

CAROLINA PUBLIC HEALTH

Gillings School of Global Public Health

The University of North Carolina at Chapel Hill

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Gillings School Experts
Discuss Some of
Today's Most Urgent
Public Health Challenges

PREVENT DISEASE

HARNESS BIG DATA

LEADERSHIP

DELIVER PROVEN SOLUTIONS

PROTECT THE ENVIRONMENT

Special Issue

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*Academic units abbreviated at left are:

BIOS	Biostatistics
ESE	Environmental Sciences and Engineering
EPID	Epidemiology
HB	Health Behavior
HPM	Health Policy and Management
MCH	Maternal and Child Health
NUTR	Nutrition
PHLP	Public Health Leadership Program



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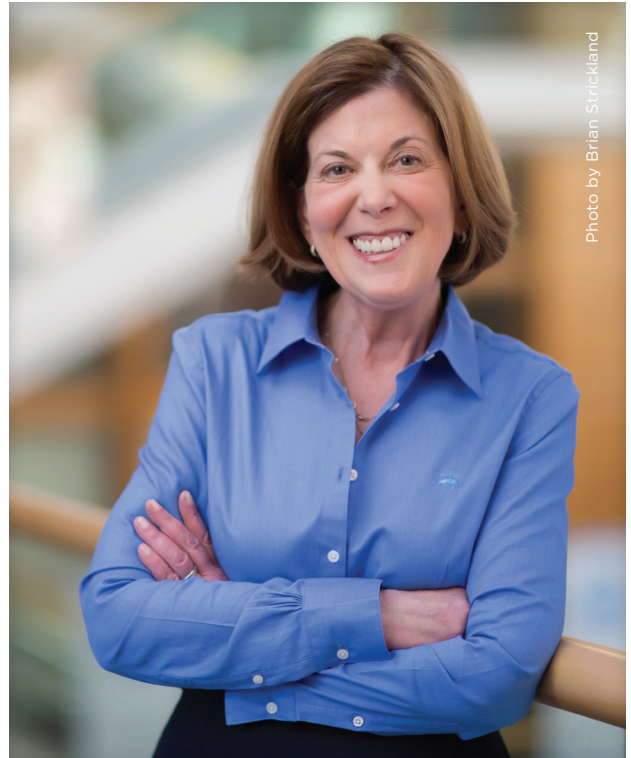
from THE DEAN

Dear readers—

Whatever one's political views, the months since the 2016 presidential election have been challenging and frenetic. For many in public health, threats to continuation of the Affordable Care Act, which Dr. Jon Oberlander addresses in this issue (page 35), are especially difficult to bear. We've waited too long to assure that people in this country would not have to fear for their lives and financial futures when faced with ill health.

We've seen natural disasters, sometimes exacerbated by humans, around the world at a distressing level of frequency, intensity and devastation. We've grappled with other events – locally, including on our campus, and around the world.

I'm proud that most people in the Gillings School and larger public health community stand up for equity, fairness and health care as a right. (I've written about many contemporary issues, including ones related to social justice, in my blog, mondaymorning.web.unc.edu.) People in public health are resilient, and collectively, we seize opportunities where we can find them and make them. We are neither daunted nor immobilized.



Dean Barbara K. Rimer

For this issue of *Carolina Public Health*, we asked members of our faculty, staff, alumni and boards to be issue writers, responding to critical questions about the future of public health.

Through their words, we aim to bring thoughtful perspective to some of the great challenges facing us locally and globally.

To organize the various pieces in this issue, we assigned each to one of our strategic theme areas, recognizing that a person's work often cuts across categories. These themes include "Deliver Proven Solutions Faster (Implementation Science)," "Healthy People, Healthy Planet," "Promote Health, Prevent

Disease and Improve Care for All” and “Harness Big Data for Health and Well-being.”

Leadership is more important than ever before, and we asked some of our School’s leaders to share lessons in and advice from their experiences. (See page 63.) We invited others to address specific threats, such as those to air and water quality, and to discuss humanitarian crises, infectious diseases and opioid addiction. We also focus on big drivers of health, such as obesity. There are many other topics, and I hope they will resonate with you.

We took liberties in assigning people to categories.

Those who wrote on topics in our category “Delivering Proven Solutions” reflect our commitment to deliver proven interventions to the people who will benefit, so we can accelerate major improvements in health.

In what we refer to as implementation science, we aim to start with evidence-based interventions and then speed up the process – so that we beat the clock on the 17 years it usually takes to get proven interventions to people across a range of health, education and medical areas. Today, as always, change is too slow, and people die waiting.

We included Dr. Steve Zeisel here (see page 27), as his groundbreaking work on the nutrient choline led to policy changes that set standards for choline requirements, especially for pregnant women. His research findings were scaled up and became part of Federal Drug Administration and other food policies. That’s impact on a scale of millions.

Similarly, through his persistent dedication to putting guidelines into practice, Dr. Herbert Peterson

(page 18) is saving the lives of women and children around the world. By working at the country level to institute taxes on sugary products, Drs. Barry Popkin and Shu Wen Ng (page 23) are contributing to countries’ bottom lines and improving health.

At the Gillings School, we are committed to build the evidence base in important areas through basic and applied research and to develop interventions, including programs and policies, which are culturally appropriate, effective, affordable and scalable. In this way, whether we are in local or global settings, what we develop, test and deploy will be useful and usable across North Carolina and around the world.

Many of our readers share this aspiration, and our remarkable students can’t wait to improve the world. Indeed, many already have begun to do so!

Thank you for your innovation, generosity, work, collaboration and friendship. Thanks to so many of you for giving of your wisdom and time to improve our school and the health of the public. You make a difference for the Gillings School and the public’s health, and we appreciate you!

Warm regards,

A handwritten signature in dark ink, reading "Barbara K. Rimer". The script is fluid and cursive, with a large initial 'B' and a stylized 'R'.

Barbara K. Rimer, DrPH



PREVENT DISEASE

Our Strategic Theme:

Promote health, prevent disease, improve care for all



Dr. Steve Marshall (left) and Dr. Nabarun Dasgupta

WHAT SHOULD WE DO ABOUT THE OPIOID CRISIS?

Nabarun Dasgupta, PhD

Senior Research Scientist

UNC Injury Prevention Research Center and UNC Eshelman School of Pharmacy

Stephen Marshall, PhD

Professor of epidemiology

Director, UNC Injury Prevention Research Center

First and most importantly, we should improve our understanding of the conditions that lead to chronic pain and addiction, compelling us to do something about those conditions. Working within our health-care delivery system, we must embark immediately upon implementing specific changes with existing tools. To make these improvements enduring, we must acknowledge the racial bias that pervades our response to the crisis.

Q ▶ How can we better understand the situations that gave rise to the epidemic?

A ▶ Our understanding of the opioid crisis is hampered by inadequate attention to the structural and social causes of pain and addiction, which are critical to the design of the public health responses.

There are intuitive, causal connections between poor health and structural factors, such as poverty, lack of education and job opportunities, and poor health-care access, as well as substandard living and working conditions. Poverty and substance-use problems operate synergistically. For example, employment opportunities in lower-income communities sometimes are dominated by jobs with physical hazard, and lower-income households have less access to improved safety features of newer “smart vehicles.”

On-the-job acute and chronic injuries, and injuries from motor vehicle crashes, can give rise to chronic, painful conditions that can limit future employment opportunities, potentially resulting in a downward spiral of disability and poverty. The provision of necessary goods and services in our economy involves a certain risk of bodily harm. Reducing conditions that lead to chronic pain requires understanding how the risks of bodily harm are distributed in our society. These risks are not allocated at random; they flow along lines of class, race, gender and ethnicity.

We tend to somaticize social disasters into physical pain, and the economic downturn and wars of recent years collectively have given rise to widespread social unease. For example, subjective economic hardship was

Our understanding of the opioid crisis is hampered by inadequate attention to the structural and social causes of pain and addiction, which are critical to the design of the public health responses.

▶ DR. NABARUN DASGUPTA

associated with new-onset low back pain following the Great East Japan Earthquake in 2011.

Intensifying substance use also may be a normal societal response to mass traumatic events, especially when compounded by income disadvantage. Increased binge drinking of alcohol was noted among U.S. Gulf Coast residents after hurricanes Katrina and Rita, with the greatest compensatory drinking among those with lower lifetime income trajectories; women experiencing work stressors after the terrorist attack on Sept. 11, 2001, were more likely to increase alcohol use. Heroin users in de-industrialized steel production areas of the Rust Belt cite economic hardship, social isolation and hopelessness as reasons for drug use, explicitly calling for jobs and community reinvestment to stem overdoses. Part of this relates to increased stress; part of it relates to disruption of social norms and controls. Until we understand the root causes of the opioid crisis, we will continue to fail in our efforts to turn its tide.

Q ▶ How can we change the health-care delivery system?

A ▶ The observation that Canada and the U.S. have the highest per-capita opioid analgesic



19% of people in the U.S. were prescribed opioids (2016).

