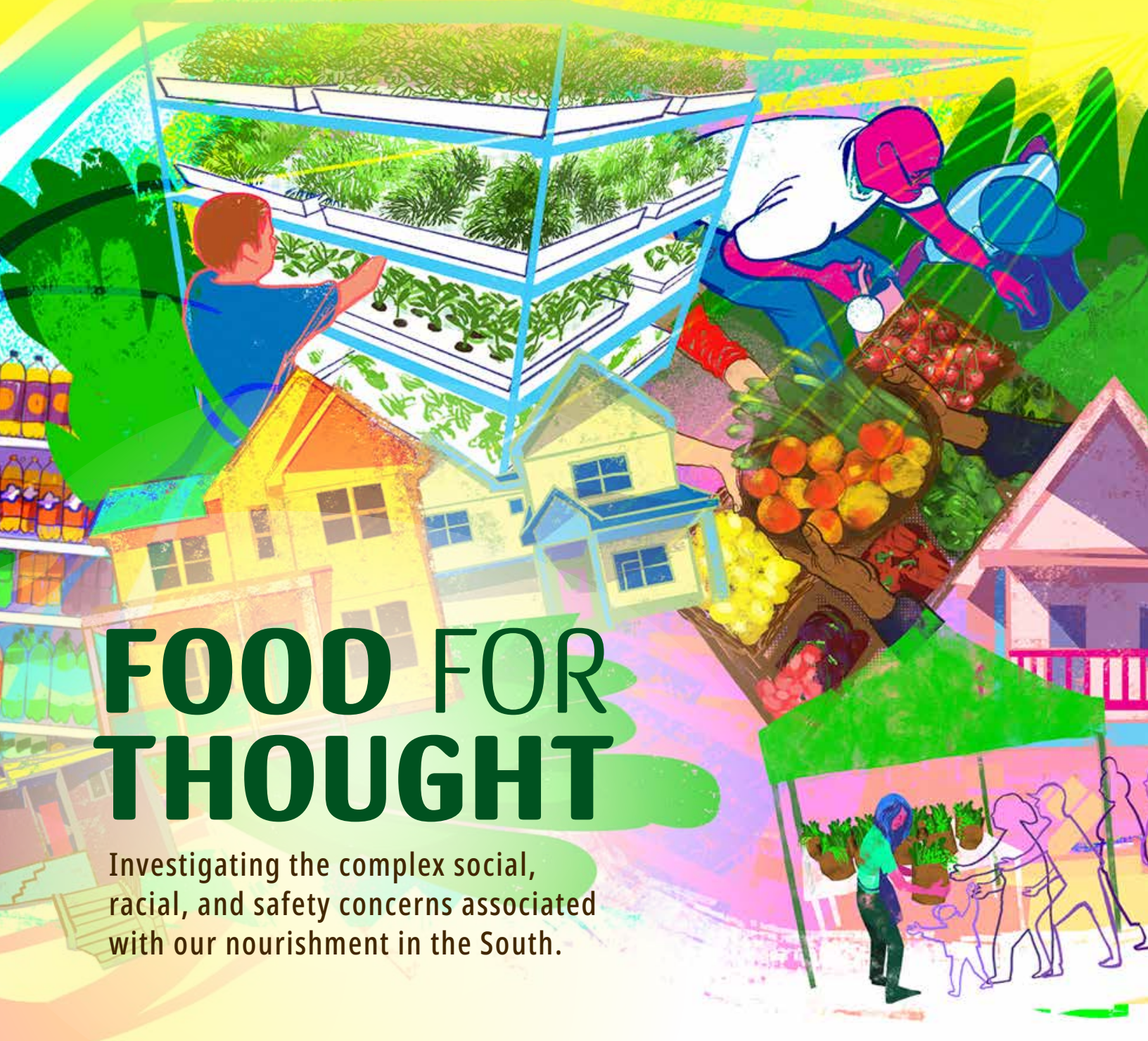


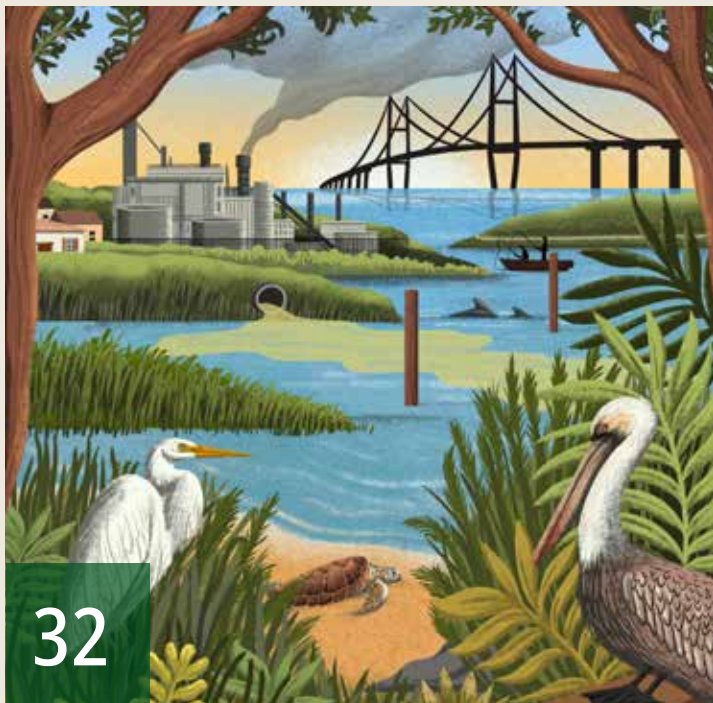
# ROLLINS



## FOOD FOR THOUGHT

Investigating the complex social, racial, and safety concerns associated with our nourishment in the South.





EMORY

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PUBLIC  
HEALTH

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# EMORY PUBLIC HEALTH ROLLINS

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# PROTECTING, CONNECTING, THRIVING

**T**he launch of our spring issue coincides with this year's National Public Health Week.

While this annual awareness event lasts just a few days during the first week of April, the values articulated in this year's theme, "protecting, connecting, and thriving," are interwoven in all the research, learning, and teaching we do at

engagement our researchers have fostered in Brunswick, Georgia, serves as just one example of the ways we create meaningful connections to advance health, improve lives, and both inform and promote public health research. You can learn about that work in "The Burden of Brunswick."

Thinking of our own community, I am thrilled to welcome the newest leader to Rollins this June, when Dr. Stephen W. Patrick will join us as chair of the Department of Health Policy and Management. I hope you'll take the time to learn about him and his background in "Bridging Patient Care, Polling, and Policy."

As I write this in late March, it has been six months since our strategic plan officially launched. In this short amount of time, we have made concrete steps toward advancing all six of our plan's goals: make discoveries that make a difference; transform our offerings; put research to work; build a thriving workplace; integrate diversity, equity, and inclusion; and champion public health. I invite you to read about our progress so far, and the specific work we have done in each of these areas on our strategic plan website, which will be updated in mid-April.

Outside of our efforts to improve our school and the public's health more broadly, we are connected by our concern for humanity.

We are living in a time of uncertainty, with 2024's contentious presidential election looming large over the year ahead, and important public health issues at stake. Armed conflict and humanitarian crises continue to rage in regions around the world—including Gaza, Ukraine, Sudan, Libya, Syria, Yemen, and more. Staying focused on why we do what we do can sometimes feel impossible. But, that is why our school exists. We promote health and prevent disease and injury. We care and activate, even when it feels impossible to know where to begin. The need to protect, connect, and do the work necessary to help others thrive is more important now than ever before. So, let us keep doing what we do best. Good work.

the Rollins School of Public Health all year long. Our shared concern for protecting and advancing the health and wellbeing of others—including each other—serves as a connector for the staff, faculty, and students that work and learn alongside us, and our generous donors who continue to support our mission.

Our alignment with this theme is also exemplified in the stories you will find in this issue of *Rollins* magazine. Our cover story, "Food for Thought," centers on food and the various factors affecting people's access to safe, healthy, nutritious sustenance, as well as the research led by Rollins faculty aiming to improve health equity, prevent foodborne diseases, and promote nutrition. We also dive into the growing global challenge of antimicrobial resistance in "Have We Entered a Post-Antibiotic Age?" which discusses ways to mitigate infectious disease spread, including long-term solutions, like investing in clean water and sanitation in low-resource settings. Environmental justice is a connecting theme across our areas of work at Rollins. The community



**M. Daniele Fallin, PhD**

*James W. Curran Dean of Public Health  
Rollins School of Public Health  
Emory University*

# BRIDGING PATIENT CARE, POLLING, AND POLICY

Neonatologist Stephen Patrick joins Rollins as chair of health policy and management.

By Deanna Altomara • Illustration by Alex Nabaum

**I**n the 1950s, Stephen Patrick's grandfather worked on the railroad in Bluefield, West Virginia.

The railroad served a booming coal industry. But when the industry began declining, things changed. The town's population is now half of what it was 60 years ago. Jobs are hard to find. And the county's overdose death rate is three times the national average.

In the 1950s, Stephen Patrick's grandfather worked on the railroad in Bluefield, West Virginia. The railroad served a booming coal industry. But when the industry began declining, things changed. The town's population is now half of what it was 60 years ago. Jobs are hard to find. And the county's overdose death rate is three times the national average.

The growing prevalence of substance use disorders in his hometown did not personally affect Patrick's life—or those of his loved ones—during his youth. It was years





**STEPHEN PATRICK, MD**

later, when he was finishing his medical training in the neonatal intensive care unit at the University of Michigan in 2010, when he came face to face with the dire effects of the country's opioid epidemic.

"We started seeing more babies having opioid withdrawal, and those infants really stood out because in a sea of infants who were critically ill, these were kind of big, fussy, irritable infants. And people weren't really talking about it. So, it really led us to ask, 'What's going on?'"

In these situations, many people initially blame the mothers. But, if you let go of assumptions and ask the right questions, he says, you'll quickly learn that the issue runs much deeper. "You learn about barriers to treatment. You learn about people's trauma, lack of economic opportunity, the layers of things that fall into place."

Patrick, MD, was riveted. And deeply disturbed. As the father of a young daughter (and another soon to follow), he couldn't bear to see the infants and mothers suffer. He dove into research on pregnant people's access to opioid treatment. His research quickly gained prominence through publications in top medical journals like *JAMA*.

After finishing his training, Patrick took his work to the national level, becoming a policy adviser at the White House. Over the next few years, he testified multiple times before Congress on neonatal abstinence syndrome (when babies withdraw

from drugs they are exposed to before birth), reviewed policy on medication-assisted treatment (MAT), and led the development of the Biden-Harris Administration's action plan to support pregnant people battling substance use disorders.

#### **FINDING ACCESS TO CARE**

In West Virginia, 1 in 25 infants are in foster care, many due to parental substance use. In Patrick's home county, up to 5% of infants are born experiencing drug withdrawal. Meanwhile, health care—both for substance use treatment and delivery—is harder to find than ever.

"The hospital where I was born doesn't even exist anymore," he says. The shortage is emblematic—and a driving factor—of the state's struggles with poverty, health problems, and substance use disorders.

As a result, the remaining health care centers in the state have been overwhelmed, making it even harder to find treatment.

To find out more about the intersecting crises, Patrick developed an innovative study to examine opioid treatment barriers from the patient perspective. He carried out a "secret shopper" study encompassing 10 states in which women called MAT providers listed on government websites. Half the time, participants weren't even able to get someone on the phone after at least five attempts. Of the participants who were able to get in contact with treatment programs, the "pregnant" people were 17% less likely to be accepted for treatment. Many participants also reported that the person who answered their call was unkind or judgmental.

Some states have enacted policies that prohibit such discrimination against pregnant people in treatment program admissions. Patrick examined those in a separate study. "We found them to be largely ineffective," he says.

"We're seeing record levels of pregnant women dying from an overdose," he adds. "We have to be able to do this better."

So, he did.

#### **FROM POLLING TO POLICY**

In 2020, Patrick became executive director of Firefly, a Vanderbilt program that cares for pregnant people with addiction. Its specially designed infrastructure integrates obstetrics, psychiatry, MAT, peer support, and connections to food banks and other resources.

Over the past two and a half years, about 350 mothers have gone through the program. Patrick was especially touched by one patient, who was getting her first ultrasound when the sonographer asked if she had found a

home [meaning, adoption placement] for the baby yet.

“Because people who use drugs never end up with their baby, it’s almost a foregone conclusion [that they will have to give the baby up for adoption],” Patrick explains, becoming emotional. “I have two girls, and I can’t imagine that feeling. It’s supposed to be a happy moment, but that’s what you’re faced with. So, she found her way to our program, got into treatment, and here she was [telling her story to a radio audience] holding her 15-month-old baby, both thriving and doing well.

“I’m a pediatrician, so I’m an optimist. I think these things are changing. I know they are because I’ve seen them incrementally get better,” he says. “In the time that we’ve been here at Vanderbilt, the care that we deliver to newborns that are opioid-exposed is completely different. It is more parent-family centric. Meanwhile, Firefly is making a tangible difference on clinical outcomes.”

Those outcomes are bolstered by qualitative research that shows patients feel connected and supported.

“It gives us this ability to say, ‘Hey, this doesn’t have to be this way,’” Patrick concludes. “And we can think about how to transform not just one person at a time, but systems and communities. And that’s what public health is all about.”

### **A SPECTRUM OF PERSPECTIVE**

Patrick’s ability to bridge clinical work, research, and public health made him stand out to recruiters at Rollins. “We were thrilled by Dr. Patrick’s deep research expertise, his work engaging in health policy discourse, his experience building new research initiatives, his strong focus on mentorship throughout his career, and his core principles that align well with our school,” says Don Operario, PhD, who led the search committee for the Department of Health Policy and Management chair.

“He’s actually the doctor caring for those babies, so he really has a perspective of the whole family,” explains Dani Fallin, PhD, dean of the Rollins School of Public Health. Furthermore, Patrick’s expertise in polling helps researchers match what communities want with the policies that can meet those needs. Fallin admires how his passions span from “individual patient care to population health and how policies affect that population. It’s a wonderful spectrum of perspectives.”

