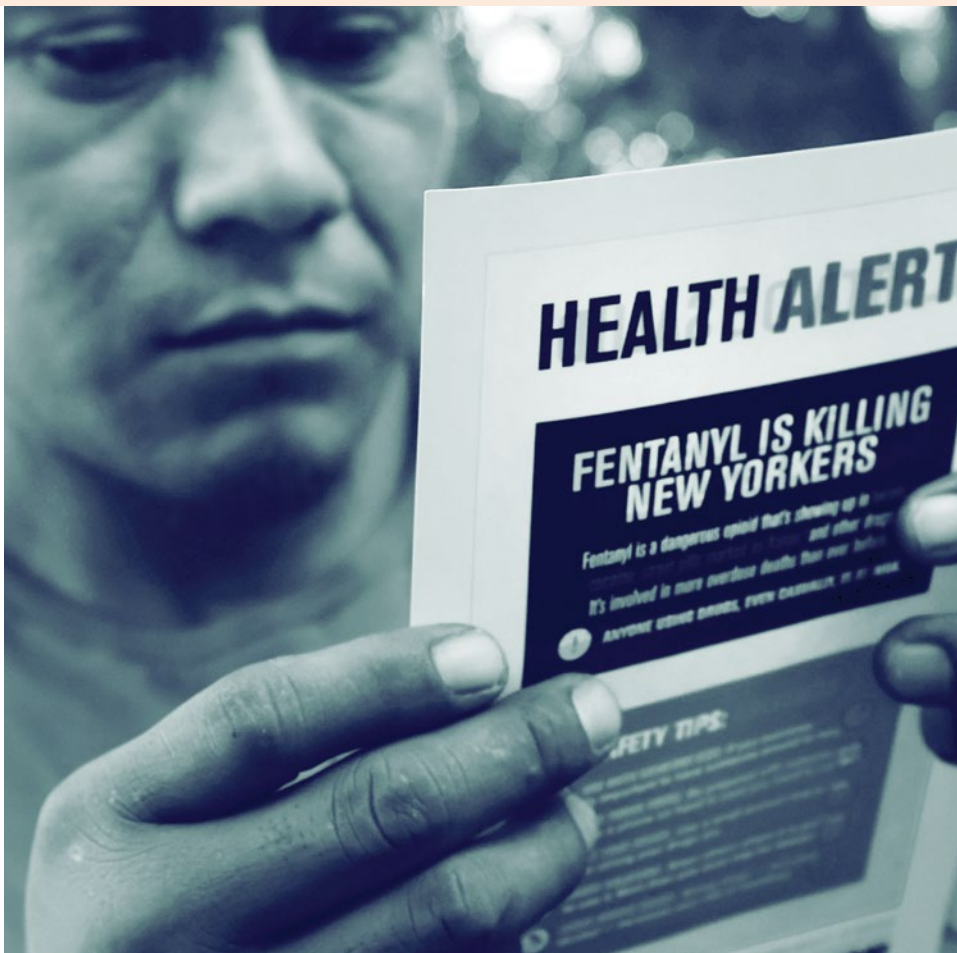
Another feedback loop that was identified by most of the communities in wave one of the study had to do with the stigma associated with naloxone distribution. Naloxone can prevent overdose deaths but does not necessarily prevent overdose. That fly in the ointment may lead to compassion fatigue on the part of first responders and police, who may come to believe that naloxone actually encourages opioid use. And compassion fatigue in turn may increase stigma against those with opioid use disorder generally. A key finding of the model, then, has been the need to link two evidence-based practices: naloxone distribution and medication treatment for opioid use disorder. Used together, these may help to reduce compassion fatigue and its associated stigma.

Stigma, the researchers found, was a fundamental variable rather than a side effect of the crisis. When people with opioid use disorder are deemed unworthy of help, a community can make little progress in addressing the social determinants of addiction or any other aspect of the opioid epidemic.

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THERE IS NO SILVER BULLET FOR OPIOID USE DISORDER AND ITS ASSOCIATED OVERDOSE AND DEATHS. THIS IS A MASSIVE PROBLEM THAT ISN'T GOING AWAY ANYTIME SOON.





In the Bronx, a heroin user reads an alert on fentanyl before being interviewed by John Jay College of Criminal Justice students as part of a project to interview drug users in order to compile data about overdoses. The students interview their subjects in a park and ask questions about their history of drug use and if they have overdosed. The subjects received a small financial compensation for their participation.

PHOTO BY SPENCER PLATT/GETTY IMAGES

Prevention: A crucial yet often neglected piece of the puzzle

Given the challenge of countering long-standing opioid use disorder, it makes sense to diagnose it early on or even prevent exposure to opioids in the first place.

“Regrettably,” adds Huang, “supply, especially of fentanyl, has been conflated with the southern border and immigration issues. We need to reframe these, of course, and develop policies that would actually make a difference.”