63.1% of **deaths** from drug overdose **involve opioid use** (2015).

84.2% of **all deaths** from drug overdose are **unintentional**.

22.1% of **emergency room visits** and

20.4% of hospitalizations for **unintentional, nonfatal drug poisoning** resulted from opioid use (2014).

consumption in the world is central to the belief that these medicines are “overprescribed.” However, this word dangerously mashes together various prescribing behaviors, leading to the unrealistic expectation that reducing dispensing automatically, abruptly and proportionately will reduce overdose and abuse.

That has not happened. Opioid overdose death rates in the U.S. did not drop when opioid prescribing declined. The number of outpatient opioid analgesic prescriptions dropped 13 percent nationally between 2012 and 2015, yet the national overdose death rate surged 38 percent. Even ignoring the recent growth in heroin-related deaths, overdose deaths attributable to prescription opioids have not decreased proportional to dispensing. The term “overprescribing” hampers intervention innovation by singularly focusing on prescribing volume.

In practice, “overprescribing” can refer to starting doses, number of units in a single prescription, dosing schedules, potency, contraindications and other factors. A more rational approach would treat these as parallel but distinct issues. Yet, the legislative and clinical reaction has included proposals to bring dosage below arbitrary targets or abandon patients that do not conform to narrow expectations.

Institutional, legal and insurance architecture has robbed clinicians of time and incentives in busy primary-care settings to attend meaningfully to patients with overlapping pain and addictive disorders. Some providers struggle with their patients’ having

complex, chronic medical conditions requiring regular follow-up, especially given limited recourse to non-therapeutic alternatives and the predominantly urban concentration of specialty services.

We urgently should adopt and pay for nonpharmacologic approaches to managing chronic pain – and we need to find ways to incentivize physicians to provide continued care of patients taking opioids to manage pain.

For example, we might advance the concept of an “opioid well visit,” such that periodic checkups would be a reimbursed part of the course of opioid therapy. This would allow time for dose adjustment to minimize side effects and would afford the opportunity to discuss the more fundamental issues that gave rise to the pain in the first place.

At the same time, we should advance our health system’s capacity to deliver proven addiction treatment services, with medication-assisted treatment (for example, through methadone and buprenorphine), known as demand reduction. These therapies are supported by meta-analyses from extensive clinical trials and real-world practice. In France, for example, the opioid overdose epidemic was quelled by providing free, on-demand and ubiquitous drug treatment.

Waiting periods for limited treatment slots and limits on how many treatment episodes are covered by insurance are barriers we must address. We must actively refute pop-culture misconceptions about coercive forms of “treatment” that strip dignity from patients.

61.86 MILLION

people who had **at least one** opioid prescription filled or refilled in 2016

people age **12 or older** who misused prescription opioids in 2015

12.46 MILLION

\$26 BILLION

health-care **costs** for opioid abuse in 2013

Statistics from the Centers for Disease Control and Prevention and the National Institute on Drug Abuse

Q ▶ Is there racial bias in our response to the opioid crisis?

A ▶ Part of the alarm associated with the opioid crisis is that these drugs are reaching mainstream populations previously perceived as being nonusers. Conventional wisdom relegates heroin to the category of a long-standing, inner-city, urban problem. However, the increase in deaths from prescription opioids has deeply affected rural and suburban areas.

Recent studies have suggested that blaming the problem on too many prescriptions may result from implicit racial bias. The anecdotes about “accidental addicts” are emblematic of the mindset, in which anyone but a person of color must have become addicted inadvertently. When minorities have been involved, the periodic calls to action about drugs have framed drug use as a moral failing. We have spent decades pathologizing minority communities for turning to drugs to cope with social stressors and structural inequities. That these phenomena also may afflict rural and predominantly white communities is emerging as a new realization in public discourse.

The public discourse on heroin has been imbued with xenophobic undertones for more than a century. In the U.S., a new wave of overdose deaths from fentanyl, imported from overseas, has been observed recently. Fentanyl is a more potent opioid than is found in

traditional street drugs. Rather than acknowledge and address the demand for heroin, the conversation has focused on cutting off the supply from foreign suppliers. Demand reduction, not supply reduction, should be the starting point for our response to the crisis.

We are at a crossroads in drug policy and national discourse on drug abuse. The silver lining that accompanies the body count of the opioid crisis is that it has accelerated the positive reframing of substance use as a medical issue, rather than a “character flaw.” We must be vigilant to ensure that the medicalization of addictive disorders does not fade when our current opioid crisis does; otherwise, we will do disservice to those who face chemical dependency in decades to come. ■

The authors acknowledge the contributions of Dr. Leo Beletsky, associate professor of law and health sciences at Northeastern University, and Dr. Dan Ciccarone, professor of family community medicine at University of California at San Francisco, in developing these concepts.

Portions of this article will be published in a forthcoming commentary in an academic journal.

ARE WE PREPARED FOR THE NEXT SUPERBUG OUTBREAK?

Ralph Baric, PhD

Professor of epidemiology

Professor of microbiology and immunology,

UNC School of Medicine



Photo by Linda Kastleman

We're well-prepared for early diagnosis and detection. Some of the new technologies can identify new pathogens within two weeks, assuming the samples are made available and not occurring in a country that does not want to communicate openly about an outbreak.

Also, new methodologies are available to generate candidate vaccines relatively rapidly. In the 2009 outbreak of H1N1 flu, for example, the vaccine strains were developed in three or four days, and we had seed stocks within a week. We can have very rapid movement from identification to candidate vaccines for a population.

Where we're not prepared is in demonstrating that the vaccines work and getting them into sufficient concentrations for distribution to the general public, first at a national level and then at a global level, which is even more challenging. The most advanced countries can make experimental vaccines and test them within one or two months. However, 90 percent of the world wouldn't receive that vaccine for several months, if at all.

We also don't have drugs on a shelf that can be used to treat outbreaks. We need to develop broad-based

drugs that attack many members in a virus family. The good news is that some pharmaceutical companies are interested in developing these kinds of drugs, but this is not going to happen overnight.

Q ▶ If something as virulent as 1918 flu appeared today, how fast would it spread, and how long would a vaccine take?

A ▶ The 1918 flu had about a 30 percent attack rate and a mortality rate of about 2 percent of the world's population. If we had an analogous outbreak now, given the 7.5 billion people on the planet, we would have about 150 million deaths.

While our public health infrastructure and response rates are better in most countries than in 1918, the world's population is much, much more mobile. Any flu with heightened attack and mortality rates would spread much more quickly and broadly than in 1918. Because the incubation period could be as much as seven days, victims won't show symptoms while they spread the virus. It would get a great head start, and there would be significant time before an effective vaccine could be developed.

If many people are without access to health care, they become a giant incubator in which any pathogen can adapt and ready itself to be transmitted.

► **DR. RALPH BARIC**

Q ► What virus families are most likely to cause a catastrophic outbreak?

A ► Flu is highest on the list. Only three flu strains have circulated in human populations – H1, H2 and H3 – but there are 17 different hemagglutinin genes, so no one has any resistance to the other ones. The more lethal known flu strains are H5N1, which has about a 50 percent mortality rate, and H7N9, with 30 percent mortality. Even if those rates decrease a bit due to higher transmissibility, you're still talking about a horrific number of deaths. Think about the state of the world with, say, 25 to 45 percent of the population suddenly gone. How does this affect food supply, water supply, sanitation, energy and other basic necessities? The damage goes well beyond the mortality rate.

Coronaviruses are next on this list. In this century, two highly pathogenic coronaviruses have surfaced – severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS) – with mortality rates of 10 percent to 35 percent. So far, transmission occurs from person to person, and the diseases' symptoms occur before transmissibility. With really good public health approaches, they can be kept from expanding as quickly as a flu.

Most people would include flaviviruses on this list. These are mosquito-transmitted illnesses such as Chikungunya, West Nile virus and Zika. Also of concern would be Ebola, Marburg, Nipah and Hendra.

The caveat to all of these is that viruses have the capability to evolve quickly in new environmental settings, which means that rapid evolution is a reality. For example, in 2000, no experts would have included coronaviruses on this list, but then SARS and MERS evolved. The human race also presents a great

evolutionary environment for viruses, especially in the high-population density of our big cities. Those environments are ripe for the rapid evolution of many viruses, especially flu and coronaviruses. The result could be an explosive, catastrophic outbreak.

Q ► What could harden our defenses against future outbreaks?

A ► The number-one defense is public health infrastructure – improved hygiene, improved medical facilities and a health-care environment that delivers care quickly. If many people are without access to health care, they become a giant incubator in which any pathogen can adapt and ready itself to be transmitted. Because of this, large areas in South America, Africa and Asia are particularly vulnerable right now.