“He is just an incredible health services researcher in an area that’s really important to the school and for the public’s health,” she says, referring to Rollins researchers with similar interests, such as Hannah Cooper, ScD, Rollins Chair of Substance Use Disorders Research; Janet Cummings, PhD, professor of health policy and

management; and Ben Druss, MD, Rosalynn Carter Chair in Mental Health; as well as colleagues in the School of Medicine. “It’s a wonderful fit in terms of the research that we do, the values that we have as a school, and where we’re moving forward.”

“The Department of Health Policy and Management is critical to a thriving school of public health,” Fallin adds, because so much of the work in other departments depends on the translation of research to policy.

These policies become even more impactful when medicine, nursing, and public health join forces. And as a neonatologist, researcher, and policy expert, Patrick is poised to facilitate those relationships.

### **A TEAM EFFORT**

And for Patrick, everything is about collaboration. When pressed to talk about his achievements, he always circles back to the power of teamwork, repeating, “But none of this has just been me. It’s really been about the team.”

As he prepares to join the Rollins team on June 1, he has been meeting with staff and students to learn more about the department and their visions for it. According to Fallin, Patrick regularly asks people questions like, “How can I do what’s best for the faculty, staff, and students in the department? How should I use my time to effectively promote them and see them thrive?”

“I, and many who met him, were very impressed with his ability to listen, his ability to be very thoughtful and reflective, and his ideas for how to create community and nurture community,” says Fallin.

Operario, chair of the Department of Behavioral, Social, and Health Education Sciences, concurs. “He comes to Rollins with excitement to co-create collaboration and boundless energy to make things happen.”

Patrick wants to build a community where people are genuinely excited to come to work every day, where they feel supported by their colleagues, and where they have access to the tools they need to pursue their passions. He looks forward to expanding access to career-advancing tools such as mentorship, coaching, and skill-building opportunities.

Meanwhile, he’s excited to move to Atlanta with his two daughters, who are now 18 and 13, and his wife, Kelly. “And we have our dogs,” he adds, three rescues “who like to bark.”

“He and his wife are both really engaging people who want to talk not only about whether *Schitt’s Creek* was the best show ever made,” says Fallin, “but also about what policies are going to be most important for the opioid crisis and beyond.” ■





# *Unlocking* **PUBLIC HEALTH**

Quick summaries of  
impactful Rollins research

By Shelby Crosier



**TITLE** | Quantifying Enteropathogen Contamination Along Chicken Value Chains in Maputo, Mozambique: A Multidisciplinary and Mixed-Methods Approach to Identifying High-Exposure Settings

**JOURNAL** | *Environmental Health Perspectives*

**THE BIG MESSAGE** | Small-scale poultry farming for meat and eggs is very prevalent in low- and middle-income countries (LMICs), and it is also a significant source of the germs that cause diarrheal diseases, which are a leading cause of childhood illness and death. This study used interviews to understand how chickens move through the food system in Mozambique and samples to quantify contamination at various critical points. Researchers found widespread contamination with *Campylobacter* and *Salmonella* in poultry, which increased as it moved from farm to point of sale. Thus, while controlling contamination on farms is important to limit the spread of foodborne illness, it is equally important to take steps to prevent contamination as food moves through the system, especially at markets.

**ROLLINS AUTHOR(S)** | Frederica Lamar, PhD; Courtney Victor; Bethany Caruso, PhD; Matthew Freeman, PhD





**TITLE |** Prevalence of COVID-19 Mitigation Behaviors in US Adults (August-December 2020): Nationwide Household Probability Survey

**JOURNAL |** *JMIR Public Health and Surveillance*

**THE BIG MESSAGE |** COVID-19 mitigation behaviors include masking, social distancing, and hand hygiene. Using survey data, researchers in this study looked at how common each of these behaviors was when COVID-19 rates were at their highest and the vaccine was not yet available. They found that mask wearing was the most common practice, followed by social distancing, frequent handwashing, and hand sanitizing. Women, older people, Black and Hispanic individuals, those who had not graduated college, and service workers were the most likely to practice mitigation behaviors. This points to a need for messaging that encourages mitigation practices and focuses on addressing the disparities in those practices during future outbreak responses.

**ROLLINS AUTHOR(S) |** Travis Sanchez, DVM; Aaron Siegler, PhD; Benjamin Lopman, PhD; Nicole Luisi; Kristin Nelson, PhD; Mariah Valentine-Graves; Patrick Sullivan, DVM



**TITLE |** “I was having an internal conflict with myself.” COVID-19 Vaccination Decision-Making Processes Among Pregnant Women

**JOURNAL |** *Women’s Health*

**THE BIG MESSAGE |** Despite the CDC’s recommendation that pregnant people be vaccinated for COVID-19 and evidence that the vaccines are safe and effective, vaccination rates remain low among pregnant women in the U.S. Researchers interviewed women who were pregnant during the pandemic to learn about their experiences with prenatal care and delivery and to understand how they made decisions about vaccination. The decision-making process around COVID-19 vaccination was complex for pregnant women and was affected by the guidance and support they received, worries about effects of the vaccine on the fetus, their values, and other preventive measures they took. These results highlight the need for targeted approaches to help pregnant people make informed decisions about vaccination.

**ROLLINS AUTHOR(S) |** Subasri Narasimhan, PhD



**TITLE |** Effects of Breastfeeding on Children’s Gut Colonization With Multidrug-Resistant Enterobacterales in Peri-Urban Lima, Peru

**JOURNAL |** *Gut Microbes*

**THE BIG MESSAGE |** In middle-income countries with a high burden of bacterial disease, young children are often exposed to and colonized by antibiotic-resistant bacteria, which can cause fatal infections. Researchers investigated whether breastfeeding during the first 16 months of a child’s life could reduce their risk of acquiring extended-spectrum beta-

lactamase (ESBL)-producing Enterobacterales in their digestive tracts, a measure that can be used to gauge the level of antibiotic resistance in communities. While exclusive breastfeeding during the first six months of life did not affect the risk of gut-colonization of ESBL-producing Enterobacterales, continuing to breastfeed past six months significantly lowers the risk. These findings support the implementation of policies that support breastfeeding as a possible tool to help stop the spread of antibiotic resistance globally.

**ROLLINS AUTHOR(S) |** Maya Nadimpalli, PhD



**TITLE |** Experiences of Childhood, Intimate Partner, Non-Partner, and Hate Crime-related Violence Among a Sample of People Living with HIV in the Epicenter of the U.S. HIV Epidemic

**JOURNAL |** *Frontiers in Public Health*

**THE BIG MESSAGE |** There is a well-established link between experiences of violence and poor HIV outcomes, but these experiences remain understudied in people living with HIV across genders and sexual orientation. Researchers surveyed 285 people living with HIV in Atlanta to learn about their experiences with different forms of violence and found high rates of past adverse childhood experiences, intimate partner violence, non-partner-violence, and hate crimes. Gay men were more likely than women or straight men to have experienced violence. This highlights that to increase engagement in HIV care, it is important to train health care providers in trauma-informed approaches and make mental health and social support services available at clinics and hospitals that serve people living with HIV.

**ROLLINS AUTHOR(S) |** Jessica Sales, PhD; Katherine Anderson; Melvin Livingston, PhD; Sophia Garbarino; Salaem Hadera; Eve Rose; Madelyn Carlson



**TITLE |** Effects of Air Pollution on Adverse Birth Outcomes and Pregnancy Complications in the U.S. State of Kansas (2000–2015)

**JOURNAL |** *Scientific Reports*

**THE BIG MESSAGE |** Gestational diabetes (diabetes during pregnancy) and high blood pressure are the most common pregnancy complications, and preterm birth and low birthweight are leading causes of neonatal illness and death. This study investigated the connection between these negative health outcomes and exposure to ozone, nitrogen dioxide, and fine particulate matter. It found that higher exposure to ozone during pregnancy increased the risk of preterm birth, low birthweight, and high blood pressure during pregnancy. Exposure to nitrogen dioxide early in pregnancy increased the risk of gestational diabetes. This means that reducing pregnant people's exposure to air pollution is vital to lowering the risk of negative pregnancy and birth outcomes.

**ROLLINS AUTHOR(S) |** Hua Hao, PhD; Rohan D'Souza; Haisu Zhang; Howard Chang, PhD



**TITLE |** Experiences of Breastfeeding Peer Counseling Among Women With Low Incomes in the US: a Qualitative Evaluation

**JOURNAL |** *BMC Pregnancy and Childbirth*

**THE BIG MESSAGE |** Breastfeeding peer counseling is proven to improve breastfeeding outcomes for women with low incomes, both in the U.S. and globally. The World Health Organization recommends it as a person-centered practice—one that respects and responds to the needs, preferences, and values of an individual. In this study,





**TITLE |** Effects of Cooking with Liquefied Petroleum Gas or Biomass on Stunting in Infants

**JOURNAL |** *The New England Journal of Medicine*

**THE BIG MESSAGE |** Stunted growth in infants is associated with household air pollution, which in LMICs is often related to burning biomass to cook and heat homes. The HAPIN trial investigated whether using liquid petroleum gas (LPG) instead of biomass fuel for cooking during pregnancy and the postpartum period would influence levels of infant stunting. The researchers found evidence that cooking with LPG reduced exposure to household air pollution for both pregnant women and infants, but there was no significant difference in the risk of stunted growth at birth or one year after birth in houses that used LPG rather than biomass fuel. This evidence could mean that to prevent stunting, changes to indoor air pollution exposure would need to happen earlier in pregnancy or preconception, or that the level of pollution is not reduced enough by switching to LPG.

**ROLLINS AUTHOR(S) |** Sheela Sinharoy, PhD; Howard Chang, PhD; Lance Waller, PhD; Kyle Steenland, PhD; Usha Ramakrishnan, PhD; Jiantong Wang; Shirin Jabbarzadeh, MD; Thomas Clasen, PhD



**TITLE |** Impact of Cash Transfers on the Association Between Prenatal Exposures to High Temperatures and Low Birthweight: Retrospective Analysis From the LEAP 1000 Study

**JOURNAL |** *British Journal of Obstetrics and Gynaecology*

**THE BIG MESSAGE |** Extreme heat has negative impacts on birth outcomes, especially in LMICs with limited access to interventions like air conditioning. This study investigated the association between extreme heat exposure during pregnancy and low birthweight for pregnant women in Ghana and explored whether the association was affected by participation in a cash transfer program (a program that provides money to impoverished families at regular intervals). Although temperatures above 30° C (86° F) were associated with increased odds of low birth weight, these impacts were less severe for women participating in the cash transfer program. The results suggest that poverty alleviation programs such as cash transfer can be a useful tool in combatting the health effects of climate change in LMICs.

**ROLLINS AUTHOR(S) |** Sarah LaPointe, PhD

researchers interviewed 28 women about their experiences participating in a breastfeeding peer counseling program. The women interviewed had positive experiences in the program. They received effective communication, respect and dignity, and emotional support from breastfeeding peer counselors in a variety of ways, all of which are vital components of person-centered care. The results underscore the importance of breastfeeding peer counselors not only in improving breastfeeding outcomes, but also in delivering quality, person-centered care.

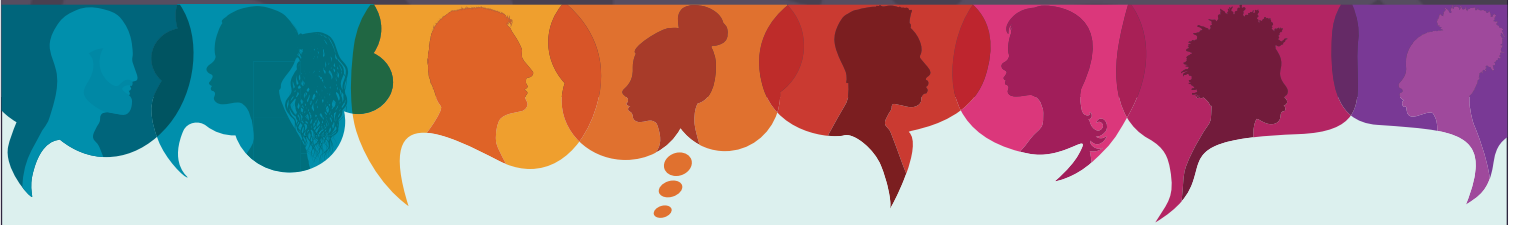
**ROLLINS AUTHOR(S) |** Elizabeth Rhodes, PhD



# ROLLINS ASK AN EXPERT

Rollins thought leaders weigh in on major public health issues.