Identifying those at risk along with early detection of opioid use disorder remain high priorities for the team and, indeed, for all stakeholders seeking solutions to the crisis, most notably the families and patients who are dealing with it directly.

From the NIH/NIDA — **Naloxone** is an opioid receptor antagonist meaning it binds to opioid receptors and reverses or blocks the effects of other opioids. Giving naloxone rapidly reverses the effects of opioid drugs, restoring normal respiration. It can be administered by injection or through a nasal spray.

Looking ahead

Since the start of the HEALing Communities Study and CUNY SPH’s New York State-based initiative, communities have designed multiple strategies to implement evidence-based practices, but many challenges remain. Given the associated effects of the COVID-19 pandemic and fentanyl supply, the analysis of the system dynamics model shows a clear challenge to reversing overdose death rates, even with expanded, sustained implementation of evidence-based practices. And prevention is still a work in progress.

Huang is concerned about another feedback loop: if communities succeed in reducing overdose deaths, resources may be shifted away from the opioid crisis in these communities and toward some other public health issue.

“There is no silver bullet for opioid use disorder and its associated overdose and deaths,” says Huang. “This is a massive problem that isn’t going away anytime soon.”



TERRY HUANG

Q & A :

Dean Ayman El-Mohandes on the new SPARC campus and the future of CUNY SPH



In October, CUNY and New York City and State leadership unveiled plans for the Science Park and Research Campus (SPARC) Kips Bay, a first-of-its kind innovation hub that will include expanded, modern facilities for CUNY SPH.

We sat down with Dean Ayman El-Mohandes to discuss the future of the school and the exciting opportunities the new campus will afford our students, faculty and community.

An architectural
conceptual
rendering of
SPARC Kips Bay.



CH: How will the new campus shape the future of CUNY SPH?

AEM: This new project really helps us reach our dream of fulfilling the potential of our school in the broadest sense. Our footprint will be doubled which allows us to expand our classrooms and student space, we'll have a state-of-the-art auditorium and very importantly we'll have facilities for wet lab research. There is a whole field within public health focused on wet lab research and we are currently somewhat limited from hiring faculty and training students in that kind of research. Despite the tremendous success we've had in growing our research portfolio, all our research is dry labs centered, so that will be a major milestone for our school.

When are the CUNY SPH facilities expected to be up and running?

The current indication is that the space will be available for occupancy somewhere in 2027 or 2028. Our plan is to be able to fully occupy that space in a dynamic and productive way that requires a lot of planning ahead of time. There will be a big expansion in our research capacity and in our educational programs so we want to occupy that space in a full capacity once the facilities are available.

What sort of opportunities will the campus afford CUNY SPH students?

First of all, being within a health sciences campus allows us to expand a lot on joint degrees and dual degrees with other programs such as nursing. Likewise, the other health sciences programs will benefit from the opportunity of us being co-located. Secondly, there will be joint facilities like a library, a gym, a cafeteria, all of which can accommodate the needs of students across these various health sciences programs and allow our students to interact directly with those students. Our small numbers currently don't allow us to have a state-of-the-art gym, for example, but once we have a campus with much-expanded student audience, these things will become more sustainable and cost-justifiable.

We aspire to maximize interdisciplinary opportunities for public health students

**WE ASPIRE TO MAXIMIZE
INTERDISCIPLINARY
OPPORTUNITIES FOR PUBLIC
HEALTH STUDENTS BECAUSE
PUBLIC HEALTH IS AT THE CORE
OF INTERDISCIPLINARITY.**

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because public health is at the core of interdisciplinarity. We work with physicians, nurses, social workers, educators, city planners, advocacy groups, communications and media vehicles, we work with so many different domains, and finding ourselves on a vibrant health sciences campus will definitely enhance our opportunities to practice what we advocate for and really allow our students to benefit from opportunities of interdisciplinary training and interdisciplinary experiential learning. Currently this is more challenging because we are an isolated campus. Once we are a more integrated campus, these opportunities will be easier to attain, easier to plan and more accessible for the students.

How will the new campus help facilitate faculty research activities?

The integrated campus will benefit our faculty much in the same way as it will benefit our students. It will allow faculty to interact directly with their peers in other health sciences domains and increases the likelihood of them finding common ground for joint research programs and joint research applications. So that will be very, very exciting. I personally find that physical co-location allows for collaboration and interaction at a much-enhanced level and hopefully we will create an environment that is attractive and comfortable to bring faculty back to the workplace in a way that is accommodating and successful.

For the first time, CUNY SPH has the opportunity to offer an undergraduate program in public health. What could this development mean for the school?

We are currently exploring the possibility of expanding our degree offerings to include undergraduate students. There are many opportunities with relatively small programs that feed into the public health workforce needs and as such creating an undergraduate program collaboratively will allow us to offer new job opportunities for students at the undergraduate level. It's an opportunity also for us to create an undergraduate program that can feed into our graduate degrees, so some of these undergraduate students, those of them that excel, may choose to continue into our graduate degree. It's a win-win situation for the school, for the workforce and for the community.