We also need to improve basic translational science and know the best targets for developing preventions and treatments. The more we understand the enemy – in this case, viruses – the more we can be in control. We must learn more about the functions of all the viral genes – and the structures and proteins, how they replicate. The more we understand, the more we can target and create drugs for entire families of viruses, rather than reacting to outbreaks one at a time. ■

WHAT SHOULD WE KNOW ABOUT INFECTIOUS DISEASES?

Allison Aiello, PhD
Professor of epidemiology



Photo by Linda Kastleman

First, it is imperative to acknowledge that a pandemic *will* occur. The 1918 flu epidemic infected one-fifth of the world's population and killed a record 50 million people around the world – and something with that potential will happen again.

The World Health Organization consistently states that an influenza pandemic is imminent. With the possibility of new pandemic influenza virus outbreaks on the horizon, pandemic preparedness has been considered an important research and policy priority in the U.S. Although many of the practical considerations of implementing pandemic planning and response have been addressed, there are few data regarding how these interventions would be carried out effectively in real-world pandemic situations.

Q ▶ How do we strengthen our defenses against such emerging respiratory infectious diseases?

A ▶ While certain types of respiratory infections can be incredibly infectious

and easily transmitted from one individual to another, some simple measures can help us prepare for and mitigate the spread of highly infectious respiratory pathogens.

Pharmaceutical interventions, particularly vaccinations, have been the principal public health method of preventing and controlling seasonal influenza, one of the most concerning respiratory infections. Nonetheless, the experience of pandemic influenza, both historic and the more recent H1N1 pandemic, has changed this perspective.

It took great effort to produce an H1N1 vaccine quickly. Many individuals who needed protection did not receive it right away, and only a limited number of vaccine doses were available. To date, no universal vaccine protects against all current and future influenza strains. Fortunately, researchers are working on this problem of universal protection.

Nonetheless, it is possible that an entirely new non-influenza virus may arise in the future for which there are no available vaccines. This leaves nonpharmaceutical interventions (NPIs) as some of our key tools for mitigating the impact of a pandemic.

Q ▶ What are some of these interventions?

A ▶ Among suggested NPIs are social distancing, school closings and use of protective face masks, all of which we have studied in our research. These measures reduce transmission of respiratory infections, but there are many questions about how to shape policies and protocols for practicing these interventions. The CDC has promoted layered NPIs to ensure that any gaps in one single recommended intervention would be covered by other practices.

Q ▶ How does your research address these concerns?

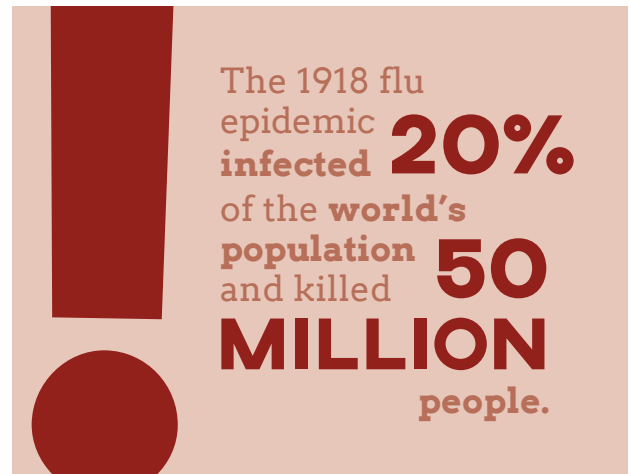
A ▶ There is little research on the social, psychological and real-world implications of implementing NPI recommendations. For instance, clear guidelines have been developed to help schools implement closings (tinyurl.com/community-guide-task-force), but we have little experimental data on how these recommendations will work in practice.

This is also true for the workplace environment, where guidelines are less consistent across different work settings than in schools. In addition, we have few data on the societal and psychological implications of implementing all recommended NPIs together, in the case of a pandemic.

We have tested several different NPIs for respiratory infections, including face masks, hand hygiene and social distancing. We learned a lot from these studies, including identifying barriers to implementation and studying the overall effectiveness of these measures for decreasing transmission of respiratory infections.

This year, we plan to conduct a study using proximity sensors to detect interactions between individuals in the workplace and identify types of behaviors and actions that lead to hand hygiene. For example, if individuals are talking to each other, and one individual coughs, are both people likely to practice hand hygiene after that conversation?

These are basic questions related to behaviors and norms, which have not been well studied in the workplace. With issues related to stringent sick-leave policies, our research may provide insights into practices that could be enhanced in the workplace to reduce transmission of infectious diseases.



Q ▶ What kinds of research teams will we need to address these pandemic threats in the future?

A ▶ One thing I learned through this research is that interdisciplinary teams are key. It is crucial that epidemiologists work with researchers from numerous disciplines, such as anthropology, history, sociology and health behavior – as well as laboratory researchers, clinicians, computer scientists, engineers and communication experts, including those who know how to use social media effectively. Together, these experts can provide important insights for carrying out and interpreting the results of NPI studies – and implementing a plan.

Q ▶ What simple measures could an individual take to offset the threat of a pandemic?

A ▶ Be sure to use proper hand-hygiene technique, stay home while ill, cough or sneeze into your elbow, keep a basic surgical mask at home in the case of a pandemic – and follow the CDC's advice when a vaccine becomes available. ■

HOW DO WE PROTECT MORE PEOPLE FROM HPV CANCERS?

Noel Brewer, PhD
Professor of health behavior



Photo by Brian Strickland

A cervical cancer survivor, Tamika Felder, once told me about her journey – from the stunning cancer diagnosis at age 25, through treatment that ended her ability to have children, to the present day, when she shares her experience to inspire others. Personal stories such as hers have motivated my research over the last decade on how to get the cancer-preventing HPV vaccine to more people.

More than 80 million people in the U.S. are infected with HPV – about a quarter of the population. With a good immune system, the body usually gets rid of the virus, but persistent infections can cause health problems.

HPV causes six cancers – of the cervix, vagina, vulva, anus, penis and mouth/throat – as well as genital warts. Globally, the virus causes more than 600,000 of the 14 million cancer cases diagnosed each year. In the U.S., HPV causes almost 40,000 cancers every year.

Screening can detect many cervical and anal cancers when they are still treatable, but it often fails. For example, cervical cancer has become less common in the U.S. since the advent of the Pap test. However, deaths from cervical cancer and other HPV cancers continue.

Many people don't get screened for cancer, can't get screened, or screening fails them. Large

HPV VACCINATION STATISTICS

60%

of children in the U.S. have **received the first dose.**

43%

are given **all recommended doses.**

The goal?

80%

of children in the U.S. are **fully vaccinated.**

disparities exist in our state and the U.S., with black women being twice as likely to die from cervical cancer. No screening test exists for most HPV cancers. People with HIV are around 100 times more likely to get cervical and anal cancer, and if they do, they are, by definition, diagnosed with AIDS. In Africa, cervical cancer kills more women than any other cancer. HPV is a predatory virus that preys on the young and the vulnerable.

The HPV vaccine is extremely effective when given to young people. Children's immune systems mount a more vigorous response than do adults'. Younger people also are less likely to have been exposed to HPV. The vaccine is so effective that experts now recommend fewer doses – two instead of three, if both are received by age 14. With more than 200 million doses delivered worldwide, HPV vaccine is one of the most studied and safest medicines. The vaccine easily can be co-administered with other recommended vaccinations for adolescents, including ones for tetanus, diphtheria and pertussis (Tdap) and for meningitis.

HPV vaccination is now the norm in our country, with 60 percent of children having received the first dose. Unfortunately, only 43 percent are given all recommended doses. Thus, the nation is far short of its goal of 80 percent of children fully vaccinated against HPV.

Q ▶ How can we increase HPV vaccination?

A ▶ The President's Cancer Panel, chaired by our dean, Dr. Barbara K. Rimer, wrote an influential call to action in 2012, urging that more be done to ensure that boys and girls are given the HPV vaccine. (See the 2012–2013 panel report at tinyurl.com/PCP-HPV.) The Panel called for urgent action that would affect parents, providers and policies. The report has influenced my own work and that of many in the U.S.

Most parents want the HPV vaccine for their child, but they often have questions. There's no single common reason for not vaccinating. It may be that the parents don't have enough information, have questions about safety, or aren't sure their children

PARENTS SHOULD:

- ▶ Ask questions of – and expect answers from – their providers.
- ▶ Make sure all doses of the vaccine are administered in a timely way.

PROVIDERS SHOULD:

- ▶ Recommend the vaccine routinely and confidently.
- ▶ Establish systems for monitoring when a child is due for vaccination.

POLITICAL LEADERS SHOULD:

- ▶ Base their comments on science, not hearsay.

are the right age. All of these questions are ones that a provider can answer.

Providers should recommend the HPV vaccine routinely and confidently. The best recommendation may be no "recommendation" at all. It is more effective for a provider to say, "Your child is due for vaccines against meningitis, HPV cancers and whooping cough. The nurse will administer those at the end of the visit."

The point is to set parents' minds at ease by treating HPV vaccine the same as all other vaccines that keep children healthy.