Compiled By **Shelby Crosier** • Photography by Audra Melton



## QUESTION

*Have any surprising findings come out of your recent breast cancer research?*

## ANSWER

In several of our projects, we are trying to understand the role of place in whether people die of breast cancer. One finding



**EXPERT: LAUREN MCCULLOUGH, PHD,**  
ASSOCIATE PROFESSOR OF  
EPIDEMIOLOGY

accounted for by neighborhood, such as the biases of health care institutions or the day-to-day discrimination that may accelerate tumor growth and treatment response.

consistent across several studies is that for white women, neighborhoods matter a lot. Meaning, white women who live in deprived neighborhoods have worse breast cancer outcomes than those who live in better neighborhoods. For Black women, this is not the case. It doesn't matter if they live in a more affluent neighborhood; they are still having worse outcomes than one would expect. We can then assume that there are factors in treating marginalized, minority women that aren't

## QUESTION

*What should policymakers do to help survivors of intimate partner violence?*

## ANSWER

The No. 1 need in the U.S. is more funding for domestic violence agencies and more flexible funding to use on things like housing,

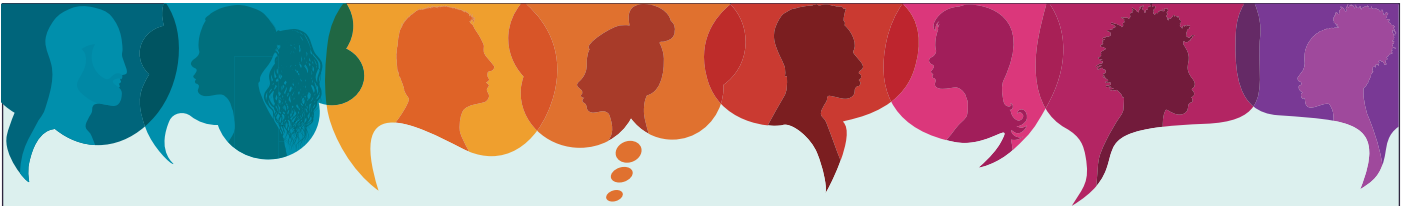


**EXPERT: DABNEY P. EVANS,**  
PHD, ASSOCIATE PROFESSOR OF  
GLOBAL HEALTH AND EXECUTIVE  
DIRECTOR OF THE EMORY UNIVERSITY  
INSTITUTE OF HUMAN RIGHTS

transportation, or ability to work, so both short- and long-term support are necessary.

shelters, transportation, and financial resources for survivors to live separate lives from their abusers. We have a housing and a shelter shortage. Shelters are not desirable locations, but we have to make them available for people who are in crisis and have nowhere else to go. Likewise, if the safest place to go is a cousin's house out of town, they may not have the transportation to get there. Survivors are often in circumstances where the partner may have controlled their finances,





### QUESTION

*How can your findings about shared blood pressure in married couples inform future public health interventions?*

### ANSWER

It's a way to identify people who do not know if they have the disease through their partner, and to identify new ways of incentivizing blood pressure screening and management at the policy level, especially in populations with high rates of undiagnosed and uncontrolled blood pressure. Now, early detection



**EXPERT: JITHIN SAM VARGHESE,**  
PHD, ASSISTANT RESEARCH PROFESSOR  
OF GLOBAL HEALTH

of hypertension and management of blood pressure is important because it can prevent complications like heart disease and stroke. It can also help public health departments better understand the burden in their communities and provide new opportunities for raising awareness for healthy living at the family level. From a clinical perspective, it may be helpful to treat couples as opposed to individuals—encouraging patients to consider joint management strategies and holding each other accountable. And from the science standpoint, the mechanism of how couples develop blood pressure together is important to understand.

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### QUESTION

*What effects can lupus have on women's health?*

### ANSWER

One important fact to know about lupus is that it can affect multiple organs, including both the kidneys and



**EXPERT: PENELOPE HOWARDS,**  
PHD, ASSOCIATE PROFESSOR OF  
EPIDEMIOLOGY

the heart. Because of that, women with lupus are more likely to have cardiovascular events prior to menopause. Although women with well-controlled lupus can have healthy pregnancies, they are at greater risk of complications during pregnancy, and it can also influence birth outcomes. But we don't want the message to be that women with lupus shouldn't get pregnant. It's more about making sure that there's clear communication about the benefits of timing pregnancy to periods of low lupus activity, providing support for women, and monitoring them in order to identify potential complications early.

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**ROLLINS ASK AN EXPERT** is an ongoing series from the Rollins School of Public Health that aligns research experts with pressing public health topics. The questions and answers featured here are excerpts from longer articles published on the Rollins News Center. View articles from this series and more at: [sph.emory.edu/news](https://sph.emory.edu/news).

# THE PUBLIC HEALTH CRISIS IN GAZA

## The spread of disease and potential for famine

**I**n the five months of the Israel-Hamas war, the impacts on public health have been profound. The death toll has climbed to over 30,000, which has included an enormous number of civilians, including health care workers.

The health care infrastructure of Gaza has deteriorated, leaving those who are sick, injured, pregnant, or seeking care forced to grapple with a bleak reality. Remaining hospitals are overwhelmed, under-resourced, and understaffed, limiting health care workers from being able to provide life-saving services.

Aid is not reaching those who need it most, with the country on the brink of famine. As of March 7, at least 20 people have died from starvation and dehydration, including a one-day-old infant, and 18 children have died, including 15 who were being treated at Kamal Adwan hospital.

In this article, Dabney P. Evans, PhD, associate professor of global health and director of Emory's Center for Humanitarian Emergencies, and Aryeh Stein, PhD, professor of global health, share their insights on what the latest developments mean for public health. The health care infrastructure of Gaza has deteriorated, leaving those who are sick, injured, pregnant, or seeking care forced to grapple with a bleak reality. Remaining hospitals are overwhelmed, under-resourced, and understaffed, limiting health care workers from being able to provide life-saving services.

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for Humanitarian Emergencies, and Aryeh Stein, PhD, professor of global health, share their insights on what the latest developments mean for public health.

### ASSESSING THE STATE OF DISPLACEMENT, DESTRUCTION, AND DISEASE

"What we know is that the displacement of people has been ongoing, and that people have now been displaced multiple times," says Evans.

At the start of the conflict, populations were urged to move south, and those residing in the middle of Gaza were also encouraged to move south. "Now we know there is a huge density of people living in the Rafah area [which includes more than 1 million displaced people]."

A March 5 Reuters article reports that only 12 hospitals in the area are "partially functioning," with just a single partially functioning hospital serving the north and 1.7 million or 75% of Gaza's population displaced. With large gatherings of people co-existing in close quarters, infectious diseases can get a strong foothold. COVID and respiratory infections are top of mind, but so too are other forms of infectious disease, including those that come from water, sanitation, and hygiene-related infections. As of March 8, 83% of groundwater wells were non-operational and about 57% of WASH-related facilities had been damaged or destroyed, according to the United Nations Office for the Coordination of Human Affairs website.

"We're hearing reports of 50 people in a two bedroom apartment, and it's just really impossible to imagine that



there's not some sort of sharing of viruses and diseases," says Evans. "Malnutrition is also going to make people more vulnerable to infectious diseases. Those with chronic diseases are even more vulnerable, for example, to an infectious disease or malnutrition.

At the same time, more than 300,000 people are still isolated in northern Gaza, where malnutrition has reached crisis levels and aid cannot get through.

### **FACING STARVATION, FAMINE, AND LONG-TERM CONSEQUENCES**

The threat of famine looms.

According to a statement from United Nations World Food

Programme Deputy Executive Director Carl Skau on February 28, famine could strike the area as soon as May. One in six children under the age of two are acutely malnourished.

"Children need food to grow," says Stein. "Children are more susceptible to infections because they haven't had them yet. Infections are energy intensive. The fever that we get with an infection is the body trying to eliminate the infection and heating. It takes energy to fight infections. If you aren't getting enough food, then the infection wins."

Undernutrition is responsible for almost half of all deaths of children under five world-wide. Children facing acute malnourishment are at risk of a number of health threats, including "muscle wasting, stunted growth, and medical complications like sepsis, meningitis, diarrhea, and severe anemia."

Stein notes that there are also long-term social and psychological effects of war, hunger, displacement, and trauma that can play out over a child's life course and that can present in various ways, including social development and cognition.

"By and large, kids who get the appropriate care in a clinical setting will recover," says Stein. "Whether they make a complete social and cognitive recovery, depends on the environment they're in. They will have been in the hospital for a while. They will have experienced multiple stressors, some of which are social, and the emotions around being hungry. It also depends on the age of the child and any infections that they may be dealing with. Those who tend to do the worst are the kids who have other comorbidities, making management that much harder."



*Photo by Majdi Fathi/NurPhoto via AP*

### **FIGHTING HUNGER, NAVIGATING WAR LOGISTICS**

Aid is currently not reaching the areas needing it most in the quantities necessary to prevent famine, though several recent efforts have aimed to increase the level and mode of supply delivery. Prior to October 7, approximately 500 trucks entered Gaza each day delivering food and supplies (including fuel, consumer goods, and medical supplies). Recent reports put the numbers closer to 150 trucks a day, with the World Food Programme urging an increase to at least 300 trucks a day to meet people's basic needs.

"That is far less than the normal demand," says Evans. "What we can conclude from that is there's no way that the basic material needs of the population are being met. And the way that we are seeing that show up is in individual cases of malnutrition, as in the cases of these deaths that have been reported as well as population-wide food scarcity and food insecurity."

Unlike an instance where a natural disaster or drought are preventing deliveries from reaching an area, or where food cannot grow, health consequences of this human-caused emergency can be averted.

"This is not a famine that is occurring as the result of a natural disaster. This is occurring because food supplies and humanitarian assistance have not been able to get to people. It's really a matter of political will to ensure that the humanitarian assistance can get into the territory of Gaza, and then we can talk about the logistics of getting it distributed equitably and geographically," said Evans. ■

# THE DATA DILEMMA

Rollins' new certificate program teaches students to navigate the complexities of data science.

By Kelly Jordan

**Data now come in all shapes and sizes, from -omics data and images to electronic health records and everything in between.** These data provide great opportunities for learning policies and clinical strategies that can improve health outcomes, but they also come with unique challenges. Today's public health researcher needs quantitative and computational training to understand these diverse data. Data now come in all shapes and sizes, from -omics data and images to electronic health records and everything in between. These data provide great opportunities for learning policies and clinical strategies that can improve health outcomes, but they also come with unique challenges. Today's public health researcher needs quantitative and computational training to understand these diverse data.

At Rollins, interest in advanced quantitative and computational skills has risen exponentially over the past several years. To meet the demand from students, and to contribute to the growing needs in the field, Rollins has been expanding its course offerings in these areas as well. This fall, the school is launching a new Data Science Certificate for enrolled master's students. Facilitated by the Department of Biostatistics and Bioinformatics, the program is open to students across academic departments at Rollins.

"We are hoping that this certificate will help our students obtain the set of skills needed to contribute to the field during this exciting time," says David Benkeser, PhD, associate professor of biostatistics and bioinformatics and director of the certificate program.

Students interested in enrolling in the certificate program are required to submit a declaration of interest form. No prerequisites are required and, as Benkeser notes, the program was intentionally designed to make it accessible to students across the school.

## FILLING THE GAP

"Rollins faculty have long been at the cutting edge of public health research, and we've offered courses along these lines for some time, but in the past, we've lacked the sort of structure to make sure that students were supported and advised during their training experience," says Benkeser.



"Our workforce needs to keep up with the demands of modern health research," he adds. "This requires a set of skills that has been lacking in the job market. Because the field is advancing so quickly, it is difficult for working professionals to keep pace with developments in these fields. The goal of the certificate is to augment the existing classical public health training that students receive at Rollins with a set of skills that allow them to fill this gap."

Students enrolled in the program complete four required courses (Introduction to R Programming for Non-BIOS Students or R Programming for BIOS Students, Data Science Toolkit, Machine Learning or Applied Machine Learning in Public Health, and Current Topics in Data Science), plus three to four hours of related elective credits. Certificate students also complete a data science-related applied practice experience, or three additional credit hours related to data science and an integrated learning experience.

"Our students need education and training to be prepared to face a new world where they are unlimited by the amount of information they can access," says Yang Liu, PhD, chair and Gangarosa Distinguished Professor of Environmental Health. "That abundance of information and knowing how to make sense of the huge amount of very noisy data require a very different mindset—one that is critical to the future of public health."

Liu notes that with a stronger emphasis on data science at Rollins, he expects to see a shift in the type of students attracted to advanced degrees in public health, including engineering students and hard science students.

"A projected continued explosion in the volume, complexity, and diversity of health data makes individuals with a combination of cutting-edge data scientific skills and a foundational understanding of public health principals essential to the future of the field," says Robert Krafty, PhD, chair of the Department of Biostatistics and Bioinformatics. "This Data Science Certificate program will not only train students to be successful in today's workforce but will also train the next generation of leaders who will shape the future of public health." ■



# *THE Art OF Healthy* **Communities**

Rollins faculty embrace the arts in their  
public health research, practice,  
and teaching.

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By **Shelby Crosier** • Illustration by **Anna Godeassi**

Portrait Photography by **Theo Gayle, Bita Honarvar, and Audra Melton**

**I**n recent years, there has been a growing movement supporting use of the arts in promoting health and well-being. Community outreach efforts and public health interventions using music, visual art, movement, and creative writing have long been proven methods for promoting healing and positive outcomes when used to treat and manage mental and physical illness. Evidence also shows that art can play a role in prevention and health promotion, from encouraging healthy behaviors to supporting child development, and making a positive impact on the social determinants of health.

As evidence mounts, using art as a public health tool has become increasingly common. Art has been used to build vaccine confidence, fight the opioid epidemic, encourage physical activity, and more. The following examples show how Rollins researchers have used art in different ways to foster healthier communities.

### **SUPPORTING MENTAL HEALTH WITH THE POWER OF STORYTELLING**

In the summer of 2020, racial and social tensions were high. On top of the national anxiety surrounding COVID-19, it also marked a year of unrest following the murder of George Floyd. Following that tumultuous summer, Emory University established the Arts & Social Justice Fellows Program. The initiative pairs Emory faculty with Atlanta-based artists to incorporate creative elements into various courses to inspire students to reflect on social inequities and promote change. Elizabeth Walker, PhD, teaching associate professor of behavioral, social, and health education sciences, participated in the inaugural cohort in fall 2020.

“Everything happening in the world at that time had a big impact on mental health, both broadly and for students,” says Walker. “I wanted to do the fellowship to use art to think through these difficult topics through a public health lens. It provided a way to help students create community and get them through this difficult time as well.”

Walker was paired with Okorie Johnson, a local cellist and composer, to teach the course, Prevention of Mental and

Behavioral Disorders. In this course, students learned about the risks and protective factors that influence mental disorders and explored how art can be used to change the narrative about mental health, build community, and bolster resilience. As a culminating project for the class, Johnson helped students write a poem based on class discussions about mental health and social justice. He then set it to music he composed and created a stirring video featuring students from the course.

By being vulnerable and creative together, students were able to build community, feel comfortable sharing their stories, and process difficult events.

“Stories and lived experiences are really powerful and important for the work that we do in public health,” says Walker. “And art is just another way to be able to powerfully share people’s stories.”