How will SPARC create a pipeline from local public schools to careers in health care and public health?

There is a proposed a high school on the campus which will focus on students looking for careers in health sciences. The school could be a direct feeder into undergraduate programs in public health. We also may be able to enrich the public health offerings within the curriculum of that school and as such enhance the awareness of the students as to the career opportunities in the field.

Making reproductive health services more inclusive

by ANDREA KOTT



What is the difference between a friend and a boyfriend or girlfriend?

What is love?

What is consent?

What can you do if someone touches you in ways that you don't want to be touched?

How do you know when it is ok to be sexual with someone else?

These are not the questions of a prying parent. They come from a socialization and sex education curriculum that CUNY SPH researchers are updating and testing on adolescents and young adults with mild to moderate intellectual and developmental disabilities.

Most public-school students in the United States receive “comprehensive” sex education at some point during grades 6-12, and well-documented evidence shows that such education reduces rates of mistimed or unwanted pregnancy and sexually transmitted infections among teens and young adults. But adolescents and young adults with intellectual and developmental disabilities (I/DD)—who are commonly misjudged as being asexual or lacking the ability to acknowledge and discuss sexuality—are less likely than their non-disabled peers to receive it, even though they need it just as much, according to Professor Suzanne McDermott, who is the Co-Principal Investigator with Heidi E. Jones, of a randomized controlled trial of a curriculum for adolescents and young adults with Down syndrome and other types of mild and moderate intellectual and developmental disabilities.

“This population is often left out of sex education in public school,” McDermott says, noting a recent national survey in which only 44% of U.S. public school children with mild I/DD and 16% with moderate to severe I/DD received sex education compared to 48% without disabilities. The sex education they do receive often emphasizes menses and hygiene rather than choices regarding sexuality and fertility, she adds.

Not surprisingly, adolescents and young adults with I/DD often experience worse reproductive health outcomes than their non-disabled peers, are less likely to use contraception, face increased risk of mistimed or unwanted pregnancy and have less access to reproductive health care services, including vaccinations against human papillomavirus (HPV) and cervical cancer screening.

“People with intellectual disabilities can be vulnerable, since they are less likely to believe they can make decisions without the input of others” McDermott says. “The key concepts we plan to address are reciprocal relationships, trust, consent, and safety.”

While many reproductive health brochures and programs are offered to people with I/DD, Jones says that neither she nor

McDermott know of any that have been tested for effectiveness using the rigor of a randomized controlled trial.

“Furthermore,” Jones adds, “individuals with I/DD have historically been excluded from randomized controlled trials, which ultimately prevents researchers from identifying true evidence-based interventions for this population.”

McDermott and Jones will be recruiting participants from most of New York state, including New York City, so that the lessons learned can be generalized to adolescents and young adults in both urban and rural locations.

The curriculum being tested uses individualized counseling, coaching and support related to social relationships and sexuality. The comparison arm of the randomized controlled trial will be a healthy eating and exercise program.

McDermott designed the curriculum, called STEPS, in the early 1990s while in South Carolina. STEPS so notably improved reproductive health knowledge and contraceptive use among female participants that it became a Medicaid reimbursable service that now reaches thousands of individuals with I/DD through the state’s Department of Disabilities and Special Needs provider network. A published program evaluation found that it improved knowledge, however, no randomized controlled trial has evaluated its efficacy on behavior change.

“We know the curriculum increases knowledge,” says McDermott. “We need to know if it changes behavior. The proposed project, to our knowledge, is the first randomized controlled trial of a sex education curriculum designed for adolescents and young adults with I/DD.”

The trial will enroll 856 adolescent and young adults of all genders aged 16-27 years, with mild to moderate I/DD who receive services from disability providers in four of the five developmental disabilities regions of the New York State Office of People with Developmental Disabilities. The researchers will stratify participants by severity of disability, region, gender, and age (16-22, 23-27). Half of the participants will receive the updated socialization and sex education curriculum, while the other half will receive a previously evaluated intervention on physical exercise and nutrition. Both interventions will occur over six weeks, and reproductive, socialization and sex education health

and related behaviors will be compared at baseline (prior to intervention) to month 12 (approximately 10 months after completing the intervention).

The curriculum addresses topics, such as self-esteem; agency and personal relationships; decision making; bodily functions and hygiene; understanding and proper use of family planning and health care consumerism through discussion and open-ended questions, such as: *What does it mean to make your own decisions? How do you know who you can trust? What is safe sex?* “Understanding and being able to discuss these issues is vital for people with I/DD, who are easily exploited,” McDermott says.

“This population is easily taken advantage of because they’ve learned to depend on others to make decisions,” she adds, referring to a study that revealed widespread abuse among males and females: 61.9% of males and 58.2% of females reported childhood abuse, and 63.7% of males and 68.2% of females reported abuse during adulthood. Thus, they hope to learn if the curriculum can help people increase the size of their social network by helping them develop the social skills it takes to be a friend.