In a 2016 feature story, National Public Radio described a successful trial we conducted with 30 pediatric and family medicine clinics in North Carolina, using this "presumptive announcement method." (See tinyurl.com/NPR-HPV-vaccine-make-it-brief.) When doctors made brief statements that presumed parents intended to vaccinate their children, vaccine rates increased by 5 percent. There was no increase in vaccination rates following lengthy discussions. Now, the presumptive announcement



The author's mother, Phyllis Jensen (Brewer), center, visited the Empire State Building around 1950, with her parents, Iris and Arthur Jensen.

method is used nationally to train a new generation of pediatricians and family physicians.

Providers should establish systems within their own practices to determine which children are due – or overdue – for the vaccination. Standing orders can be established, such that nurses and mid-level providers can initiate vaccination. Most importantly, the provider's office should present a united message. From the receptionist to senior physicians, the staff should be “on the same page” in terms of the vaccination being required if children are to remain healthy.

Policy makers also impede a higher vaccination rate.

Political leaders have spoken about the vaccination without proper evidence, including a presidential candidate who publicly claimed to have “heard” that the HPV vaccine caused lasting side effects. Such pronouncements from public officials must be based on science, not hearsay. Data on the more than 200 million doses delivered globally show the vaccine is safe, as are the meningitis vaccine and other vaccines for teens.

My mother died of cervical cancer in 2012. While going through her belongings, I found a photograph of her, standing between her parents at the Empire State

My mother died of cervical cancer in 2012. While going through her belongings, I found a photograph of her, standing between her parents at the Empire State Building, beaming at the camera.

She was perhaps nine years old. Were HPV vaccine available then, my mom probably would be alive today.

► **DR. NOEL BREWER**

Building, beaming at the camera. She was perhaps nine years old. Were the HPV vaccine available then, my mom probably would be alive today.

It's too late for her. She did not live to see her grandchild, and the best I can do is share her picture and my memories. It's too late for Tamika, who can never have grandchildren. However, it's not too late for today's children, to help them stay healthy and become tomorrow's parents and grandparents. ■



DELIVER PROVEN SOLUTIONS

Our Strategic Theme:
Deliver Proven Solutions Faster





Photo by Tom Fuldner

Dr. Herbert Peterson

HOW CAN WE IMPROVE IMPLEMENTATION OF LIFE-SAVING INTERVENTIONS IN MATERNAL AND NEWBORN HEALTH?

Herbert B. Peterson, MD

William R. Kenan Jr. Professor of maternal and child health

Professor of obstetrics and gynecology, UNC School of Medicine

We are living in a profoundly important moment in global health. For the first time in human history, global leaders have declared their commitment to the well-being of every person on the planet, including every mother and every newborn child.

With the new United Nations Sustainable Development Goal of achieving “health and well-being for all” by 2030 and the related Secretary General’s “Global Strategy on Women’s, Children’s and Adolescents’ Health” goal of eliminating all preventable deaths among women, children and adolescents by 2030, we have unprecedented political will and a wonderful window of opportunity. Yet, to realize the potential of this moment, we must improve dramatically our ability to implement life-saving interventions at scale, particularly in the low- and middle-income countries, where doing so has been most challenging.

Can we do this? Absolutely! Our hopes for achieving this Sustainable Development Goal for mothers and their newborns are buoyed by the progress we have made. Between 1990 and 2015, we saw worldwide reductions in maternal and child mortality of 45 percent and 53 percent, respectively. This is incredible progress. Looking to the future, there is good reason to believe that the new and rapidly evolving focus of the global health community on implementation science will help us save even more lives.

Q ▶ What are the biggest implementation challenges ahead?

A ▶ Landmark studies in the 1990s showed us that, globally, most maternal deaths occurred because of emergency complications during childbirth. It became clear that we would save the lives of mothers and babies if – and only if – we ensured access to high-quality emergency obstetrical and newborn care services.

That, in turn, meant creating access to trained surgeons, well-equipped operating rooms, safe blood, and adequate medications and supplies. Because 99 percent of all maternal and newborn deaths occur in low- and middle- income countries, creating the capacity to put these services in place in a sustainable

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We have been remarkably successful in developing effective interventions for saving mothers and babies, but less successful at putting these interventions in place, especially in low-resource settings. Clearly, people do not benefit from interventions they do not experience.

▶ **DR. HERBERT PETERSON**

way has become a primary implementation challenge. A high proportion of births in these settings still occur outside of hospitals; many women labor and deliver in facilities that are understaffed, underequipped and have no running water or electricity.

It would be a mistake to believe that we don’t have related implementation challenges in the United States. In addition to having some of the highest maternal and infant mortality rates among high-income countries, we also have major health disparities. We continue to struggle with limited health services access, which affects far too many mothers and babies. To solve these problems, our drive to improve global health also must include a focus on health at home.

Q ▶ What would an enhanced focus on implementation look like?

A ▶ We have been remarkably successful in developing effective interventions for saving mothers and babies, but less successful at putting these interventions in place, especially in low-resource settings. Clearly, people do not benefit from interventions they do not experience.

Between 1990 and 2015:

Maternal
mortality down

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Child
mortality down

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99%

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middle-income countries.

It is imperative that we improve our ability to deliver these innovations to the people who need them most. Fortunately, the global health community has recognized the importance of an enhanced focus on implementation – and on science to support it. A recent synthesis of the evidence on implementation science, led by Dr. Dean Fixsen, concluded that successful and sustainable outcomes are contingent upon the interaction between three key components – effective interventions; effective implementation of these interventions; and contexts that support successful implementation.

Fixsen is research professor of maternal and child health at the Gillings School and co-founder of the National Implementation Research Network.

Discovering how to maximize the synergy in these interactions is at the heart of the exciting new field of implementation science, which strives to make innovations easier to implement and contexts more supportive of successful implementation.

Q ▶ Are you hopeful that we can close the gap between knowing what we need to do to save mothers and newborns and actually doing it?

A ▶ I am, indeed! The global health community is now focused on this issue and UNC's World Health Organization (WHO) Collaborating Center is ready and fully committed to helping lead the way. We are working closely with WHO and other United Nations colleagues, as well as other key stakeholders in the public and private sectors, to develop and support programs to ensure that

In addition to having some of the highest maternal and infant mortality rates among high-income countries, we also have major health disparities.

▶ DR. HERBERT PETERSON

innovations in maternal and newborn health are successfully and sustainably implemented at scale.

Our firm belief is that success on this front is contingent upon the creation of virtuous cycles between research and practice, such that our best research informs practice – and experience gained in practice informs future research. Generating these cycles will require intentional and effective collaborations between scientists, implementers, policy makers and funders. We also must build the capacity that countries need to address their ongoing challenges in implementation. Doing so rapidly will be essential for the scalability and sustainability of our most promising life-saving innovations.

This will take great effort, but mothers and babies the world over deserve quality care. We're going to do everything we can to see that they receive it. ■

Some comments from this article also will appear in the journal Obstetrics and Gynecology, as part of the Hale Lecture, "Health and Well-being for All," delivered by Peterson at the annual meeting of the American College of Obstetricians and Gynecologists, on May 6 in San Diego.

HOW CAN WE IMPROVE HEALTH AND HEALTH CARE IN RURAL AMERICA?

Mark Holmes, PhD

Associate professor of health policy and management

Director, UNC Cecil G. Sheps Center for Health Services Research

George Pink, PhD

Humana Distinguished Professor of health policy and management



Photo by Linda Kastleman

About 46 million people – 15 percent of the country's population – live in rural America. Rural Americans produce most of our food, much of our energy – and they build strong, cooperative communities. However, they face many challenges when it comes to health and health care. Median income is lower in rural areas, and there's more poverty. The population is also older and aging rapidly, which means that rural residents will require more health care over time.

Declining health-care infrastructure and low rates of insurance coverage make access to good care even harder. The current situation demands that we study and refine policies that have an impact on rural health.

Q ▶ **Is that part of your work at the Sheps Center's Rural Health Research Center?**

A ▶ At the N.C. Rural Health Research Center, we work to meet those challenges by documenting rural mortality rates across the country, tracking rural hospitals at risk for closure and studying the effects of public insurance coverage on rural Americans.

HOW TO CLOSE THE GAP BETWEEN RURAL AND URBAN HEALTH CARE:

- ▶ Screen patients for high blood pressure.
- ▶ Increase cancer prevention and early detection.
- ▶ Encourage physical activity and healthy eating.
- ▶ Promote smoking cessation.
- ▶ Promote motor vehicle safety.
- ▶ Engage in safer prescribing of opioids for pain.

The mortality rate in rural areas is higher than in urban areas – and the gap is growing fast. From 2005 to 2009, rural non-metropolitan areas had a 13 percent higher mortality rate than did urban areas, compared to a 2 percent gap during the period 1990-1992.