**CHECK OUT “Cohort 2020: Prevention of Mental and Behavioral Disorders” from Emory Arts & Social Justice on Vimeo at <https://vimeo.com/491811352>.**



**ELIZABETH WALKER, PHD, TEACHING ASSOCIATE PROFESSOR OF BEHAVIORAL, SOCIAL, AND HEALTH EDUCATION SCIENCES**

### **AMPLIFYING THE YOUTH EXPERIENCE THROUGH PHOTOVOICE AND THEATER**

For 10 years, Briana Woods-Jaeger, PhD, associate professor of behavioral, social, and health education sciences, has worked with colleagues and community partners on Youth Empowered Advocating for Health (YEAH), a program designed for youth to promote social action in their communities. A central component of the program is “photovoice,” a research approach in which community members use photography to describe their experiences, stories, and ideas for change.

“By implementing YEAH, we learned that the process of storytelling and using the arts to promote social change and community action are really powerful and something youth wanted to see more of,” says Woods-Jaeger. In response, she and her colleagues partnered with Atlanta’s Alliance Theatre to bring theater arts and storytelling into the YEAH curriculum and expand



the program to more communities.

This expanded program will begin in fall 2024 at six Boys & Girls Clubs of America across metro Atlanta in communities experiencing high rates of structural violence (when social structures or institutions harm people by preventing them from meeting their basic needs). Over the next three years, youth from 12 Boys & Girls Clubs will participate in the eight-week intervention.

In the first half of the program youth use photography to document community issues they are concerned about as well as strengths. Facilitators—including Alliance Theatre teaching artists, Boys & Girls Club staff, and Emory University students—then lead discussions about the photos, identify priorities, and help youth craft a theater performance that tells their stories. Through youths’ participation in this creative process, and engaging the wider community in watching their performances, Woods-Jaeger and her team hope to see positive changes in civic engagement, racial identity, and community violence prevention.

“Addressing the issues we’re focused on requires multilevel approaches that promote individual healing



**BRIANA WOODS-JAEGER, PHD, ASSOCIATE PROFESSOR OF BEHAVIORAL, SOCIAL, AND HEALTH EDUCATION SCIENCES**



and collective healing,” says Woods-Jaeger. “The arts are uniquely positioned to allow us to do that and to build on community strengths. I believe that solutions exist within communities and that the arts can help us tap into that potential and translate it into community-level impact.”

**WATCH THE VIDEO** to see how youth who participated in YEAH translated their photovoice themes into a short film to raise awareness of Kansas City's Black history at <https://youtu.be/IzyDcBzVhio>.

### HIGHLIGHTING YOUTH SLEEP DISPARITIES WITH PAINTING

Using visual imagery to promote understanding of public health issues is something that Julie Gazmararian, PhD, professor of epidemiology, has become very familiar with throughout the course of her career.

“I’ve done a lot of work around health literacy, and there’s been so much research demonstrating that pictures make more of an impact than looking at numbers and data tables,” she says. “When you’re dealing with different audiences, art is a common denominator and another way to communicate effectively.”

It is no surprise then that in 2019, Gazmararian jumped at the opportunity to participate in Science.Art.Wonder. The Atlanta-wide initiative, led by Emory University and Georgia Institute of Technology, pairs scientists with artists to produce creative works that communicate scientific research in accessible ways. She had recently finished a study of the relationship between sleep and academic performance in historically marginalized populations and was interested in using art to increase awareness of the topic. She was paired with artist David Denton, a Rollins student (now an alumnus) and painter.

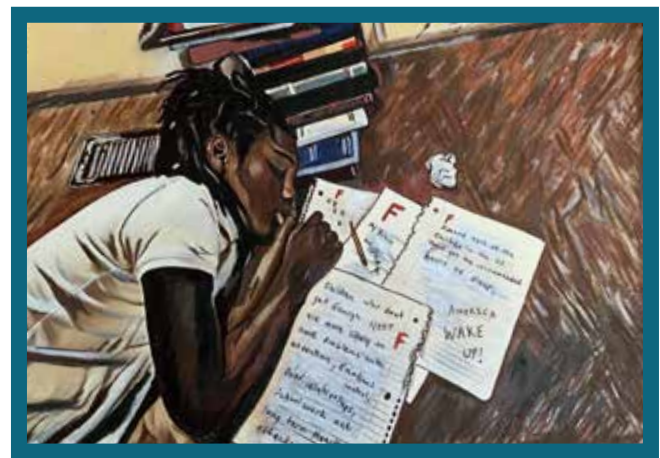
After meetings with Gazmararian to gain understanding about her research and share ideas, Denton produced three paintings about chronic sleep loss in Black adolescents. All three paintings feature his nephew as the subject.

“I was blown away by his work,” says Gazmararian. “There was just so much emotion in his paintings.”

Although the work was originally slated to be exhibited at the Atlanta Science Festival in March 2020, the event was cancelled because of the COVID-19 pandemic. Denton’s paintings, along with others from the fall 2019 class of Science.Art.Wonder, were displayed on Emory’s campus later that year.



JULIE GAZMARARIAN, PHD, PROFESSOR OF EPIDEMIOLOGY



PAINTINGS BY DAVID DENTON, A ROLLINS ALUMNUS AND ARTIST

## ADVOCATING FOR JUSTICE THROUGH STREET THEATER

Anna Mullany, PhD, a postdoctoral fellow in behavioral, social, and health education sciences, has long been interested in using art for activism and health promotion. She often uses street theater as a tool to educate others and advocate for social justice.

“There’s a long history of street theater being connected to activism and social issues, and there are a lot of examples of it being used in public health,” says Mullany. “I also understand public health as a political issue, embedded with health inequities and reflecting the serious societal issues that we face.”

When she taught public health communication to undergraduate students during her PhD program at University of Massachusetts Amherst, she knew she had to incorporate street theater into the class. She continued teaching street theater as a public health tool as a visiting professor at Clark University in Worcester, Massachusetts, where students in her health activism course wrote and performed skits on campus as their culminating project. During the course, students worked to understand the relationship between activism and public health and chose health issues that were important to them as the focal point of their skits. She recently shared her insights on theater as a learning tool in an article published in *Pedagogy in Health Promotion*.

For Mullany, street theater serves as an accessible and approachable health activism tool. The short length of skits and the visual impact of props make it an effective way to reach audiences from diverse backgrounds. Street theater can also shed light on hidden and stigmatized issues such as mental health and harm reduction.

“A lot of these issues are invisible to people who often can’t or don’t want to see them,” she says. “By making them visible out on the street, you’re interrupting that person’s day to say, ‘This is important, you need to see what’s happening.’ It’s a way to draw people in.” ■



ANNA MULLANY'S STUDENTS PRESENT THEIR STREET THEATER PROJECTS AT CLARK UNIVERSITY.



# FOOD FOR THOUGHT

Investigating the complex social, racial, and safety concerns associated with our nourishment in the South.

By **Kelundra Smith** • Illustration by **John Jay Cabuay**  
Portrait Photography by **Theo Gayle and Bitá Honarvar**

**T**ypically, when people living in urban areas need to buy food, they walk, drive, or take public transit to a grocery store, where they can select from an array of fresh produce and nonperishable items to feed their families. However, for people who live in low-income areas of Atlanta, fresh produce is much more difficult to find, according to the *Fresh Produce Access* report recently published by Rollins researchers.

In the City of Atlanta, where large chain grocers and farm co-ops are difficult to find, people in the poorest neighborhoods shop at convenience stores and small food stores for their day-to-day groceries. Many of these stores do not carry the types of fresh produce needed to develop and sustain a healthy, balanced diet. For residents in those low-income areas, lack of access to fresh fruits and

vegetables often leads to various health and wellness issues.

The root of the problem is not a matter of purchase orders and supply-and-demand. The journey from farm to fork is complex and multifaceted. Agricultural regulations, distribution channels, commercial and residential zoning laws, climate change, and a host of other factors affect who has access to what types of food in the United States.



## GOING TO THE SOURCE

Juan Leon, PhD, associate professor of global health, studies the farm side of the process. He is specifically interested in preventing disease outbreaks and illnesses stemming from the food-supply chain by improving grower health and the microbial safety of fresh produce worldwide. While the greatest risk of food contamination occurs closer to the fork portion of the farm-to-fork process—in grocery stores, restaurants, and people’s homes—it is important to work with the entire infrastructure in mind, notes Leon. Much of his research has focused on the U.S.-Mexico border, where a variety of people and products pass through daily. He began his research there in 2004 as a postdoctoral fellow under Christine Moe, PhD, Eugene J. Gangarosa Chair in Safe Water and Sanitation at Rollins.

At the time, Moe was looking at fruit and vegetable contamination on farms in the southern border states where 38% of agricultural exports from Mexico come into the U.S. When she had an opportunity to deepen her safe water and sanitation research, Leon took over the project and received a grant from the U.S. Department of Agriculture (USDA) in 2010. In the 20 years that Leon has been doing this work, he’s realized that access to nutritious foods depends on having clean water and safe work conditions for agricultural workers. For example, on farms where workers are being paid by how much food they pick per day instead of by the hour, people may not take lunch breaks or have paid sick leave, making them more likely to come to work sick.

“If we don’t have good places for farm workers



JUAN LEON, PHD, ASSOCIATE PROFESSOR OF GLOBAL HEALTH







to use the restroom, then fecal waste can contaminate food,” says Leon. “In agricultural fields or in restaurants, if food workers don’t wash their hands thoroughly, they can infect food and contaminate doorknobs, faucets, handles, etcetera.”

At the U.S.-Mexico border—where billions of pounds of fresh produce that Americans consume come into the country— it’s also impossible to ignore the social determinants of health and the impacts of race and policies. According to the 2022 USDA Economic Research Service, about 22 million people are involved in the farm-to-

fork chain, including farmers, fishermen, manufacturers, servers, farm supervisors, and many other agricultural workers. Looking at farmworkers, the National Center for Farmworker Health estimates that there are about 3 million farmworkers in the U.S., most of whom are people of color. These demographics show that the very people who grow fresh produce may be less likely to have access to it in their own communities.

“About 3% of the U.S. population is making sure that food gets to the table, but 100% of us eat that food,” says Leon. “We all have a role in supporting our food workers’ well-being and desire that the food we eat is of good quality.”

### **RESTOCKING THE SHELVES**

When fruits and vegetables safely leave the farm without being contaminated by viruses and bacteria, the journey to individual communities is still a precarious one. The

aforementioned *Fresh Produce Access* report notes that less than half of the 150 randomly selected small food stores in Atlanta offer fresh produce. It’s important to note that most of the store owners do not live in the ZIP codes where their businesses are located. This is in line with national and international trends.

Further, even national chains in low-income, predominantly Black communities, such as dollar stores, don’t offer fresh produce. Megan Winkler, PhD, assistant professor of behavioral, social, and health education sciences,

led the team that produced the report. She was surprised to learn that in Atlanta, “the disparities worsened among SNAP (Supplemental Nutrition Assistance Program) accepting stores because SNAP is supposed to be a dietary quality support safety net.”

Researchers from The Center for Science in the Public Interest found that dollar stores are second to big box stores in places where SNAP recipients purchase food.

In other work, Winkler and colleagues have found most small food store owners said they were simply responding to customer demand. People would rather buy ultra-processed foods because they have a longer shelf life and can feed more people for less money. However, the power of marketing and advertising to drive demand cannot be ignored, says Winkler. In the United States, ultra-processed food is prevalent and regularly advertised in media. In grocery stores of all sizes, products such as chips, sugary cereals, and candy have vibrant displays that make people want to buy them, while fruits and vegetables do not.

“If we looked at the shelf space in a grocery store and compared it to MyPlate [the USDA’s dietary recommendations plan], it wouldn’t line up,” says Winkler. “Our retail environment should look like our dietary guidelines. Half the grocery store environment should be stocked with fruits and vegetables because half your plate should be fruits and veggies.”

Winkler would like to see Atlanta go the way of Minneapolis, which became the first city to create a Staple Foods Ordinance in 2008. It requires licensed grocery stores (including corner stores, gas stations, dollar stores, and pharmacies) to sell a certain amount of basic food items, including fruits and vegetables, whole grains, eggs, and low-fat dairy. In conversations with small food store owners in Atlanta, Winkler said many expressed concerns about waste and profit loss. But there are ways for the city to incentivize compliance.

“We need to invest in this as a community,” says Winkler. “We don’t need to have the same expectations for all retailers. For dollar stores, we can create mandates because they have large revenues, resources, and scale. For smaller retailers, we need to create support from private and/or government dollars. We won’t see fast changes. We have to reteach communities that they have healthy options.”

### **CRAVING SOLUTIONS**

Significant shared consequences and costs are associated with disparities in fresh food access, whether people live in a low-income area or not. Increased health care



MEGAN WINKLER, PHD, ASSISTANT PROFESSOR OF BEHAVIORAL, SOCIAL, AND HEALTH EDUCATION SCIENCES







costs and higher taxes are two big-ticket items that affect all Americans. People who do not have access to fresh food and clean water are more likely to develop chronic illnesses such as diabetes, hypertension, high cholesterol, and cardiovascular disease. Consequently, in low-income areas, more people are in the public health care system who may rely on Supplemental Security Income earlier in life. Karen Siegel, PhD, assistant professor of global health and core faculty with Emory Global Diabetes Research Center, believes that one key to preventing such outcomes is a healthy diet.

Last year, Siegel received a grant from the Georgia Center for Diabetes Translation Research and a Synergy Award from the Woodruff Health Sciences Center to research the feasibility of developing a food prescription program within

the Emory Healthcare Network. In this program, when someone who is experiencing food insecurity shows signs of diabetes or pre-diabetes, they would be prescribed the necessary medications and a box of fruits and vegetables, along with recipes on how to prepare them. The hope is that receiving a weekly supply of fresh produce may lead people to make better food choices and improve their health in the long run.

Emory researchers are already involved in a program at Atlanta's Grady Memorial Hospital called Food As Medicine. In this program, an onsite food pharmacy and teaching kitchen are used to help patients better manage chronic conditions and make healthy lifestyle changes. Siegel is learning from Emory School of Medicine professors Jada Bussey-Jones, MD, and Rosette J. Chakkalal, MD, about how their work at Grady could translate into the larger Emory health system.