“People with I/DD are concrete learners,” McDermott says. “In this program, we’re explaining things in ways that are concrete and clear so that individuals with these disabilities can make good decisions.”

To promote the concept of sexual safety, the curriculum covers informed consent, which can be confusing to people with I/DD.

“If you ask someone in this population if they’ve had sex, they may say ‘yes’ because they’ve kissed their boyfriend or girlfriend,” she says. “So, you try to get them to tell you what happened by asking more questions, like *‘Where did you kiss your boyfriend/girlfriend? Were you alone in the room? Did you touch him/her? Did s/he touch you? Did you want it?’*”

Through the trial, the researchers hope to test the curriculum’s effectiveness in improving use of contraception and protection against sexually transmitted infections, HPV vaccination status and receipt of sex and age-appropriate preventive health screening.

“One of the simplest behavior changes we hope to increase is that young people with I/DD visit a healthcare provider for a reproductive health evaluation whether they’re sexually active or not, which most people don’t do,” McDermott says.

Proof that the intervention significantly increases access to reproductive health services will give the researchers the foundation they need to develop best practices for socialization and sex education for adolescents and young adults with I/DD, McDermott adds.

“People with intellectual disabilities can have a good healthy life, and this is one way to make that happen.”



SUZANNE MCDERMOTT & HEIDI JONES

Student experiential learning

Taking public health from the classroom to the field

Experiential learning, the cornerstone of our curriculum, enables students to apply the public health knowledge and skills honed in the classroom to a real-world public health problem. Students work with a partner organization or agency to develop, manage, evaluate or lead evidence-based public health projects. Each experience varies according to the student's degree program, professional development goals and the needs of the partner organization.



Jesmin Chowdhury

MPH, PUBLIC HEALTH NUTRITION

Jesmin Chowdhury, a student in the MPH program in Public Health Nutrition, worked with the Extended Food and Nutrition Education Program (EFNEP) at Cornell University's Cooperative Extension Program-NYC to develop and implement tailored nutrition education programming in targeted populations from underserved communities. Jesmin's program was geared towards communities in Jamaica, Queens, a neighborhood with a large South Asian and Caribbean population.

"The cultural differences make this area a unique place, but unfortunately these populations are also vulnerable to many social and health-related problems and are in need of more equitable resources as compared to other areas of NYC," says Chowdhury.

As part of her fieldwork project, Chowdhury developed flyers in different languages to recruit community nutrition educators, who are integral to creating culturally sensitive and tailored nutritional educational materials and workshops for the targeted community. The workshops, delivered in-person and virtually, are conducted primarily in English, Spanish and Creole. Given the large South Asian population in the area, adopting curriculum and materials to additional languages like Bengali, is essential, says Chowdhury.

"There is a high demand for Bengali speaking nutrition educators and sharing materials translated to Bengali to foster community engagement in these programs that aim to bring health equity, food access and positive changes to these underserved communities," says Chowdhury, who is herself bilingual in English and Bengali.



Isabel Levey-Swain

MS, HEALTH COMMUNICATION
FOR SOCIAL CHANGE

Isabel Levey-Swain, a recent graduate from the MS program in Health Communication for Social Change, designed her Capstone project around her passion for making information and resources accessible so that communities are empowered to make healthy choices. While interning in the communications department at the Mayor's Public Engagement Unit (PEU), Levey-Swain developed a campaign entitled, "Let's make this fun: Promoting health insurance and GetCoveredNYC to young New Yorkers." GetCoveredNYC, a PEU program, provides free assistance for New Yorkers seeking to enroll in health care, regardless of immigration status or income. Levey-Swain wrote an outreach plan based on social marketing and social media analyses, laid out an implementation strategy and developed content for the campaign, with the goal of increasing health literacy and health insurance coverage among young adults living in New York City.

"In order to both catch young people's attention, demystify health insurance and improve health insurance literacy, I experimented with 'fun' content, adding humor and aesthetic designs, ensuring that language is easy to read and highlighting one of GetCoveredNYC's best selling points: the free, one-on-one support from Specialists," says Levey-Swain.

After completing her master's program, Levey-Swain became a full-time communications coordinator with the unit. "I've been putting my capstone plan to work," she says. "I'm proud to be able to apply the skills I've learned in the Health Communications for Social Change program like health literacy, social marketing, multimedia production and health program management to help promote city services that help New Yorkers live healthy lives."