Since we know that the root causes of this disparity are different across the country, we've tried to document the disparity more clearly, highlighting county-level differences in mortality trends. These more granular data allow us to evaluate the underlying causes of the disparity and provide local policy makers with information they need to devise solutions tailored to their county and region.

Graduate and undergraduate students from the Gillings School have been integral to our work in answering these and other questions.

Q ▶ How concerned are you about the need to increase health-care access and improve insurance coverage for rural Americans?

A ▶ Very. Through our grant funding at the Sheps Center, we're evaluating access to inpatient care in rural areas through tracking rural hospital closures, monitoring those at-risk for closing and studying innovative solutions to improve access to needed services.

Rural hospital closures are a significant concern across the nation. Since 2010, 81 of more than 2,200 rural hospitals have closed, most of them in the South. To identify areas where hospitals are likely to disappear in the future, Sheps researchers developed a model to determine which hospitals are at risk for closure within two years. The tool provides stakeholders in rural areas with information they need to rally around hospitals in danger of closing.

We're also actively seeking solutions for areas with a dearth of hospitals and other providers. When a hospital closes, the major concern is that residents won't have access to emergency services. MedPAC, the entity that advises the Congress on Medicare issues, recently proposed rural freestanding emergency centers – emergency rooms not attached to a hospital – as a potential solution. We don't know how and whether they'd work in underserved rural communities.

Understanding more about how people access these services will determine whether this is a viable way to expand access to care.

Declining health-care infrastructure and low rates of insurance coverage make access to good care even harder. The current situation demands that we study and refine policies that have an impact on rural health.

▶ DR. MARK HOLMES

Q ▶ How do we improve insurance coverage?

A ▶ Ensuring access to services is important, but it is not the full story. People also need access to health insurance to afford needed care. We know that rural communities depend for coverage on public programs, such as Medicare and Medicaid, to a greater degree than do their urban counterparts. With fewer large employers, residents are less likely to obtain health insurance through their jobs.

Medicaid covers nearly half of all children in rural areas, compared to less than 40 percent in urban areas. Due to the high Medicaid coverage rate, expansion of the program made available under the Affordable Care Act disproportionately provides substantial assistance in states that implement it. We need more research on promising ways to improve health insurance rates in rural areas.

Rural health comprises a significant amount of our country's health-care infrastructure. The population in rural areas has higher needs and fewer resources – both in terms of doctors/hospitals and access to health insurance. However, rural communities are resilient, and we – and others – are working to learn more about how policy might pave the way for better health in rural America. ■

IS SUGAR THE NEXT 'TOBACCO' BATTLE?

Shu Wen Ng, PhD

Associate professor of nutrition

Barry M. Popkin, PhD

*W.R. Kenan Jr. Distinguished Professor
of nutrition*



Photo by Elisabeth Delafield



Photo by Dan Sears

Yes and no. Like tobacco, the sugar industry is vast and has very deep pockets. Any battle likely will last decades.

While excessive sugar intake increases risk of diabetes, liver and kidney damage, heart disease, some cancers and death, sugar can be consumed safely in low amounts – something we can't say for tobacco. The World Health Organization (WHO) and World Cancer Research Fund have published guidelines showing that individuals should consume no more than 10 percent of total calories from added sugar, and preferably less than 5 percent. For most people in the United States – and increasingly, for the rest of the world – sugar consumption is far beyond recommended levels. On average, in the U.S., added sugars account for 16 percent of total calorie intake.

To provide a reference, a 20-oz. (600ml) bottle of regular soft drink, one of many types of sugary drinks, provides 12 percent of a day's total calories from added sugars for an adult on a 2,000 kcal/day diet.

Q ▶ Why are sugary beverages particularly bad for our health?

A ▶ Sugary beverages are the lowest-hanging fruit in terms of ways to lower sugar intake. Most sugary beverages, including carbonated and noncarbonated soft drinks, fruit drinks, energy and sports drinks, and all milk and yogurt drinks with added sugar, provide zero nutritional benefits. Some argue that 100 percent fruit juices also should be considered a sugary drink, as the sugars in them are no different than added sugars.

Sugar in liquid form is absorbed more quickly than the liver likely can process and release it. Excess amounts are stored in the liver as fat or glycogen deposits. This can lead to fatty-liver disease and increased risks for diabetes and other chronic diseases.

Usually, intake of calories from sugary drinks is not balanced with an equivalent reduction in calories from

other foods. When drinking sugary liquids, most people do not reduce food intake to adjust calories; hence, total calorie intake increases.

In developed countries, such as the U.S., sugary drinks are associated strongly with obesity. Paradoxically, they also can be associated with under-nutrition, particularly with having a lack of micronutrients, such as vitamins and minerals.

In developing countries, infants consume sugary drinks as a weaning food, which has adverse effects on increasing undernutrition and stunting. Stunted infants have a much greater risk of becoming obese and diabetic.

Ideally, consumers should limit and governments should regulate many other unhealthy foods, but sugary drinks are an obvious place to start.

What are some early successes in the public health ‘sugar fight’?

A ▶ A growing number of countries (e.g., Mexico, France, South Africa, Saudi Arabia, India, the U.K. and Ireland) and U.S. localities – including Berkeley, San Francisco and Oakland (Calif.); Albany, N.Y.; Boulder, Colo.; Philadelphia; Cook County, Ill.; Seattle; and the Navajo nation – have instituted, or plan to implement, taxes on sugary drinks.

These places have recognized that sugary drink taxes are a win-win for governments because they reduce consumption while increasing government revenue. Such revenue can be re-invested in early childhood education, health promotion and improving community infrastructure.

Independent and rigorous peer-reviewed evaluations of the earlier taxes implemented in Mexico and Berkeley show that meaningful sugary drink taxes reduce consumption while increasing consumption of healthier beverages, such as water. Some locations also are tracking how tax revenues are used.

Beyond fiscal measures, other policies, such as regulations about front-of-package labeling and food marketing targeting children, also have had some early successes. Chile now uses scientifically-based nutrition criteria to determine which products sold in Chile require a front-of-package warning label and are

subject to marketing restrictions. This is an excellent model for other countries and localities.

How have the food and beverage industries responded?

A ▶ As expected, leaders in the beverage industry generally have fought attempts to educate consumers and policy efforts by funding counter-campaigns and lobbying against regulations. They view these policies as being “bad for business,” but only because they can’t see the opportunities offered by the policy changes.

Business leaders should embrace becoming part of the solution. *Why?* Evaluation studies in Mexico and Berkeley found that water sales rose after sweet drinks were taxed – water that is sold by the very same beverage industry! In addition to the stable sales numbers, a healthier population is good for business. Loyal customers, with extended lifespans, result in more sales.

What else should be done?

A ▶ Everyone has a role to play and should do so. Consumers can vote with their dollars and gradually change their food choices in ways that improve their health and that of their families. Industry leaders must act in socially responsible ways to improve their customers’ health and their own bottom lines. Policy makers must consider the alarming health-care costs and productivity losses that will result if nothing meaningful is done to minimize nutrition-related diseases.

Clinicians and public health professionals can present data and educate people, but real change requires a truly concerted effort.

We are optimistic that larger and continued successes will happen. We must keep working hard at it – together. ■

HOW HAS DIGITAL TECHNOLOGY CHANGED PUBLIC HEALTH?

Deborah F. Tate, PhD

Professor of health behavior and professor of nutrition

Director, UNC Weight Research Program

Director, Communication for Health Applications and Interventions (CHAI) Core



Photo by Brian Strickland

Most of our students can't remember a time before digital technology. For perspective, consider that the iPhone celebrated its 10th birthday in 2017, Facebook is now firmly a teenager, Google turns 20 next year, and the internet will be 50 in 2019. Digital technology has changed daily life dramatically, and clearly has made an impact on public health. Some of those changes have been good, and some, less so.

Q ▶ What are some of the negatives of advances in technology?

A ▶ We see so many benefits of technology in our lives, including progress on preventable causes of death such as tobacco, physical activity, diet and obesity. Not all technological advances are beneficial, though.

For example, research by Dr. Kurt Ribisl and colleagues at the Gillings School alerted us to the dangers of internet sales of tobacco products to minors and showed us the ways internet tobacco vendors escaped early taxation. Their research has helped to close these loopholes over the past decade or

so, but this example illustrates how the opportunities offered by the internet are coupled with some public health perils.

In considering physical activity and obesity, digital technology presents more obvious challenges. It has been documented that the rise of computers and digital devices over the last couple decades has resulted in a decline of physical activity in the workplace. Although we don't have studies to prove it yet, the omnipresence of digital technology also seems to be making it harder to avoid a sedentary lifestyle.

Still, there's a big upside. Technology aids, such as smart watches, can be invaluable in providing cues to exercise, track and reinforce exercise behavior.

Q ▶ How has your work used digital technologies to improve public health?

A ▶ Over the past 15 years, our work has focused upon digital solutions to obesity prevention and treatment. Some of our earliest studies used the internet to increase the potential reach of effective weight loss treatment to people who might not have access to a specialized, multidisciplinary treatment

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Digital technology affords tremendous opportunities to develop precision public health interventions which deliver the right intervention, at the right time, for the right person.