"We want to bolster local and regional food systems," says Siegel. "One thing people have said about produce prescription programs is that they are often short term. I want to partner with local growers to better connect them with consumers and places to sell produce in Atlanta."

Siegel's sense of urgency isn't unwarranted. Climate change has exacerbated shared health care costs due to increases in chronic illnesses. People living in low-income communities in Atlanta often deal with poor air quality, high heat indexes, and inequitable zoning laws that promote less than optimal health outcomes. These factors add injury to insult; most people live in these areas because of redlining, historic real estate practices resulting in racial segregation and a lack of investment in community infrastructure.

"When you have rising temperatures, changes in precipitation patterns, and extreme weather events, all of these climate factors can affect crop yields," says Christine Ekenga, PhD, Rollins assistant professor of environmental health.

Ekenga believes in the power of community-engaged health promotion—getting people to civically engage

around environmental justice. It's an essential step needed to increase access to nutritious foods. Ekenga's research focuses on chronic diseases, specifically cancers, that are linked to environmental injustices, such as lack of good soil to grow fresh produce in urban areas.

She and her team conducted community workshops in low-income areas of Atlanta to identify residents' concerns around climate change. Based on those concerns, the team used NASA satellite data to map green space, temperatures, and air pollution in residents' ZIP codes from 2002–2022. They found that over the past 20 years, people in the selected ZIP codes experienced more air pollution, less green space, and hotter temperatures than the rest of metro Atlanta.

Even if people in some of Atlanta's most vulnerable neighborhoods had access to healthy food, they would still have poorer quality air than other residents, thus widening the scope of problems to address. Policies must be put into place and/or changed to ensure that everyone has a healthy plate.

"We acknowledge that this is a big problem, but it requires collective action, such as starting a community garden, writing letters to a representative, supporting legislators who want to address climate change, and attending zoning meetings with neighbors," said Ekenga. "You have to get people, from the community to policy level, to believe their actions can make a difference."

Nutrition and health are cumulative. Every step in the right direction contributes to longevity. Rollins researchers have ideas about what can be done to improve conditions for people living in low-income communities throughout the South. All agree that laws and policies are at the core of changes that must be made.

For Siegel, it's shifting USDA farm subsidies toward fruits and vegetables and supporting farmers who are growing fruits and vegetables. Leon wants to see water, sanitation, and hygiene become a higher priority to ensure food safety and proper nutrition from farm to fork. In their report, Winkler and her colleagues emphasized the importance of adding tax incentives for retailers who carry fresh produce and for produce distributors capable of supplying corner stores with small orders and on-the-go fresh produce snacks that align healthier options with the convenience store business model.

"I can provide communities with resources in the way of data and examples of how people can reduce their carbon footprint, but they have to engage leaders and policymakers and advocate for action," said Ekenga. "This isn't something that can be solved by me, you, and a couple of people in a room. It's a global issue and we have to encourage legislation." ■



KAREN SIEGEL, PHD, ASSISTANT PROFESSOR OF  
GLOBAL HEALTH AND CORE FACULTY WITH EMORY  
GLOBAL DIABETES RESEARCH CENTER



CHRISTINE EKENGA, PHD, ROLLINS ASSISTANT PROFESSOR  
OF ENVIRONMENTAL HEALTH



HAVE WE ENTERED A  
**POST-ANTIBIOTIC AGE?**

**Global antimicrobial resistance poses a dire and growing threat.**

By **Martha Nolan** • Illustration by **Kathleen Fu**

Portrait Photography by **Bita Honarvar**

**I** imagine a time when the drugs doctors have prescribed for years to treat common illnesses no longer work.

When everything from a bout of strep throat to wisdom teeth extraction could be lethal. When many of the miracles of modern medicine, from chemotherapy to organ transplantation, are no longer possible.

Experts say that time is approaching if we are not able to restrain the formidable and growing threat of antimicrobial resistance (AMR). In fact, the World Health Organization (WHO) has identified AMR as one of the top global threats facing humanity, and some scientists say we are rapidly approaching a post-antibiotic age.

“I’m not sure the general public truly understands how great a danger AMR is,” says Maya Nadimpalli, PhD, assistant professor of environmental health. “Like climate change, the impacts of AMR are cumulative and move more slowly than a pandemic like COVID-19, so they don’t

induce the same kind of panic. But the repercussions AMR is going to have on population health will be massive and absolutely devastating.”

AMR has been around as long as there have been antimicrobials—the medicines, including antibiotics, antivirals, antifungals, and antiparasitic drugs, used to treat infectious diseases. Just a year or so after penicillin was introduced for widespread use during World War II, pathogens resistant to it were recorded. “That’s just how bacteria work,” says Nadimpalli. “They naturally compete for nutrients and space. When they are exposed



to antibiotics, some will develop mechanisms to withstand them. Then, when antibiotics knock out the nonresistant bacteria, there is more room and resources for the resistant bacteria to thrive.”

But the rate at which bacteria are developing this resistance is accelerating. According to the WHO, from 1930 to 1950, the average time it took for resistance to develop to new antibiotics was 11 years. That window dropped to just two to three years from 1970 to 2000.

What is fueling this surge in AMR? Overuse and misuse of antibiotics in both human and animal health care are considered the main drivers. In some parts of the world, antibiotics are readily available without a doctor’s prescription. In more regulated sectors, physicians too often prescribe antibiotics when they are not needed—to treat a viral infection, for example—and/or patients stop the regimen before it has been completed. In animal husbandry, farmers more and more often use antibiotics to promote animal growth rather than to treat infections.

Once a germ develops antimicrobial resistance, it can share its resistance mechanisms with other germs that have not been exposed to antibiotics or antivirals. All these AMR strains can spread through human-to-human and animal-to-human contact, as well as through nonhygienic water and sanitation conditions.

Today, AMR contributes to an estimated 5 million deaths a year. Once confined primarily to health care settings like hospitals, drug-resistant infections have proliferated in community settings over the past 10 years. As a result, diseases such as pneumonia, tuberculosis, and gonorrhea, to name a few, are becoming much more difficult, and sometimes impossible, to treat.

“The time to act on AMR is now,” says Nadimpalli. “Otherwise it may be too late.”

### **TUBERCULOSIS AND ANTIMICROBIAL RESISTANCE**

Up until the coronavirus pandemic, tuberculosis (TB) had been the leading cause of death by a single infectious agent for centuries. It may be no surprise, then, that drug-resistant TB is a major contributor to antimicrobial resistance worldwide and is one of the leading causes of antimicrobial-related deaths.

There is (relatively) good news in the TB story. Although about a half million new cases of drug-resistant TB occur each year, that number has remained relatively stable for the past two decades. “There has been a huge global effort toward addressing drug-resistant TB, and a lot of progress has been made in developing better diagnostic tests and better treatment,” says Sarita Shah, MD, professor of epidemiology and global health and a director of the



SARITA SHAH, MD, PROFESSOR OF EPIDEMIOLOGY AND GLOBAL HEALTH AND A DIRECTOR OF THE EMORY/GEORGIA TB RESEARCH ADVANCEMENT CENTER’S CLINICAL & POPULATION SCIENCE CORE



Emory/Georgia TB Research Advancement Center’s Clinical & Population Science Core. “As a result, more people are getting diagnosed and started on the correct treatment than ever before.”

The bad news is that drug-resistant strains of TB are becoming *more* resistant. “Through our early work with laboratories that are part of a global network, we showed that drug-resistant TB is becoming resistant to more and more drugs,” says Shah. “We came up with a term for it—extensively drug-resistant tuberculosis, or XDR-TB. These are strains of TB that are not resistant to just one or two antibiotics, but four or more, making it much more difficult to treat and cure.”



Treatment of normal, nondrug-resistant TB requires a regimen of four different antibiotics taken for six months. While this is difficult enough, treatment of drug-resistant TB involves four or five antibiotics, one of which is given by daily injection. It's easy to imagine the difficulties in following doctors' orders, particularly when the medications make you feel even sicker because of side effects. In many countries, including the U.S., one or more of the prescribed drugs could become out of stock. The patient might not be able to afford

all the drugs or have transportation to get them. As such, many assumed adherence failure was the primary driver of drug-resistant TB, including XDR-TB.

However, work by Shah and her colleagues looking at XDR-TB in South Africa was instrumental in demonstrating that most people who get drug-resistant TB don't develop it from failing to follow their treatment regimen. Rather, they get infected at the outset with an already resistant strain of TB. "That was a real sea change in the way we think about drug-resistant TB," says Shah. "People who had never had TB before were showing up with XDR-TB, so it wasn't because of failure to take medications correctly."

Currently, Shah's team is working to test another assumption: that most drug-resistant TB is transmitted in hospitals, health care facilities, or homes. Shah believes transmission often occurs in community settings. Her research team is also monitoring for the emergence of resistance to new drugs for TB—how often it is happening and what molecular mutations are causing the resistance—in the hopes that knowledge could be used to make new diagnostic tests and tailor treatment accordingly.

Additionally, Shah hopes her findings will help inform interventions. While regimen compliance and development of new TB antibiotics as resistance develops are important

all the drugs or have transportation to get them. As such, many assumed adherence failure was the primary driver of drug-resistant TB, including XDR-TB.

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in LMIC populations, more emphasis should be placed on stopping the spread of TB in the first place and addressing social determinants that increase vulnerability to TB disease.

“This requires investing in efforts like community wide infection control; water, sanitation and hygiene; nutrition; and health care access” says Shah. “It’s hard to get people to invest in these things. They are not flashy or exciting. TB has survived for millennia, and it is going to continue to find ways to become resistant. I hope the research that we are doing will help us stay just one step ahead of it.”

### BYSTANDER EXPOSURES

Elizabeth Rogawski McQuade, PhD, assistant professor of epidemiology, studies pediatric enteric (intestinal) disease in low-resource settings. She has a lot of material to work with. Enteric infections are a leading cause of death in children in LMICs, and they are a likely contributor to the development of antibiotic resistance.

“Diarrhea from enteric pathogens is just so common and so recurrent in children in these settings,” says McQuade. “At the same time, antibiotics are readily available without a prescription in many of these places. In South Asia, for example, you can pretty much walk into any pharmacy and get antibiotics. So these children may be getting an antibiotic when they don’t need one. Or they may be getting the wrong antibiotic. Or they may not take an appropriate dose. It’s totally the Wild West in many places when it comes to using antibiotics.”

It’s little surprise, then, that enteric pathogens in these settings develop AMR, and many antibiotic stewardship activities in these settings have focused on curtailing the overuse of antibiotics for diarrhea.

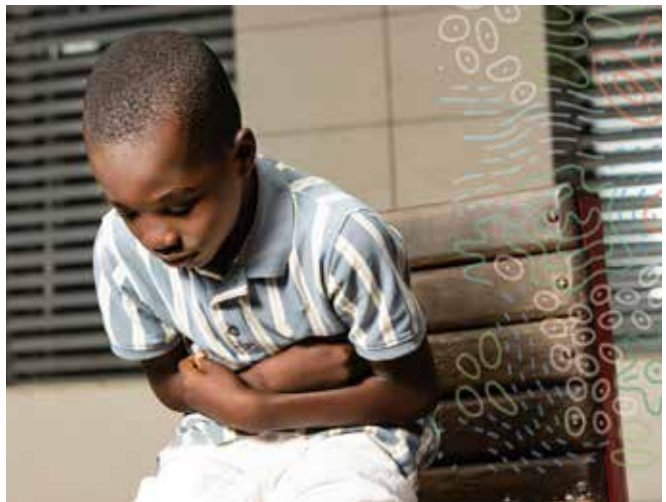
McQuade contends that focus needs to be expanded to include overuse of antibiotics for respiratory diseases as well. The reason: Children in LMICs tend to have a host of pathogens—many asymptomatic—residing in their guts. “When a child takes antibiotics for a respiratory infection, *all* the bacteria in their gut gets exposed to those antibiotics, not just the bacteria causing the illness,” says McQuade. “That means they *all* can become resistant and be passed to others.”

And, in fact, they do. McQuade and her colleagues looked at data from a previous large cohort of children in eight low-resource countries. The study collected, among other things, monthly stool samples and detailed information on illnesses and antibiotic use. By analyzing this data, McQuade and her team determined that each asymptomatic pathogen they looked at had more than seven antibiotic exposures per year.

“This is called bystander exposure, and we found that it is shockingly common,” says McQuade.