Tracy Sun

MPH, EPIDEMIOLOGY AND BIOSTATISTICS

Prior to and continuing throughout the COVID-19 pandemic, unintentional drug overdose mortality rates have escalated and reached unprecedented levels throughout New York City (NYC). As part of the experiential learning component of her degree, Tracy Sun, an MPH student in Epidemiology and Biostatistics, completed her fieldwork at the NYC Department of Health and Mental Hygiene (NYC DOHMH). Sun applied her biostatistical skills in R programming to support overdose morbidity and mortality surveillance conducted by NYC DOHMH Bureau of Alcohol and Drug Use Prevention, Care, and Treatment, Research and Surveillance unit. She assisted in updating data summaries and visualizations for reports, presentations, and helped update fact sheets summarizing trends on overdose deaths in each NYC borough.

"I'm thankful for the opportunity to have learned how to use R programming for analysis and visualization in my Biostatistical courses (BIOS620 and BIOS621) to apply in my fieldwork and support the agency's surveillance work."

RESEARCH
BRIEFS



Study calls into question the “Hispanic paradox” for birth outcomes in New York City

In the United States, African American or non-Hispanic Black infants have historically experienced worse birth outcomes than Hispanic infants, whose outcomes are more comparable to those of non-Hispanic white infants despite mothers’ lower educational attainment and income as well as reduced access to health care. This phenomenon is referred to as the “Hispanic paradox.”

A new study led by CUNY SPH Distinguished Professor Luisa N. Borrell with affiliated faculty

member Francisco Bolívar, doctoral student Christina Nieves and University of the Basque Country Professor Elena Rodríguez-Alvarez suggests that the Hispanic paradox does not apply to all Hispanic people and calls attention to the need for data disaggregation for the Hispanic population when it comes to birth outcomes whenever possible to better understand and address health inequities.

When disaggregating New York City Hispanic women by country or region of origin, infants of

Mexican American, Central American, and South American women were less likely to have low birth weight infants whereas the opposite was true for infants of Cuban women when compared with infants of white women. When compared with white women, Mexican American and South American women were less likely to have an infant that was small for their gestational age whereas Puerto Rican women were more likely to have a small for gestational age infant. All Hispanic women were more likely to have a preterm birth baby than white women whereas for infant mortality, greater odds of dying were observed for infants of Puerto Rican and Dominican women.

“We found that the Hispanic paradox does not apply to all Hispanic women when subgroups’

outcomes were examined in NYC,” says Dr. Borrell. “In addition, our findings suggest that the racial and ethnic composition of the neighborhoods in which women live and interact may be important for birth outcomes, underscoring the importance of downstream and upstream determinates of health and their interactions to promote or affect health outcomes.”

Borrell LN, Bolívar F, Rodríguez-Alvarez E, Nieves CI. Adverse birth outcomes in New York City women: Revisiting the Hispanic Paradox. *Soc Sci Med*. 2022 Dec;315:115527. doi: 10.1016/j.socscimed.2022.115527. Epub 2022 Nov 11. PMID: 36442315.

Legalization of recreational cannabis may be linked with asthma prevalence among children and adolescents

A study led by CUNY SPH Professor Renee Goodwin suggests a link between the legalization of cannabis for recreational use and the prevalence of asthma among children and adolescents.

To investigate the relationship between cannabis legalization for medical and/or recreational use and the state-level prevalence of asthma among children in the U.S., Goodwin, along with Associate Professor Katarzyna Wyka and colleagues, used data from the 2011-2019 National Survey on Children's Health, a representative sample of the population of minor children in the U.S.

The researchers found that childhood asthma increased among teens ages 12-17 by 2019 in states where recreational cannabis is legal when compared to states where it remains illegal. An increase was also observed among youth from some minoritized ethnic and racial minority groups by 2019, relative to 2011 in states with recreational legalization relative to those where cannabis use is not legal. In states where recreational cannabis is not legal, there was a decline in childhood asthma. Overall, declines in the prevalence of childhood asthma were less pronounced in states where cannabis use has been legalized for recreational use, relative to those where it remains fully illegal, from 2011 to 2019.

"More research is needed to understand the potential impact of increased adult use of cannabis on children's respiratory health," says Goodwin. "In the meantime, providing information and education in clinical and public health settings, analogous to that which is now standard practice with tobacco use among adults and parents, especially those with children with asthma, would likely be useful to folks. This is not common knowledge, and cannabis smoke is often perceived as 'less harmful' than secondhand cigarette smoke."

R.D. Goodwin, K. Wyka, M. Luo, et al., Cannabis legalization and childhood asthma in the United States: An ecologic analysis, *Preventive Medicine* (2022)



Early in U.S. pandemic, household crowding was risk factor for severe COVID-19 infection

Towards the beginning of the COVID-19 pandemic in the U.S., stay-at-home measures helped stop the spread of the virus. At the same time, it may have shifted transmission to homes where, in many cases, entire families were suddenly spending more time together in close quarters.

To investigate household crowding as a risk factor for severe COVID-19 disease, a team

of researchers from the CUNY Institute for Implementation Science in Population Health (ISPH) conducted a study using interview data from 6,831 U.S. adults screened for the Communities, Households and SARS/CoV-2 Epidemiology (CHASING) COVID Cohort Study in April 2020.