► DR. DEBORAH TATE

center. We are proud that our work provided needed evidence for online digital health counseling approaches to be considered a form of evidence-based weight loss.

We also have used digital technology for primary prevention. We’ve shown that a primarily digital approach can reduce weight gain in young adults over a period of three to five years. Young adults are at high risk for gaining weight during the many early adulthood transitions, and avoiding weight gain reduces their risk for getting cardiovascular disease, diabetes and cancer. Our recent work has shown that digital treatments are more effective than usual care in primary care settings – and also is more effective for lower-income Latina mothers in Women, Infant and Children (WIC) clinics. (See tinyurl.com/usda-wic.)

Q ► *Is this primarily an educational program delivered via cell phone?*

A ► No – and that’s an important point. Changing behavior is rarely about changing knowledge through education. Some populations truly lack knowledge about which foods are healthy or that physical activity is important – but that’s not the norm.

Digital interventions that work are grounded in behavioral science; delivered via a digital device; and provide behavioral skills training, monitoring, tailored feedback and support that help guide

behavior change. That’s why many commercial apps are ineffective – they aren’t grounded in behavioral science and behavior-change techniques.

Q ► *How are digital technologies changing public health interventions?*

A ► Before digital technology was ubiquitous, public health interventions had to reach large numbers of people, and to do so they needed to be universal and less customized. Digital technology has changed that. We develop computer algorithms to deliver highly prescriptive, personalized interventions – ones that people can access on their smartphones – and we can change the recommendations and messages instantaneously to adapt to the user’s progress.

We know that not everyone responds to an intervention the same way, much the same as one blood-pressure medicine, or one dosage level, is not right for everyone. It has been hard to make public health interventions highly customized and yet still able to reach large populations. Wearable technology and smartphones with GPS now make it possible to develop algorithms that predict behavior better – and collect more data with less burden on the user.

In our Gillings Innovation Laboratory on Precision Public Health, along with Drs. Carmina Valle and Brooke Nezami, we have developed an app called “Nudge,” which employs this technology to deliver interventions “just in time,” along with guidance and a gentle push toward a healthier lifestyle.

The app functions much like a behavioral counselor, analyzing progress, making suggestions and providing praise for successes. It’s just much more scalable. This is a real opportunity for behavioral science and public health. ■

WHAT'S ESSENTIAL FOR THE PRENATAL BRAIN?

Steven Zeisel, MD, PhD

*Kenan Distinguished University Professor of
nutrition and pediatrics*

*Director, Nutrition Research Institute,
Kannapolis, N.C.*



Photo by Chad Mitchell

In science, 10 percent of successful scientific discovery is the result of skill and hard work – but 90 percent comes from asking the right question. During my graduate training, I was very lucky to ask the right question. I wondered where the choline in acetylcholine comes from.

Acetylcholine is an organic chemical that serves as a neurotransmitter – it's released by nerve cells and sends signals to other cells, such as in muscles.

At the time, all the textbooks stated that people could make their own supply of this nutrient in the liver and did not need to obtain it through food. I knew that this was not true for rats, mice and dogs, and I doubted it was true for people.

As soon as I got my first job as an assistant professor, I wrote a grant proposal. It was funded, and I did the experiment. I placed people in the hospital research unit, fed them a diet very low in choline, and proved that most men, most postmenopausal women, and about half of premenopausal women got sick when fed a low choline diet for many weeks.

Most people in the study developed short-term liver damage. About 10 percent developed muscle damage – all of which was reversed when choline was reintroduced into their diet.

We had proven that choline was an essential nutrient for humans. This discovery led the U.S. Institute of



WHAT DOES CHOLINE DO?

Choline is used to make the wrappers, or protective membranes, around cells and to make acetylcholine, which serves as a 'nerve messenger.' Choline also is needed for many biochemical pathways in the body where methylation – adding a carbon group – must occur.

Medicine (now the National Academies of Sciences' Division of Health and Medicine) to set a dietary intake recommendation for choline in 1998 and the U.S. Food and Drug Administration to establish food-labeling rules in 2017.

Q ▶ What foods contain choline?

A ▶ We worked with the U.S. Department of Agriculture to develop a database of foods that are high in choline. (See the report at tinyurl.com/USDA-choline.) Good sources include eggs, milk and fatty foods – exactly the foods nutritionists told you to avoid if you need to lower your cholesterol.

Our research team then asked why some young women got sick when fed a low-choline diet, while others did not. We found that estrogen can 'turn on' a gene in the liver that's needed for choline production, and that young women, especially during pregnancy, had enough estrogen to do this, thereby making themselves less reliant on dietary choline.

Q ▶ Why did half of young women in the study still get sick when deprived of choline?

A ▶ They had an alternate variation, or 'spelling,' of the choline-producing gene in liver that makes it unresponsive to estrogen. These women had to obtain choline from their diets because they could not make enough in their livers.

With further study, we were able to describe a number of other genes which, when their genetic codes were "misspelled," required that a person obtain greater amounts of dietary choline. This discovery still is among the most dramatic examples of how important it can be to individualize nutritional needs. This field of personalized nutrition, also called precision nutrition, is a primary focus for researchers in the UNC Nutrition Research Institute in Kannapolis, N.C., which I am fortunate to direct.

I went to The Gambia, in Africa, to determine whether these spelling differences in genes for choline metabolism were present in people there. Choline intake in the diet

in The Gambia is about half of that in the U.S. Also, since humans first evolved in Africa and then migrated to Europe and Asia, we wondered whether these spelling differences occurred only after people left Africa.

We found that almost all of the spelling differences that made people require more choline in their diets were missing in The Gambia. However, when we studied the genes of the Maasai people in Kenya, we found the same gene misspellings that occur in people of European descent. (The Maasai eat diets rich in milk and cow blood, both high in choline.)

This meant that, over tens of thousands of years, a diet low in choline selected, by evolutionary pressures, for people without the spelling errors – an example of how traditional diet can affect evolution.

In other studies, we found that many infant formulas did not contain the same amount of choline as did mother's milk. In 2007, all commercially available infant formulas were adjusted to deliver the same amount of choline as does human milk.

Q ▶ Why is this important?

A ▶ Our research team showed that development of the brain during fetal and early life depends upon the mother's supplying enough choline to the child. In mouse experiments, we and others showed that when a mother eats low choline for only a few days during pregnancy, her pups are born with brains that have fewer nerve cells, and the memory of these pups is worse throughout their lifetimes.

Our work has updated the nutrition textbooks, changed the composition of infant formulas and made the public aware of the need for sufficient choline in their diets. Each of us needs about one-half gram of choline every day. Soon, food labels may list how much of it a food provides.

Scientific discovery can change the world. We want to continue to ask more of the right questions. ■



DELIVER PROVEN SOLUTIONS

Our Strategic Theme:

Promote health, prevent disease,
improve care for all



Dr. Peggy Dilworth-Anderson

HOW CAN WE COPE WITH THE CHALLENGES OF AGING?

Peggy Dilworth-Anderson, PhD

Professor of health policy and management

Member, Global Council on Brain Health

Former president, Gerontological Society of America

There are challenges and opportunities related to global aging.

The group of people in the U.S. – and around the world – who are age 60 or above is increasing rapidly. In 2015, almost 13 percent of the global population was 60 years old and older, and that number is expected to double by 2050 – to 2.1 billion people. This demographic shift brings opportunities and challenges to all aspects of older people's lives.

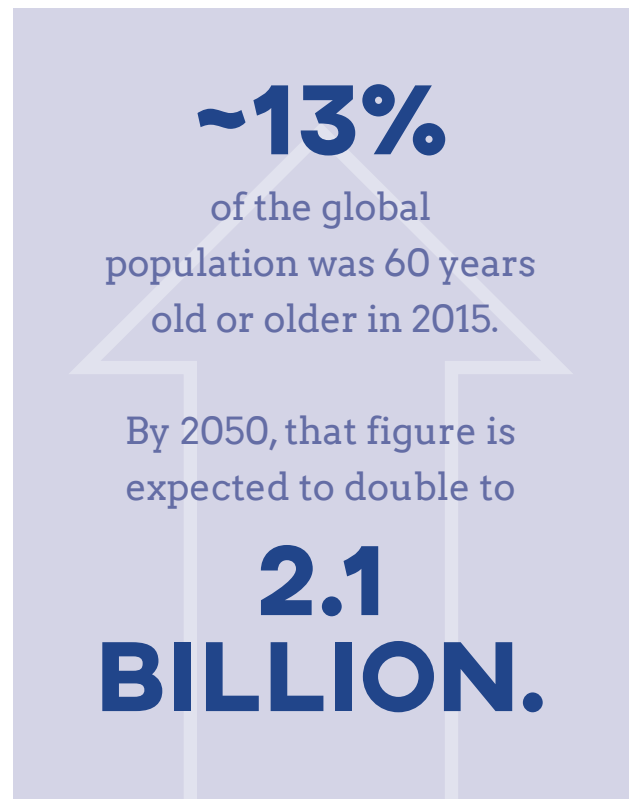
One of the positive things about living longer is the acquisition of more wisdom and experience. Older adults can provide familial, social, cultural, educational, political and economic contributions to societies. However, one of the major challenges has to do with the changing health status of many older people. Physical and emotional needs may require high levels of health care, especially among those ages 85 and older. Along with more frequent or complex care often comes the need for more familial and economic support.