ELIZABETH ROGAWSKI MCQUADE, PHD, ASSISTANT PROFESSOR OF EPIDEMIOLOGY

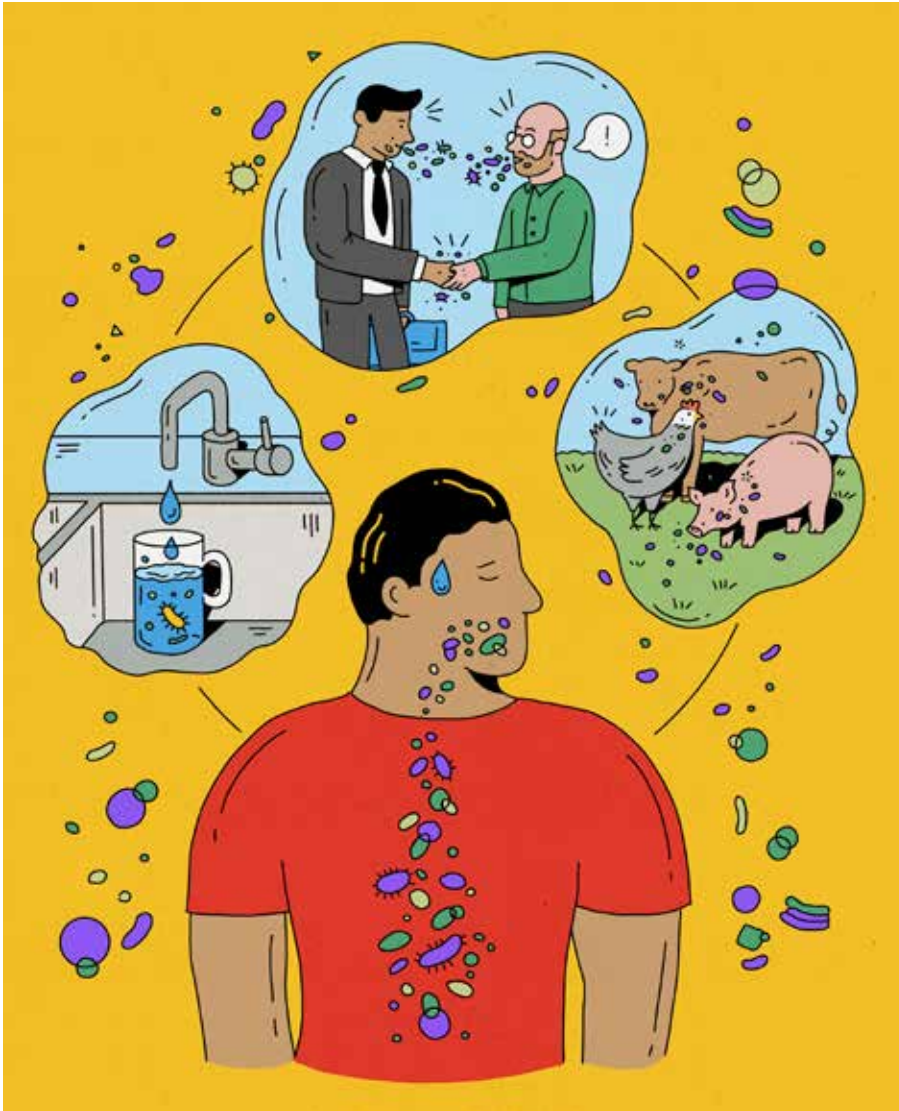


She found respiratory infections accounted for more bystander exposure than enteric infections, suggesting antibiotic overuse in both instances needs to be targeted. But she acknowledges that both are a tall order.

“It’s really hard to change treatment practices,” she says. “Once a child is sick, it’s really hard to withhold antibiotics if they could help. That’s even true in high-resource settings like the U.S., but even more so in low-resource settings where the children are already so vulnerable.”

Which leads McQuade to another area of interest—vaccines. Indeed, vaccines have already been shown to effectively reduce antibiotic use and improve AMR in rotavirus and pneumonia. Her team is looking at the promise of a potential vaccine for *Shigella*, the leading cause of diarrhea in children.





high-resource countries, or the so-called Global North, it likely will not prove as effective in the lower resource settings of the Global South.

“So often, people think we just need to reduce antibiotic use in humans and that will solve the problem,” says Nadimpalli. “But it turns out antibiotic use isn’t as high in some settings in the Global South as previously thought. In fact, more children in LMIC countries die from inadequate access to antibiotics each year than drug-resistant infections, so there must be more to the story than that.”

Nadimpalli thinks that story needs to include how animal and environmental reservoirs contribute to the spread of AMR pathogens—a “One Health” perspective that recognizes that the health of people, the health of animals, and the environment are connected.

In many LMICs, a growing middle class is fueling demand for meat. In response, more and more farmers are using more and more antibiotics to promote growth in their livestock, poultry, and aquatic animals. The connection between animals and humans tends to be more intimate in lower resource

The team did a simulation study to quantify the impact of potential *Shigella* vaccines on antibiotic use. The vaccine would be expected to prevent about a third of antibiotic treatments for *Shigella* diarrhea episodes and bystander exposures due to shigellosis treatment. However, because the reductions in total antibiotic use are expected to be small, vaccines in combination are likely needed.

Says McQuade, “By doing this type of study, we hope to show policymakers and ministries of health that investments in vaccines could result in a huge impact on levels of AMR, which is a huge priority.”

### A ONE HEALTH APPROACH

Worldwide, efforts to curb AMR have focused on reducing antibiotic misuse in humans and developing new antibiotics. While that strategy may work well in

settings than in high. Pigs and chickens roam freely in the yards and even homes of small farms, which tend to be close to population centers rather than far removed. Consumers interact with livestock in live and wet markets. And food safety regulations in these areas tend to be quite lax.

To see if this proximity could lead to “leaks” of AMR pathogens between animals and humans, Nadimpalli and her research team looked at strains of antibiotic-resistant *Escherichia coli* collected from people and meat products sold at markets in Cambodia. They found strikingly similar genes in both, suggesting they had been exchanged at some point between humans and animals.

“In these types of settings, we have to find ways to block that circular transmission of bacteria between humans and animals,” she says.

That circle can also include the environment. Inadequate



MAYA NADIMPALLI, PHD, ASSISTANT PROFESSOR OF ENVIRONMENTAL HEALTH

sanitation and hygiene measures mean water sources can become contaminated with animal and human waste carrying AMR pathogens. Humans can consume or bathe in this water, and it can also be used to grow vegetables that might be eaten raw.

Plugging those leaks will require investments in water, sanitation, and food safety infrastructure.

“Ensuring consistent access to clean water and sanitation can improve people’s health and well-being in so many ways,” says Nadimpalli. “We’ve suspected that it could also help antibiotic resistance, but our findings show that access to clean water and safe disposal of fecal waste is actually critical—for both humans and food animals—if we want to have a fighting chance at preserving antibiotics for human health.”

Nadimpalli acknowledges these types of improvements are big-ticket items requiring huge investments. “A lot of funding flows from the Global North and focuses on the priorities of high-income countries, specifically reducing antibiotic use,” she says. “But what is needed in the Global South is very different. The greatest need is reducing the burden of infectious disease, and that requires investing in clean water and basic sanitation. Otherwise we are fighting a losing battle.” ■

## BREASTFEEDING TO FIGHT AMR



**P**eople in low-resource countries may have an overlooked resource in their arsenal to combat antimicrobial resistance: breastfeeding. That’s the conclusion drawn by Maya Nadimpalli, PhD, assistant professor of environmental health, using data from an observational study of children in Lima, Peru.

Her study team had collected surveillance data every day for the first two years of the children’s lives. The researchers tracked how long each child was breastfed, which antibiotics they took and when, and the presence of a very drug-resistant strain of *E. coli* in stool samples.

Perhaps surprisingly, the team did not see any association between exclusive breastfeeding and the presence of the drug-resistant *E. coli* within the first six months of life. However, they did see a dramatic difference in children who continued to be breastfed after six months. These children, even when they were eating solid foods and drinking other liquids, had a 60% reduced risk of harboring drug-resistant *E. coli* than their counterparts who no longer breastfed.

Nadimpalli is not sure why breastfeeding during this time conferred such protection. It could be because the breastfed children were exposed less often to foods and drinks contaminated by unclean water. Or because the components in breast milk could make the children’s guts a less hospitable environment for drug-resistant bacteria.

Either way, her findings could empower people in these settings. “In low- and middle-income countries, fighting AMR requires big, costly institutional changes to improve water, sanitation, and hygiene,” says Nadimpalli. “Those things are out of the control of individual families. But breastfeeding is something that mothers can do to potentially protect their children from dangerous resistant bacteria. And supporting breastfeeding among mothers is something governments can do to help prevent the spread of AMR in their communities.”





# THE BURDEN OF BRUNSWICK

Haunted by decades of industrial pollution, a coastal community in Georgia has partnered with Rollins researchers in hopes of shedding light on the toxic substances hidden in their midst.

By **Russell McLendon** • Illustration by **Lucy Rose Cartwright**  
Portrait Photography by **Audra Melton**

**A**nita Collins is angry. Throughout her hometown of Brunswick—a historic port city nestled among salt marshes on the Georgia coast—friends and neighbors are struggling with cancer, kidney disease, autoimmune conditions, and other serious health problems.

Collins, like many in Brunswick, suspects these are more than just isolated illnesses. She's worried they're signs of a deeper danger plaguing her city—and she's mad so little has been done. "It is painful. I am angry, and for so long nobody's really given a darn," says Collins.



Brunswick is blessed with natural beauty and resources yet cursed by the toxic legacy of industrial sites congregated around the city over the past century. While these facilities often provide high-paying jobs, some have released staggering amounts of long-lasting pollutants into the environment for years or decades.

Despite ongoing efforts to remediate environmental damage at some sites, too little attention has been paid to the human consequences, says Kavanaugh Chandler, MD, a physician and CEO of Coastal Community Health in Brunswick, a federally qualified health center.

“We can never forget to make sure that the focal points in all of this are the communities that live within this,” Chandler says. “The communities that are perhaps experiencing some level of trauma, whether it's directly or indirectly associated with this.”

To that end, researchers from the Rollins School of Public Health—at the invitation of the community—launched a project last year to examine how Brunswick’s pollution affects residents. Rather than swooping in to gather data and leaving, researchers have worked with affected communities as partners, teaming with Brunswick-

based organizations such as Coastal Community Health, the Environmental Justice Advisory Board, the Urbana/Perry Park Neighborhood Planning Assembly, One Hundred Miles, the Glynn Environmental Coalition, Eco-Action, and the Coastal Equity and Resilience Hub.

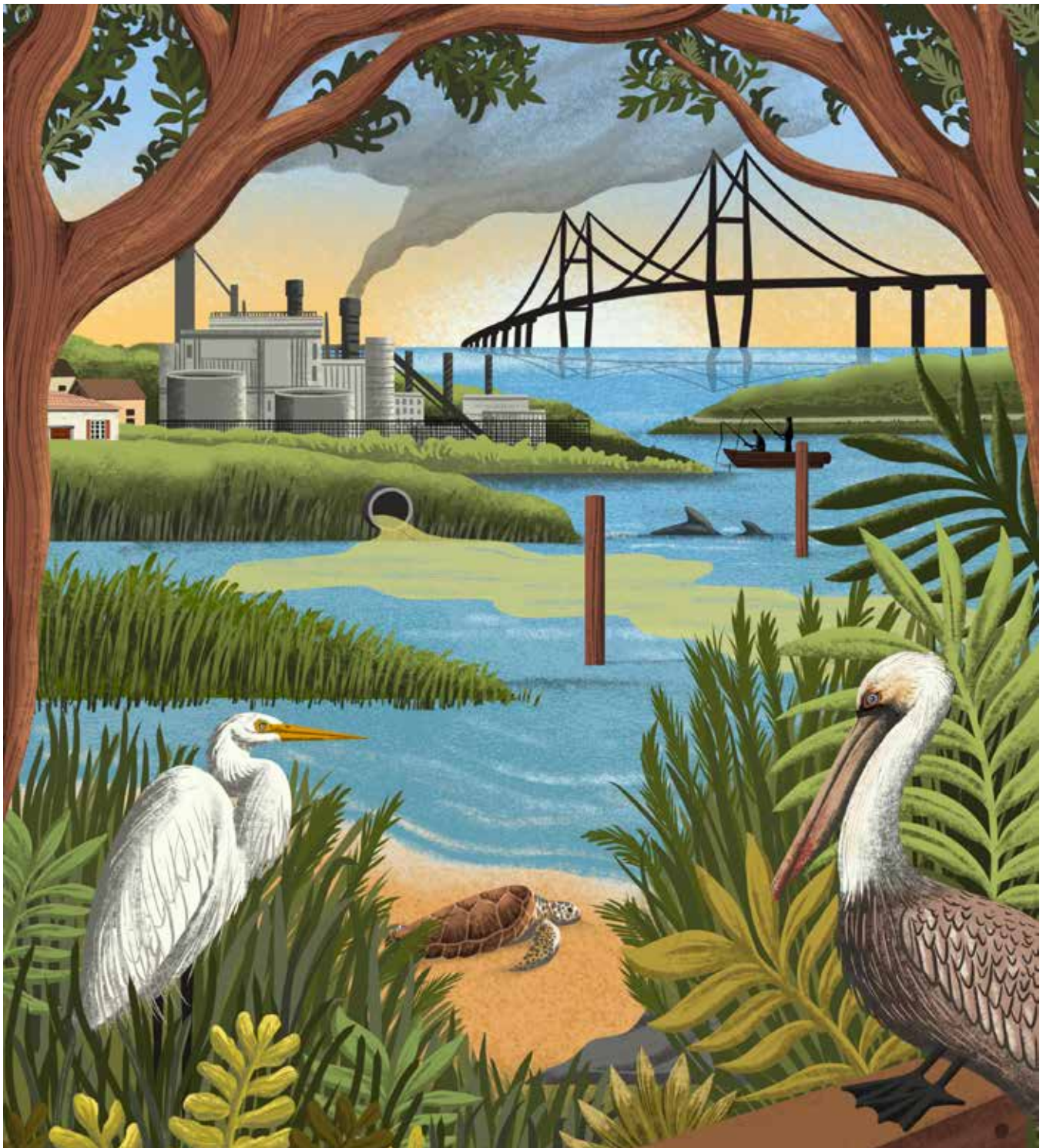
“They had people come into Brunswick previously and do research, but they never found out what the results were,” says Dana Barr, PhD, professor of environmental health and a member of the research team. “People would come in, take some samples, and they never followed up with the community. So I think [the community] was quite distrustful at first.”

### **TOXIC RELATIONSHIPS**

Brunswick is the county seat of Glynn County, which has 14 sites on Georgia’s statewide Hazardous Sites Inventory, including four federally managed sites on the Superfund National Priorities List—more than any other Georgia city.

These four include the LCP Chemicals Superfund site, where an oil refinery, power plant, and chloralkali facility took turns releasing multiple hazards—namely polychlorinated biphenyls (PCBs), polycyclic aromatic





hydrocarbons, mercury, and lead—into the surrounding area between 1919 and 1994.

There's also the Hercules 009 Landfill Superfund site, where Hercules Inc. spent three decades dumping waste in a 7-acre landfill, including sludge contaminated with toxaphene, a durable insecticide the U.S. Environmental Protection Agency (EPA) classifies as a probable human carcinogen. Tests have found toxaphene levels up to 15,000 parts per million at the site, according to the EPA,

and lower levels in the front yards of some nearby homes.

The same company is also responsible for the Terry Creek Dredge Spoil Areas/Hercules Outfall Superfund site, where it discharged more toxaphene-laden sludge into a salt marsh tidal creek ecosystem, adjacent to a residential neighborhood and near an elementary school.