The researchers found that household crowding not only increased the risk of infection, but

also increased the risk of severe COVID-19 disease, requiring hospitalization. Having children in the home was also a risk factor for being hospitalized with the virus.

"Since community prevalence is often at its peak at the time stay-at-home measures are put in place, continued transmission in many households after lockdown is highly likely," says lead author Distinguished Professor Denis Nash. "Moreover, there were no vaccines to protect people against severe disease

when this study was conducted, making it most relevant for future pandemics. The findings suggest that mask wearing and other safety measures should be implemented in homes following stay-at-home orders in future pandemics to limit household transmission and severe disease."

Nash D, Qasmieh S, Robertson M, Rane M, Zimba R, Kulkarni SG, et al. (2022) Household factors and the risk of severe COVID-like illness early in the U.S. pandemic. *PLoS ONE* 17(7): e0271786.

Testing the role of meat consumption in cardiovascular disease

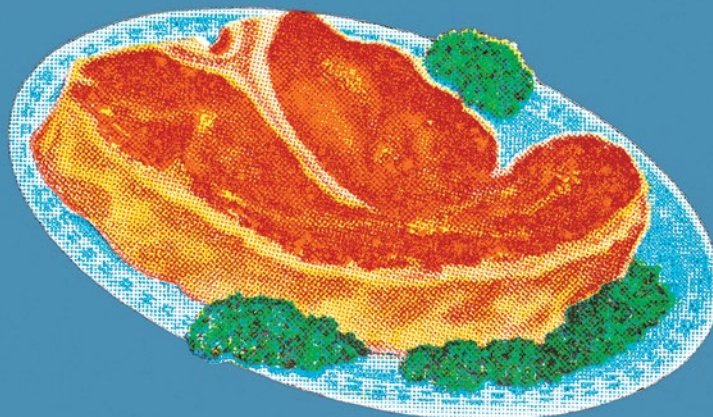
In February 1977, in the midst of a heart disease epidemic, a U.S. senate select committee encouraged people to eat less meat. Within the year, however, possibly due to pressure from the meat industry, the committee shifted its advice, placing more emphasis on reducing saturated fat. Over the last 45 years, researchers have accumulated high-quality evidence suggesting that saturated fat has no effect on cardiovascular or overall mortality.

To further investigate the role of meat consumption in ischemic heart disease, CUNY SPH Professor Mary Schooling and colleagues led a study published in *BMC Medicine* testing L-carnitine, a biomarker of meat intake, using a study design similar to a randomized controlled trial, taking advantage of genetic randomization.

The study found L-carnitine to be positively associated with ischemic heart disease, particularly in men. These findings help explain the higher rates of heart disease in men, as well as substantiating the original dietary advice to decrease consumption of meat. Given the ecological footprint of meat consumption, Schooling says, following this advice could also reduce dietary environmental impacts.

“Reducing meat consumption could be a means of improving planetary and men’s health,” Schooling says. “Identifying the sex-specific underlying drivers/consequences of L-carnitine could inform identification of further interventions.”

Zhao JV, Burgess S, Fan B, Schooling CM. L-carnitine, a friend or foe for cardiovascular disease? A Mendelian randomization study. *BMC Med.* 2022 Sep 1;20(1):272. doi: 10.1186/s12916-022-02477-z. PMID: 36045366; PMCID: PMC9434903.



Gauging the successes, failures, and needs of physician abortion advocacy

For decades, physicians have advocated for and provided access to abortion in the United States, both prior to and after the *Roe v. Wade* decision in 1973. Since *Roe v. Wade* was overturned in June 2022, the need for knowledgeable and effectively trained advocates is more critical than ever.

In a study in *Health Promotion Practice*, Associate Professor Meredith Manze, doctoral alum Amy Kwan, Assistant Professor Lynn Roberts, Associate Professor

Heidi Jones and Professor Diana Romero sought the perspectives of select stakeholders by way of key informant interviews.

The researchers interviewed 15 sexual and reproductive health providers with expertise in organizational policy and advocacy, clinical leadership and education, media and reproductive justice. Key informants relayed that skill building related to communication, developing relationships with change-makers, and understanding political

systems was critical for effective advocacy. They felt clinician advocacy training programs should include providers other than physicians and be designed for trainees to build relationships with one another over time.

“As abortion rights are increasingly restricted in the United States, designing effective advocacy programs is essential to ensuring abortion access,” says Manze. “The perspectives of these key informants can help inform advocacy

training program curricula and offer strategic approaches to increasing equitable and widespread access to sexual and reproductive health services.”