Globally, low-income to high-income countries are seeking ways to meet the range of demands, especially for health care, of a population growing increasingly older. Although the World Health Organization (WHO) identified ischemic heart disease, stroke and chronic obstructive pulmonary disease as the three leading causes of mortality among older adults, especially in low- and middle-income countries, brain health also has become a concern.

Q ▶ What are we learning about dementias, including Alzheimer's?

A ▶ For one thing, we are expanding our discussions about multi-morbidity in later life to include brain health.

Several organizations are leading the way in this discussion, including the National Institutes of Health, Alzheimer's Association, World Health Organization, Pan-American Health Organization, The World Dementia Council (see below), National Alzheimer's Project Act, National Academies of Sciences, Engineering and Medicine's Health and Medicine Division (formerly the Institute of Medicine) and the Global Council on Brain Health.



Even closer to home, former U.K. Prime Minister David Cameron appointed Dr. Dennis Gillings, CBE, as World Dementia Envoy in 2014. In that role, Dr. Gillings chaired the World Dementia Council from 2014 to 2016, raising funds toward a cure for Alzheimer's disease and other dementias.

These organizations have provided us with important leadership and scientific knowledge. In 2015, the Institute of Medicine, now the National Academies' Health and Medicine Division, published an informative report on cognitive aging (see tinyurl.com/iom-aging), a process described here by the authors:

Like other organs, the human brain changes with age in both its physical structures and its ability to carry out various functions. The brain is responsible for cognition, a term that includes memory, decision-making, processing speed, wisdom and learning.

As a person ages, these functions may change – a process called cognitive aging. Cognitive aging is not a disease; instead, it is a process that occurs in every individual, beginning at birth and continuing throughout the life span.

Take the steps instead of the elevator. Stand and stretch periodically. Even small changes can make aging less difficult.

► **DR. PEGGYE DILWORTH-ANDERSON**

The report provides recommendations and steps that can be taken by individuals, families, communities, health-care providers and systems, financial organizations, community groups and public health agencies to promote cognitive health among older adults.

Q ► What are you doing currently in the field of aging?

A ► I'm pleased to have been named to the Global Council on Brain Health (GCBH) in 2015. Convened by AARP (aarp.org), with support from Age UK (ageuk.org.uk), the council's governance committee includes 13 scientists, health professionals, scholars and policy experts from around the world who are working in areas of brain health related to human cognition. The governance committee also works with other experts to make evidence-based lifestyle recommendations that can have an impact on brain health.

We aim to offer the best possible advice about what older adults can do to maintain and improve their brain health. Members discuss specific lifestyle issues that may have an impact upon people's brain health as they age, with the goal of providing evidence-based recommendations for people to consider incorporating into their lives.

I encourage people to look at one or more of our four reports. They include *Cognitively Stimulating Activities* (2017), *Social Engagement and Brain Health* (2016), *Sleep and Brain Health* (2016), and *Physical Activity and Brain Health* (2016). These are available at tinyurl.com/GCBH-aging-reports.

Good health is about both physical and brain health. Life history has a lot to do with all aspects of the aging process and health. In other words, life course matters.

The health care and attention that I had as a child and throughout life has affected my health today. My level of education has facilitated my brain and physical health. Positive relationships with friends and family provide support in times of need, which is good for all aspects of our health. For many, like myself, having a spiritual home helps develop coping skills and resilience.

Like others, I'm sometimes challenged to maintain ongoing physical activity to support brain and physical health. The Gillings School is a great partner in that regard, with its Culture of Health initiatives. I'm among those who take advantage of our health-oriented work environment. My two-or-three-times-per-day "wellness walks" get my blood circulating and stimulate cognition. I talk to people along the way, so I'm engaging socially as I exercise my physical body. I hope that all of this leads to my sleeping enough and sleeping well – which is the best support for brains of all ages.

Many people don't have the opportunity to take a 15-minute break to walk or use a treadmill. To those, I would say, if your own work environment doesn't support your being active and healthy, find ways to create that environment for yourself. Work small things into your routine – take the steps instead of the elevator, stand and stretch periodically. Even small changes toward physical activity, decreased stress and good sleep can make aging less difficult. ■

CAN GOOD NUTRITION REDUCE RISKS FOR CHRONIC DISEASES?

Alice Ammerman, DrPH

*Mildred Kaufman Distinguished Professor of Nutrition
Director, UNC Center for Health Promotion and
Disease Prevention*



Nutrition is a primary factor in five of the top 10 leading causes of death in the United States.

It's telling that immigrants who come to this country and adopt a "western diet" often see their rates of chronic disease increase dramatically. What's more, nutrition-related health problems such as obesity, hypertension and diabetes have been linked for some time with racial, ethnic, economic and geographic disparities in our country.

Q ▶ Who is at greatest risk for nutrition-related illness?

A ▶ Nationally, the highest rates of nutrition-related chronic diseases are found among African-Americans, Hispanics and Latinos/Latinas, particularly among those with the lowest incomes and those who live in rural areas. The southern states generally have the highest incidence of chronic diseases, and experts often refer to the southeastern U.S. as the "stroke belt," where rates of hypertension and stroke are two to three times the national average.

While we haven't identified all the causes of chronic disease disparities, we know that both poverty and

diet are contributory, and they often have a combined effect. The U.S. Department of Agriculture defines food security as "access by all people at all times to enough food for an active, healthy life." The lack of that access is what we call "food insecurity."

It may sound counterintuitive, but many people in the U.S. suffer from both food insecurity and obesity. Many of the least-expensive foods available are very high in sugar, refined carbohydrates and low-quality fats, which all contribute to poor nutritional health and obesity. While it is possible to eat a healthy diet on a budget, doing so requires significant knowledge, time and food preparation skills.

Most researchers and nutritionists are now quite confident that the strongest evidence upholds the benefits

Nutrition is a
primary factor in

50%

of leading causes of death
in the United States.

of the Mediterranean diet, which emphasizes more high-quality fats (vegetable/olive oils and nuts), whole grains, and fruits and vegetables. One focus of my work is adapting this premise to the southern palate and local food availability. I refer to this hybrid as the “Med-South diet.”

Q ▶ What can policy do to help improve nutrition?

A ▶ Food policy can impact people’s diets at the local, national and global levels. On a very local scale, workplace policies can be put in place to encourage providing healthier options for celebrations and lunch meetings. At the Gillings School, the dean’s office does not serve sugary soft drinks, and healthy, local foods generally are provided at schoolwide events.

On the state level, one positive example is the recently passed bill in North Carolina that provides funding to corner stores in food deserts so they can purchase refrigeration equipment that facilitates the sale of fresh and frozen produce.

At the national level, the U.S. Farm Bill contains many important nutrition benefit programs, including the Special Supplemental Nutrition Program for Women, Infants and Children (WIC), the Supplemental Nutrition Assistance Program (SNAP, formerly known as Food Stamps) and assorted Child Nutrition Programs (including ones that provide school breakfasts and lunches and summer meals for children). These programs increase access to healthy food among those with limited incomes.

Globally, some countries have instituted national taxes on sugar-sweetened beverages. Such taxes have curtailed the consumption of these obesogenic products while generating funding for public health programs. (Read more on page 23.)

Q ▶ How can changes in the food system make a difference?

A ▶ Another approach to improving nutrition is by making conscientious changes to our food choices and food system. By consuming locally and sustainably grown food, we can reduce toxic exposures from pesticides and fertilizers while revitalizing our



Dr. Alice Ammerman prepares to purchase produce at the Carrboro (N.C.) Farmers Market.

connection to the source of our food. By shopping at farmers markets or joining a community-supported agriculture (CSA) program, through which a box of farm-fresh produce is delivered each week, consumers can reconnect with what it means to “eat with the seasons” and rekindle the social and creative aspects of cooking together and sharing meals.

On the positive side, “eating local” is increasingly popular, and federal nutrition programs are being adapted to facilitate the use of food benefits at farmers markets and through CSAs. While it can be a challenge to assure simultaneously that farmers get a fair return on investment and consumers have access to affordable healthy food, innovative strategies are making this more possible.

Sharing food should be a wonderful and joyous occasion. My work aims to ensure that making healthier choices – and supporting local farmers in the process – adds to that satisfaction, and ultimately, improves our collective health. ■

WHAT ARE THE NEXT STEPS FOR THE AFFORDABLE CARE ACT?