Glynn County also has several other, less notorious sites still teeming with contaminants, including arsenic, benzene, cadmium, dioxin, lead, mercury, and toluene. The chemical



company Pinova recently committed to shutting down a 110-year-old factory in Brunswick—the former Hercules plant—due to damage from a 2023 fire.

Industries are likely drawn to Glynn County partly for its geography, Barr says, including port access as well as creeks and marshes for discharging wastewater. But there's another factor that may help explain the way factories have clustered there: Polluting industries in the United States are infamous for gravitating toward communities of color and lower-income areas.

“There is a lot of wealth in the county, especially along the coast,” says Melanie Pearson, PhD, a research team member and community engagement expert. “Brunswick, however, where these industrial facilities exist, is much more under-resourced, has less economic opportunity, and is predominantly a community of color within the city limits. While we can't say for sure why the facilities are located where they are, we can say there is definitely a disparity in the surrounding community in terms of who's exposed.”

While much of this toxic burden dates back decades, the county is still experiencing new pollution today, points out Allen Booker, who grew up in Brunswick and now serves as Glynn County Commissioner for District 5.

“You have to have people with ethics all up and down the chain with these companies,” says Booker, also a representative of the Environmental Justice Advisory Board. “And that hasn't always been the case.” At the same time, government agencies have a duty to rein in polluters, he adds. “We pay them as taxpayers to make sure these companies operate the way they're supposed to. But that isn't always done.”

The private and public sectors have both failed the people of Brunswick, Booker says, allowing chronic desecration of their environment with substances few people would choose to live near.

“If your family lived here, that is the standard they should be regulating these companies by,” he says.

### WISDOM LISTENS

People in Brunswick have worried about pollution for a long time yet felt ignored. They've drawn more attention in recent years, though, as community leaders built relationships with the University of Georgia Marine Extension Service, which eventually brought in other academic partners—including Rollins researchers hoping to collaborate on new projects.

“They wanted community input. So I suggested we do a health fair, but a different kind of health fair,” Booker says. “Instead of just passing out a bunch of information,



MELANIE PEARSON, PHD, ASSOCIATE PROFESSOR OF ENVIRONMENTAL HEALTH, RESEARCH TEAM MEMBER, AND COMMUNITY ENGAGEMENT EXPERT



NOAH SCOVRONICK, MELANIE PEARSON, AND JOSIAH (JAZZ) WATTS CATCH UP AT THE SOUTHEASTERN REGION ENVIRONMENTAL JUSTICE SUMMIT IN ATLANTA.





NOAH SCOVRONICK, PHD, ASSISTANT PROFESSOR OF ENVIRONMENTAL HEALTH

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we do it in increments and where the information is explained to people, but also where the researchers are able to get feedback from the community residents.”

In their proposal for the project, Barr and principal investigator Noah Scovronick, PhD, assistant professor of environmental health, were deliberately noncommittal. “They wrote it with a lot of flexibility, saying, ‘We are proposing to respond to the concerns in this community,’” Pearson says. “The project was funded with that flexibility. So then Noah was able to go back to the community and say, ‘OK, now we have this funding, what would *you* like to do with it? What are *your* concerns?’”

While the researchers had considered studying local threats from climate change, the message from the health fair and other conversations with residents was clear, Scovronick says.

“They told us what it was like to live and grow up and work there, not knowing whether it was affecting their health,” he says. “Once they found out we have the capability to look at whether these chemicals from the hazardous sites were getting into people’s bodies, which is one of Dana’s areas of expertise, they invited us to do the study. So we gave them options of what we were able to do, and they asked us to do this human exposure study.”

### RESULTS AND REACTIONS

The researchers took blood samples from 100 people, all residents of Brunswick for at least 40 years, and tested for several contaminants.

Preliminary results suggest a substantial number of participants do have higher-than-normal blood levels of toxaphene and certain PCBs, chemicals now banned in the U.S. and considered probable human carcinogens.

“We haven’t done any environmental pathway samples, so we don’t know necessarily where they’re getting the exposure,” Barr says. “But we do know certain PCBs are pretty prevalent in everybody in the U.S., primarily from consumption of meat and dairy. And those particular PCBs were not elevated in this population. They were similar to the U.S. population.”

Instead, participants showed high levels of a specific PCB mixture, found in a product known as Aroclor 1268, that—like toxaphene — was once produced in Glynn County.

“The fact that these PCBs were specific to this one Aroclor used there probably suggests their exposure is something unique to their environment,” says Barr.

“You cannot ignore what the data has shown,” Brunswick resident Anita Collins says. “I just want more people to see the significance of environmental damage that has been heaped upon this community for so many

years. We cannot be silent about it, and we should not be silent about it. And yeah, we should be angry about it as well. Even though [these companies] put food on the table and paid the house note, people are still suffering, and many don't know why.”

The Rollins project is one small pilot study, the researchers point out, and they're still finalizing the results for publication. The team is committed to continuing to work in Brunswick and has applied for funding to hopefully expand the effort “quite substantially,” Scovronick says.

Many in Brunswick appreciate the research team's transparency and inclusivity, Collins says. Community members have played key roles in guiding the project, and many join the researchers for a weekly video conference.

“The researchers have been very receptive and very real,” she says. “And what I mean by that is just very attuned to the fact that, without the community being aware and involved, you really didn't do the research that you intended to do. And therefore, fortunately, there's been good feedback as well as more engagement, more people who want to participate in a future study, if that materializes.”

The team has proposed several new investigations, including an exposure health study to look for any prevalent health outcomes in Brunswick that might be related to exposures. Other ideas include examining the toxicity of specific pollutants and studying how increased flooding in Glynn County might affect its many toxic waste sites.

If the project does expand, researchers will continue to shape it jointly with their partners in Brunswick. “They're very engaged. They are co-leads of this effort,” Pearson says. “We decide everything together as a coalition of partners.”

Partnering is key to the project's success, Chandler adds.

“I'm very grateful for Rollins' involvement. We want to make sure this research doesn't forget the individuals,” he says. “All of the resources, all of the effort has to be led with the mindset of putting people first.” ■



DANA BARR, PHD, PROFESSOR OF ENVIRONMENTAL HEALTH AND A MEMBER OF THE RESEARCH TEAM



SCOVRONICK PRESENTS PRELIMINARY STUDY RESULTS TO THE BRUNSWICK COMMUNITY IN SEPTEMBER 2023.



ROLLINS RESEARCHERS AT AN IN-PERSON MEETING IN SUMMER 2023 WITH THEIR COMMUNITY PARTNERS.



# VISUALIZING THE MATERNAL AND REPRODUCTIVE HEALTH CRISIS IN GEORGIA

Data snapshots highlight the extent of the challenge.

By **Kelly Jordan** • Illustration by **Alex Nabaum**





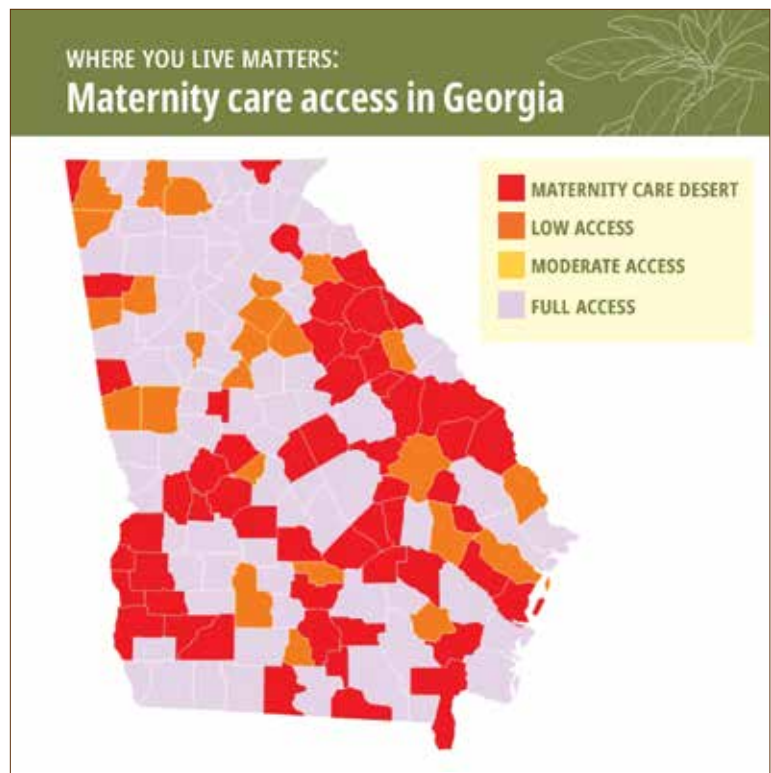
# Restrictions to reproductive rights, limited access to health care during pregnancy, and rising health care costs have placed a significant burden on women's health in Georgia.

The toll is particularly great for those residing in rural or low-income areas, where barriers to care may also include a limited (or nonexistent) health workforce and minimal transportation options to access treatment. Racial disparities, too, continue to impact women's lives, with Black women—regardless of income, and those covered by Medicaid or who are uninsured—experiencing disproportionate rates of death associated with pregnancy and the postpartum period. The issues examined here are prevalent across the state and could be addressed through policy changes.

## MAPPING MATERNAL HEALTH DESERTS

The United States ranks worst among developed nations in the world for pregnancy-related deaths—defined as deaths occurring during pregnancy or within one year of the end of pregnancy.

Several factors contribute to the high U.S. maternal mortality rate, including systems-level factors. These include a lack of affordable access to quality prenatal and postpartum health care, barriers to mental health and substance use screening and treatment, and individual-level barriers—such as individuals' co-morbidities, social determinants of health, lack of social support, and experiences with discrimination and racism from the medical community. Maternity care deserts, or areas that lack designated maternal health care providers (such as OB-GYNs or certified nurse midwives), are a major barrier for birthing persons seeking the care they need to protect their health and the health of their infants.



THIS DATA VISUALIZATION ILLUSTRATES THE NUMBER OF OB-GYNs BY PUBLIC HEALTH DISTRICTS ACROSS THE STATE OF GEORGIA, WITH NOTICEABLE DISPARITIES IN RURAL DISTRICTS ACROSS THE STATE. RELATEDLY, MARCH OF DIMES GRADES GEORGIA WITH A F FOR ITS RATE OF PRETERM BIRTHS. © 2024 MARCH OF DIMES, A NOT-FOR-PROFIT, SECTION 501C(3).

CITATION: FONTENOT, J, LUCAS, R, STONEBURNER, A, BRIGANCE, C, HUBBARD, K, JONES, E, MISHKIN, K. WHERE YOU LIVE MATTERS: MATERNITY CARE DESERTS AND THE CRISIS OF ACCESS AND EQUITY IN GEORGIA. MARCH OF DIMES. 2023.

**TRACKING THE HIGH COST OF MATERNAL CARE**

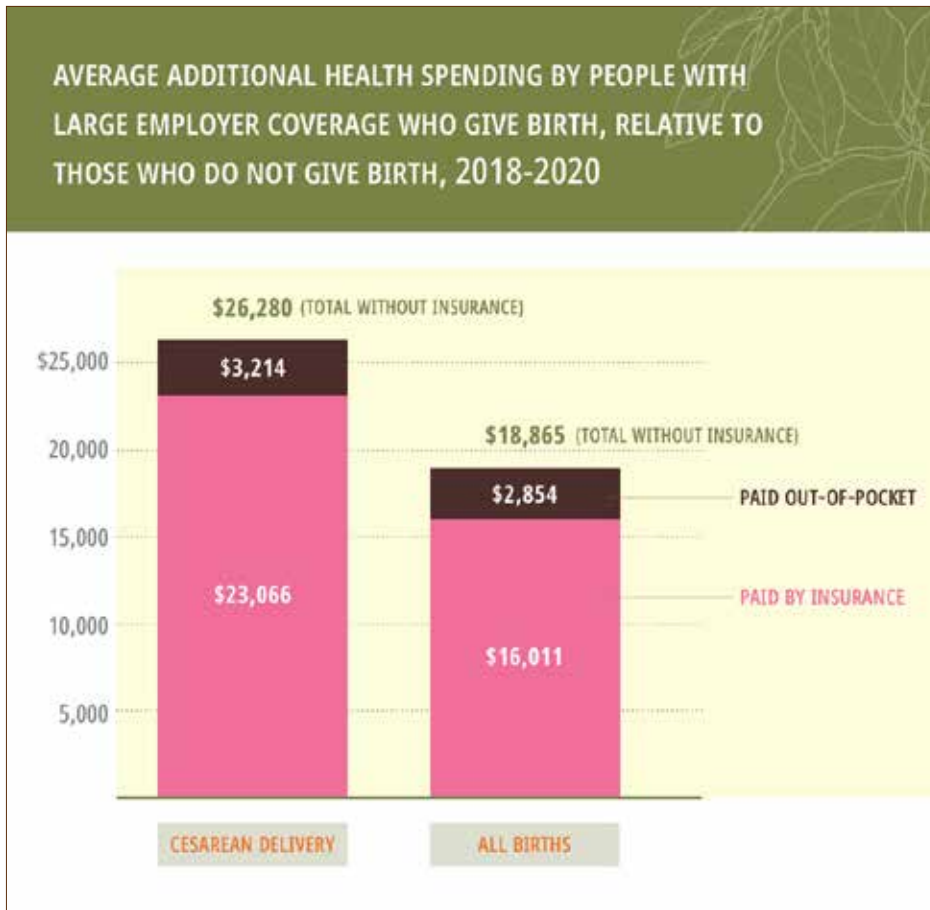
In addition to the lack of maternal health care resources available to many in rural areas, other structural barriers prevent pregnant persons from accessing needed care. These include limited medical leave workplace policies, limited insurance coverage, and high out-of-pocket costs for maternity care. Some birthing persons, especially those in part-time and low-wage positions, have limited time off for health care appointments or limited medical or family leave policies after the birth of an infant. Relatedly, they are less likely to have full insurance coverage or be able to afford maternal health care.