Manze M, Kwan A, Jones H, Roberts L, Romero D. Sexual and Reproductive Health Advocacy Successes, Failures, and Needs in the United States: Perspectives From Key Stakeholders. *Health Promotion Practice.* 2022;0(0). doi:10.1177/15248399221137053

Study shows many U.S. children missed routine pediatric visits during pandemic

The COVID-19 pandemic and early efforts to stop the spread led many in the U.S. to delay non-emergency and elective medical care. Evidence suggests that missed care during the pandemic may have contributed to increased mortality in adults from causes other than COVID-19, but there is little research on the prevalence of missed routine pediatric visits among U.S. children.

To investigate, Assistant Professor Chloe Teasdale and colleagues from the CUNY Institute for Implementation Science in Population Health (ISPH) led a study published this month in *Preventive Medicine*.

In March 2021, the researchers conducted a cross-sectional online survey of 2,074 U.S. parents of children 12 years and younger to measure the proportion of children who missed pediatric care and vaccinations over the first 12 months of the COVID-19 pandemic. Overall, 41.3% of parents

reported that their youngest child missed a routine medical visit due to the COVID-19 pandemic. Missed care was more common among children older than two years and among Hispanic children. A third of parents also reported their child had missed a vaccination.

“Delayed or missed pediatric care, including missed vaccinations, could have significant long-term impact on the health of children, their families and communities,” says Teasdale. “Catch-up efforts are needed to ensure continuity of preventive care for all children.”

Teasdale CA, Borrell LN, Shen Y, Kimball S, Zimba R, Kulkarni S, Rane M, Rinke ML, Fleary SA, Nash D. Missed routine pediatric care and vaccinations in US children during the first year of the COVID-19 pandemic. *Prev Med.* 2022 May;158:107025. doi: 10.1016/j.ypmed.2022.107025. Epub 2022 Mar 19. PMID: 35318030; PMCID: PMC8933962.



Social vulnerabilities—not individual behavior—put opioid-using women at risk for rape

In a study published in *Violence Against Women*, a team of researchers from the CUNY SPH Institute for Implementation Science in Population Health (ISPH) sought to understand why young women who use prescription opioids non-medically and/or heroin are at heightened risk of rape.

Affiliated Researcher Lauren Jessell, Associate Professor Pedro Mateu-Gelabert, Research Associate Professor Honoria Guarino and Data Analyst Chunki Fong used data from 168 female participants of a NIDA-funded study which examined the drug and sexual risk behaviors of 539 young adult opioid users in New York City. Structured interviews

included questions about socio-demographics, drug use, and sexual experiences.

The responses revealed a shockingly high prevalence and frequency of sexual violence, including rape, among women who use opioids. One-third of the sample had been raped at least once while using drugs. Social vulnerabilities such as low household income, having experienced homelessness or living with a mental illness increased women's risk of being targeted for sexual violence.

The findings suggest it is not drug use itself that puts women at risk, but the sexually coercive context in which drugs are used and the multiple social vulnerabilities that women who use opioids

experience. Participants described situations where they were often insulted, propositioned for sex, or otherwise felt they were expected to have sex after drugs were shared with them.

“It is our hope that these findings will help in the development of more useful prevention efforts,” says Jessell. “These efforts should target risky contexts and patriarchal norms rather than the behavior of individual women.”

Jessell, L., Mateu-Gelabert, P., Guarino, H., & Fong, C. (2022). Why Young Women Who Use Opioids Are at Risk for Rape: The Impact of Social Vulnerabilities and Sexually Coercive Drug Using Contexts. *Violence Against Women*, 0(0).



A better way to gauge the health risks of firefighters

A new study by CUNY SPH researchers presents an improved system for evaluating associations between firefighting and adverse health outcomes.

Firefighters are at great risk for disease due to occupational exposure to combustion byproducts, but it is difficult to monitor these exposures due to safety concerns, randomness and variability of each fire incident.

To estimate quantities of smoke particles emitted during fire incidents, CUNY SPH doctoral alum David Goldfarb, Professor Ilias Kavouras and colleagues developed a refined

job exposure matrix based on incident types, severities and response characteristics and applied it to a cohort of New York City firefighters.

The matrix is an improvement on prior methods which estimate exposure crudely, and thus increase the potential for exposure misclassification, the researchers say.

"This instrument can help us better understand the burden of exposure for other cohorts, cumulative dose-response relationships for different health outcomes and inform exposure prevention and planning," says Goldfarb.

Goldfarb DG, Prezant DJ, Zeig-Owens R, et al. Development of a job-exposure matrix (JEM) for exposure to smoke particle mass among firefighters of the Fire Department of the City of New York (FDNY) Occupational and Environmental Medicine 2023;80:104-110.

COVID lessons learned can inform efforts to improve NYC food system

In an article in *Urban Governance*, Associate Professor Nevin Cohen discusses the opportunities presented by COVID-19 to address not only the symptoms of food insecurity, but the root causes as well.

The COVID-19 pandemic disrupted food systems in New York City, disproportionately impacting the most vulnerable populations. City officials responded with emergency measures to stave off food insecurity and hunger, but also sought to address other social equity issues, such as fears of engaging with food programs by immigrant communities, disparities in access to online grocers, worker rights and worker ownership, and new priorities for the use of public space.