Costs associated with pregnancy, labor, and delivery can be life-altering, especially without insurance. Peterson-KFF’s Health System Tracker identified the average costs of labor and delivery clocking in at \$18,865 without insurance (\$26,280 for Cesarean delivery) and \$2,854 out-of-pocket for enrollees on major health plans (\$3,214 for Cesarean delivery). These costs are for uncomplicated deliveries, with additional life-saving procedures, surgeries, lengthened hospital stays, and time in the NICU escalating costs further. And, according to March of Dimes data, as of 2021, about 1 in 6 women of childbearing age were uninsured in Georgia.

These numbers align with the fact that the state’s poverty rate is at 12.9%, and at 17.2% for those under 18, based on 2022 Census data. In Georgia, the average household income was \$71,355 in 2022 dollars, and the weighted poverty threshold for a family of four was \$26,496 in 2020.

Researchers note that expanding Medicaid could help alleviate this burden and prevent maternal deaths and improve the pregnancy and postpartum health of birthing persons and their infants across the state.

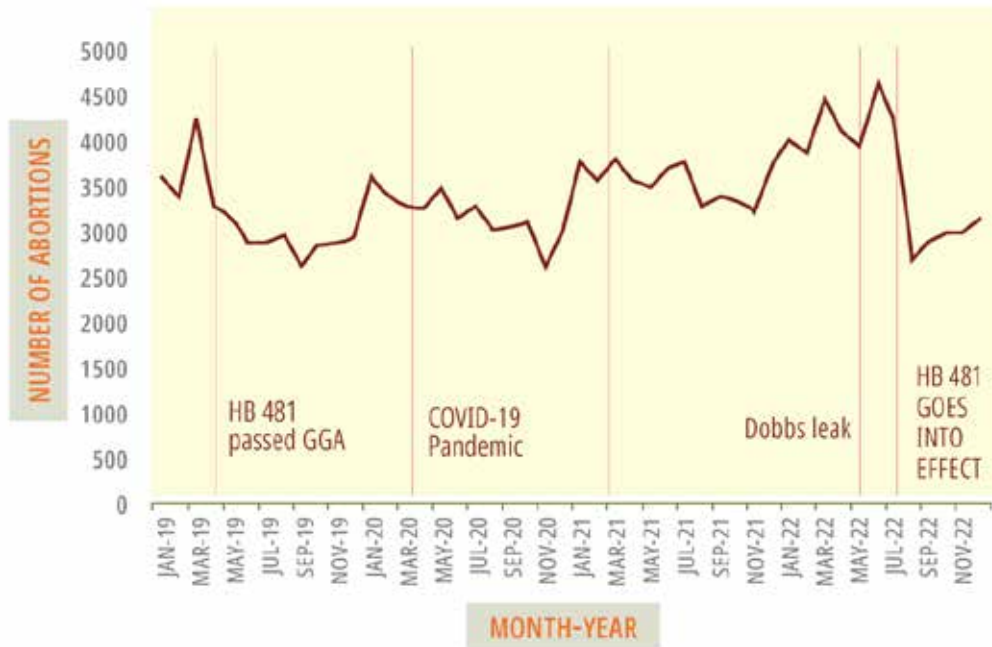
“Expanding Medicaid coverage is essential so that birthing individuals have continuous health care coverage before, during, and after the end of pregnancy,” says Sarah Blake, PhD, associate professor of health policy and management. “Medicaid expansion is proven to reduce adverse maternal and infant health outcomes and has been shown to improve preconception care and improve utilization of primary and preventive care. In 2022, Georgia extended Medicaid coverage for mothers until 12 months postpartum, joining more than 40 other states in doing so. This is a great start, but we hope the state can do more to protect the health of mothers and their children by enacting a full Medicaid expansion.”



AVERAGE COSTS OF PRENATAL CARE, DELIVERY, AND POSTPARTUM CARE FOR THOSE ENROLLED IN LARGE GROUP HEALTH PLANS VERSUS THE TOTAL PROJECTED COSTS WITHOUT INSURANCE

SOURCE: KFF ANALYSIS OF MARKETSCAN DATA

## ABORTIONS IN GEORGIA BY MONTH-YEAR: 2019-2022



THIS DATA VISUALIZATION PRESENTS DATA COLLECTED FROM GEORGIA DEPARTMENT OF PUBLIC HEALTH AND SHOWS ABORTIONS IN GEORGIA BY MONTH AND YEAR FROM 2019-2022.

### UNDERSTANDING THE IMPACT OF ABORTION RESTRICTIONS ON MATERNAL DEATH RATES

In July 2022, Georgia House Bill 481 went into effect, prohibiting women from legally obtaining an abortion in Georgia after approximately six weeks of gestation (about two weeks after a missed period), except in cases of incest or rape, when the pregnant person's life is at risk, or when the pregnancy is confirmed by medical professionals to be incompatible with life due to congenital or chromosomal abnormalities. Since this legislation was passed, the number of abortions has dropped in the state as illustrated below.

Researchers anticipate this law will directly impact rates of maternal death in the state as those pregnant persons seeking abortions for medical or personal reasons may carry their pregnancies to term despite medical, personal, or financial concerns. Past research has pointed to direct correlations between states with restrictive abortion policies and rates of maternal death.

“Research shows that restricting abortion access

increases the risk for morbidity and mortality via numerous pathways,” says Sara Redd, PhD, director of research translation at the Emory Center for Reproductive Health Research in the Southeast. “First, pregnancy and childbirth are inherently more dangerous than abortion care; second, people living in states with more restrictive policies likely also experience other structural barriers to care; and third, being denied wanted health services and navigating structural barriers all increase the psychosocial stress a pregnant person may experience, which increases the risk for poor outcomes.

“This set of mechanisms becomes particularly worrisome in a state like Georgia, where we have very few state policies supporting maternal and family health and well-being and a vastly under-resourced maternal health care system, with 82 of our 159 counties lacking an OB-GYN,” Redd continues. “Thus, reducing abortion access for Georgians and those traveling from surrounding states has very real implications for the autonomy, health, and well-being of pregnant people and their families.” ■



# GENEROUS CONTRIBUTIONS FROM INDIVIDUALS AND ORGANIZATIONS SUPPORT ROLLINS RESEARCH, ADVANCE PUBLIC HEALTH

By Kelly Jordan

## MULTIPLE GIFTS PROMOTE FOOD FORTIFICATION, SERVE TO PREVENT BIRTH DEFECTS

The Food Fortification Initiative (FFI) recently received several philanthropic contributions. ADM and Ardent Mills, two grain milling industry partners, provide expertise as members of FFI's executive management team. Both made generous grants recently to support FFI's vision of improving lives around the world by broadening access to fortified grains.

ADM has provided key support to FFI for the past three years. "Partnering with FFI was a natural fit for ADM, and we are very proud of the work we are doing together," says Mark Lotsch, president of global health and wellness at ADM. "Fortification is a sustainable, transformational approach to improving health and wellness at a massive scale for very little cost."

The van Lengerich Family Foundation, another longtime FFI donor, pledged to match contributions from others who join them in giving to FFI. Together, these contributions are used to prevent birth defects, anemia, and other health consequences by fortifying staple grains with vitamins and minerals like folic acid and iron.

"These donations come at a pivotal time for FFI and will allow us to provide technical assistance and guidance to countries around the world that are taking steps to fortify staple grains," says Scott Montgomery, director of FFI. "There is no reason that babies should continue to suffer from preventable birth defects. We are grateful to all our funding partners for joining us to build a healthier world."

## GIFT TO ROLLINS EPIDEMIOLOGY FELLOWS PROGRAM SUPPORTS WORKFORCE CAPACITY IN GEORGIA

The R. Howard Dobbs, Jr. Foundation has continued its support of the Rollins Epidemiology Fellows Program. This impactful initiative serves to build the epidemiology workforce for the state of Georgia by placing early-career epidemiologists in each of the state's 18 health districts for a two-year fellowship. The R. Howard Dobbs, Jr. Foundation's most recent gift will provide two years of support for a fellow in Cohort 4.

"The Rollins Epidemiology Fellows Program has exceeded all our expectations," says Allison Chamberlain, PhD, founding director of the program. "Since we launched in 2020, we have placed 50 fellows across 16 of Georgia's 18 health districts and at the state health department. Half of the fellows that have graduated from our program have accepted jobs in state and local public health in Georgia, and 46% of those have advanced into leadership roles. This program is making a marked impact on the public health workforce in Georgia, and gifts like those from the Dobbs Foundation make this program sustainable. We are truly grateful."

## CORPORATE AND FOUNDATION GRANTS ADVANCE RESEARCH IN HIV/AIDS, CANCER, AND MENTAL HEALTH

Gilead Sciences, Inc., has renewed funding for the Gilead COMPASS®



Initiative with a \$4.5 million grant to end the HIV/AIDS epidemic in the South. This brings its cumulative funding of the project at Emory to \$18.5 million over nine years.

Emory is home to one of four COMPASS coordinating centers and serves as the lead center, working to strengthen more than 200 HIV/AIDS organizations in the region by providing funding and capacity-building support. Gilead, Emory, and their many partners aim to reduce HIV-related stigma and promote holistic wellness of individuals impacted by HIV/AIDS. Read about the impact the Emory COMPASS Coordinating Center has made.

Gilead Sciences, Inc., awarded \$165,000 to Lauren McCullough, PhD, associate professor of epidemiology, for a project examining breast cancer disparities and the experiences of Black women in Georgia. Black women have the lowest 5-year relative breast cancer survival rate compared to all other racial/ethnic groups for every stage of diagnosis and every breast cancer subtype. McCullough's project uses an approach called "narrative medicine." In focus groups and community forums, women have the chance to share their own stories with each other as well as with clinicians and researchers, so that future breast cancer research, policy, care, and other services will better address structural and social barriers experienced by Black women, reduce deaths, improve other health outcomes, and close disparities.

The William T. Grant Foundation awarded \$579,998 to Briana Woods-Jaeger, PhD, associate professor of behavioral, social, and health education sciences, for a project titled, "Understanding the Potential of Youth Participatory Action Research to Improve African American Youth Mental Health Outcomes." Racial trauma, defined as stress and emotional pain resulting from experiences of racism, can result in depression, anxiety, and suicidal ideation among Black youth. Woods-Jaeger and colleagues will conduct a community- and youth-engaged qualitative study across three cities to explore how Black youth experience an intervention using photography, film, and other arts-based approaches. Findings may shed light on practices to promote growth and healing following racial trauma to help Black youth thrive, building on cultural and community strengths.

Learn more about how Woods-Jaeger and other Rollins researchers utilize art to promote public health in, "The Art of Healthy Communities." ■

# PREPARING FOR DISASTER

## 2013 MPH alumnus Jeff Freeman thrives under pressure

**T**hroughout Jeff Freeman's career, he has led countless scientists and public health personnel in supporting responses to pandemics, violent conflicts, and major health crises. Last May, he stepped into his biggest role yet as director and special assistant to the president for the National Center for Disaster Medicine and Public Health (National Center), a component of the Uniformed Services University in Bethesda, Maryland.

After Hurricane Katrina, the National Center was created as both a federal organization and an academic center to advance the United States' medical and public health readiness for health emergencies, from natural disasters to terrorist attacks. It was founded by five federal executive departments: Defense, Homeland Security, Health and Human Services, Veterans Affairs, and Transportation. Today, the National Center is governed by a board of advisers comprised of senior executives from each of those five original founding departments plus the Department of State.

Among Freeman's top priorities is launching a national initiative focused on "building on the fly by design" to help the country rapidly build capacity above and beyond what can be maintained before and after disaster-level events. In a nutshell, he's creating an agile response plan for any large-scale, worst-case scenario event where the typical rules and assumptions may not apply, and the medical and public health mission trumps all.

During the COVID-19 pandemic, while leading the Disaster Response Corps at the Johns Hopkins Applied Physics Laboratory (APL), Freeman managed the mobilization of several hundred scientists under the White House COVID-19 Task Force. Freeman and team helped the government build an analytic infrastructure to operationalize patient-level data being sent to the government en masse from hospitals across the country, which was not common practice before the pandemic.

"Short of a Congressional mandate, this was not something most health surveillance experts believed was possible prior to the pandemic. Our failure to imagine a more extreme scenario where the rules no longer applied meant it took months to build the necessary infrastructure to receive and act on that data," he says.

With his new initiative, Freeman hopes the nation will be better prepared for the next big thing.

While many would feel overwhelmed by the magnitude of responsibility that comes with leading a nation in preparing for disasters, Freeman thrives on the stress and pressure.

"The pressure of an event and the limited time and resources



available bring focus to what you can do in the moment. Focusing on the important things is also how I live my life," says Freeman, who was born close to Fort Moore (previously called Fort Benning) near Columbus, Georgia, and grew up in a military family.

Freeman began his career serving others in the humanitarian sector, working in areas of violent conflict, such as Sudan and its surrounding nations, before applying to Rollins to pursue his master of public health. "I needed additional education to be as useful as I wanted to be at my job," he says. "So, I left my work to pursue a degree and pick up new skills."

He credits Rollins and two advisers in particular as the catalysts for the public health successes and opportunities that led to all of the jobs that followed. Roger Rochat, MD, professor emeritus, played an instrumental role in Freeman's success at Emory through his early support, mentorship, and friendship. Additionally, former academic adviser Theresa Nash hired him to help coordinate the graduate certificate in humanitarian emergencies.

During that experience, he got to know staff members at the Emergency Response and Recovery Branch of the Centers for Disease Control and Prevention and subsequently landed an internship there that led to a fellowship. Ultimately, the fellowship helped get him into his environmental health and engineering PhD program at Johns Hopkins University. While working on his PhD, he was hired as a researcher at Johns Hopkins' Center for Humanitarian Health. Upon graduation in 2017, Johns Hopkins APL recruited and tasked him with building a disaster response program for the lab, which became APL's Disaster Response Corps.

"Inherently, the decisions you make in humanitarian situations and disasters count for a lot," says Freeman. "Being at the National Center today feels meaningful, and it has a mission I can feel good about. That's really all you can hope for in a public health career." —*Karina Antenucci*



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