Dr. Cohen says emergency responses to the NYC COVID food crisis contain within them the seeds of social change. He analyzes a set of policy initiatives

that attempt to avert hunger and malnourishment and seek to advance equity in the food system.

"By widening access to public food programs for immigrants, protecting low wage food workers from health-harming labor practices, expanding access to online food ordering to low-income communities and smaller food businesses, creating new opportunities to open worker-owned businesses, and making public spaces more available to restaurants by limiting space for car parking, New York City has shown that municipal responses to the COVID-19 pandemic can advance a more equitable food system and a more just city," Dr. Cohen says.

Nevin Cohen, *Food Crisis as a Tool for Social Change: Lessons from New York City's COVID-19 Response*, *Urban Governance*, Volume 2, Issue 1, 2022, Pages 173-177, ISSN 2664-3286, <https://doi.org/10.1016/j.ugj.2022.03.001>





Exploring barriers and facilitators to mental health care among student service members and veterans

"It's sort of like going to a dentist for a toothache, I guess—you ignore it until you can't, and by the time you can't, you need a root canal."

This is one of the insightful, humorous, and sometimes heart-wrenching accounts that student service members and veterans shared about their mental health experiences in a research project led by CUNY SPH graduate Magdalen Harris (MS, Health Communication for Social Change '22).

Published in the *Journal of American College Health*, the article discusses barriers and facilitators to mental health care based on 21 interviews of veteran and service member students recruited online and via snowball sampling. The project evolved during Magdalen's time in the MS program and culminated with her Capstone project.

"Most of our health communication students produce extensive plans for their Capstone project, but Magdalen chose the research route," says Clinical Professor Chris Palmedo, co-director of the MS in Health Communication for Social Change program. "We hope her work will eventually help students with military experience navigate on-campus mental health environments."

Harris, MPJ; Palmedo, PC & Fleary, SA (2022) "What gets people in the door": An integrative model of student veteran mental health service use and opportunities for communication, *Journal of American College Health*, 13 Oct. 2022 DOI: 10.1080/07448481.2022.2129977

Study suggests insulin receptor genetic variants may protect from type 2 diabetes

Diabetes mellitus is one of the most prevalent chronic diseases in the United States and around the world and is associated with several comorbidities. While diet and genetics play a role in the onset of the disease, its exact causes remain elusive.

In a recent study, Associate Professor Ghada Soliman and Professor Mary Schooling used Mendelian randomization—a study design that avoids confounding by taking advantage of the random allocation of genetic material at conception—to investigate

whether the risk of type 2 diabetes varies with genetically predicted insulin, insulin receptor, or insulin-like growth factor-1 receptor using genetic variants.

The results suggest that insulin receptor genetic variants may protect a person from developing type 2 diabetes. Insulin receptor in red blood cells regulates glycolysis, which may affect

their functionality and integrity. Also, the insulin receptor may mediate its effect via the ABO gene variant rs507666. As such, the insulin receptor may be a target for intervention to reduce the risk of type two diabetes and the associated comorbidities.

"These findings help us to better understand the causes of type 2 diabetes and thus enables us to develop more effective treatment in the future," Dr. Soliman says.

Soliman GA, Schooling CM. Insulin Receptor Genetic Variants Causal Association with Type 2 Diabetes: A Mendelian Randomization Study. *Curr Dev Nutr*. 2022 Mar 29;6(5):nzac044. doi: 10.1093/cdn/nzac044. PMID: 35611355; PMCID: PMC9121804.



Medical cannabis for chronic pain may help patients on long-term opioid treatment reduce dosages

A study from New York State and CUNY researchers suggests that receiving medical cannabis for thirty days or more may help patients on long-term opioid treatment to lower their dose over time.

The findings leverage existing population-level data to contribute robust evidence for practitioners regarding the potential clinical benefits of medical cannabis in reducing the opioid

burden for long-term opioid therapy patients and possibly reducing their risk for use of illicit substances and overdose.

Researchers from CUNY SPH, the New York State Department of Health, and the New York State Office of Cannabis Management used a combination of two large state databases to analyze data from eight thousand adult New Yorkers during 2017-2019.

“This study found meaningful reductions among patients receiving medical cannabis for longer duration,” says lead author Dr. Trang Nguyen of the Department of Health. “Patients’ daily opioid dosages were reduced by 47%-51% of the baseline dosages after eight months. In contrast, patients receiving medical cannabis for a shorter duration reduced their initial dosages by just 4%-14%.”

Nguyen T, Li Y, Greene D, Stancliff S, Quackenbush N. Changes in Prescribed Opioid Dosages Among Patients Receiving Medical Cannabis for Chronic Pain, New York State, 2017-2019. JAMA Netw Open. 2023;6(1):e2254573. doi:10.1001/jamanetworkopen.2022.54573



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