Jonathan Oberlander, PhD

*Professor of health policy and management
Professor and chair of the Department of Social
Medicine, UNC School of Medicine*



Photo by Max England

The Affordable Care Act (ACA) has an impressive record of survival. It has managed to overcome legal challenges, state resistance, controversy, unpopularity and a disastrous rollout of *healthcare.gov*. At least for now, it has survived efforts by Congressional Republicans and the Trump administration to dismantle it.

Yet, following the implosion of Republicans' repeal efforts, the ACA's future remains uncertain. The Trump administration already has taken steps, including defunding efforts to promote enrollment, to weaken "Obamacare." Will President Trump choose to take more dramatic steps, such as refusing to reimburse insurers for the cost-sharing reductions they give low-income enrollees in ACA plans, something that could further destabilize the ACA's troubled marketplaces?

Alternatively, it is possible that a bipartisan agreement could emerge that would strengthen and stabilize insurance marketplaces. In theory, Democrats and Republicans could come together to improve the law. Republicans could acknowledge that the ACA is here to stay and pursue reforms rather than repeal. Democrats could acknowledge that the ACA has serious problems that require attention.

However, bipartisanship in health-care politics has been seen in Washington about as often as unicorns in

recent years. A bipartisan agreement to repair the ACA would require a suspension of the existential politics and partisan polarization that have pervaded health-care policy. I hope it happens – but common sense does not tend to prevail in U.S. health-care policy.

Q ▶ There is a lot of attention to single payer as an alternative to Obamacare – could it happen at the federal or state level?

A ▶ The American health-care non-system is, even after the ACA, extraordinarily dysfunctional, costly, complex, wasteful, inefficient, irrational and inequitable. Therefore, the appeal of single payer arrangements (think "Medicare for All" or Canadian-style national health insurance, with the government as the sole insurer) is understandable.

Dissatisfaction with the ACA's limitations have fueled interest in single payer insurance, as has the prospect of Obamacare's repeal. Those limitations include the facts that health insurance remains unaffordable for many Americans; we still have nearly 30 million people who have no coverage; many who are insured face rising

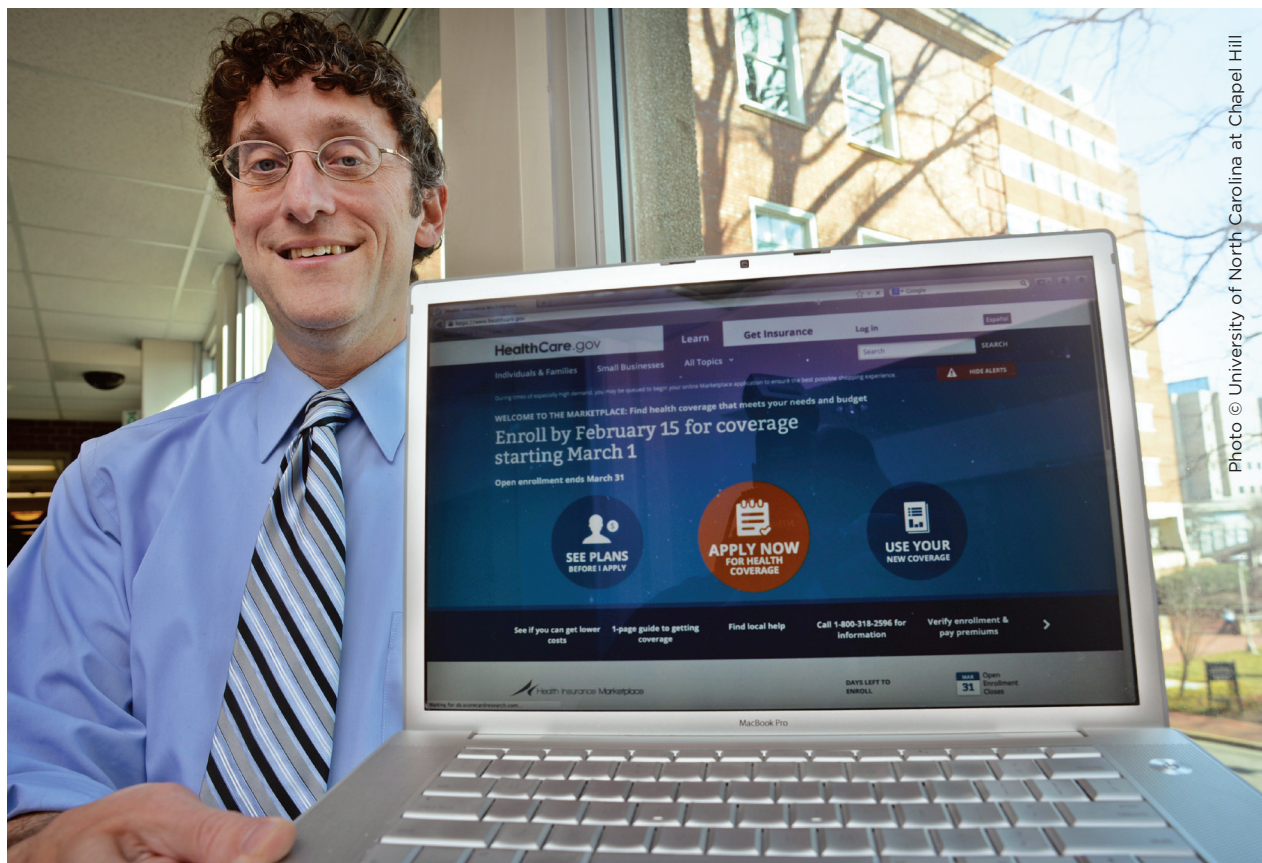


Photo © University of North Carolina at Chapel Hill

In 2014, Dr. Jonathan Oberlander explained how to enroll for insurance coverage through the Affordable Care Act.

out-of-pocket costs for deductibles and copayments; and under-insurance is increasing, even as lack of insurance has dropped substantially.

Bernie Sanders' presidential campaign also gave a boost to the idea of single payer. Some polls show increasing public support for the idea. Still, political obstacles to single payer – including fierce opposition from the insurance industry and other stakeholders, the well-insured's fear of changing health plans, Americans' deep ambivalence about government, the political difficulty of raising taxes to a level necessary to fund single payer – remain formidable.

Even liberal states predisposed to single payer face the difficult fiscal and political question of how to finance such a plan, an equation that no state has solved to date. Given the current Congress, single payer has no immediate prospects in Washington.

Will the Democratic party turn to single payer in the 2020 campaign? That might be possible, as candidates try to appeal to the liberal base of the party whose members vote in primaries. However, for all the recent

momentum, none of the barriers to single payer has eroded substantially.

Democrats instead could consider “Medicare for More” – expanding the existing Medicare program – rather than “Medicare for All” as a goal. For decades, some health reformers in the United States have framed the debate as single payer or nothing, and generally, they have gotten nothing. Given the constraints of U.S. political institutions and our patchwork health-care system, any reform that passes must be a compromise, just as the ACA was.

It is easy to design on paper a better health insurance system than we currently have, but it is much harder to enact such a system through Congress. Whatever the long-range aspiration, reformers need to grapple, in the short term, with ways to improve our health-care system and strengthen its ability to serve all Americans. ▮

HOW CAN WE ACHIEVE EQUITY IN PALLIATIVE AND SUPPORTIVE CANCER CARE?

Cleo A. Samuel, PhD

Assistant professor of health policy and management



Photo by Jennie Sala

If you're like most people, when you see the phrase "palliative care," you think of end-of-life care, perhaps hospice. Palliative care covers so much more. According to the National Cancer Institute, it is "care given to improve the quality of life of patients who have a serious or life-threatening disease, such as cancer." It is whole-patient care, which moves beyond the primary course of treatment to consider psychological, social and spiritual needs. Examples include pain and symptom management, physical rehabilitation, mental health counseling and pastoral care.

To be more consistent with this holistic approach to cancer care, many in the field now use the phrase palliative and supportive cancer care (PSCC). With this new framing, we hope to introduce PSCC to more patients much earlier in their cancer-care journey, ideally as soon as they receive a diagnosis.

Q ▶ What kinds of inequities currently exist?

A ▶ In my work, I focus primarily on racial/ethnic inequities in palliative and

supportive cancer care. Longstanding inequities include greater symptom burden, higher perceived unmet supportive care needs and lower rates of pain management in black cancer patients relative to their white counterparts. An especially important area of difference, one that has multiple contributing factors, has to do with inequities in effective pain management.

First, providers have been found to underestimate the severity of pain among patients of color relative to white patients. Consequently, providers are more likely to undertreat that pain. Second, pharmacies in predominantly black neighborhoods often have insufficient supplies of pain medications, making it difficult for patients of color to get these drugs when they are prescribed.

Another difference in the cancer care offered to white patients and patients of color is that black patients, in particular, are less likely to receive true hospice care at the end of life and are instead more likely to enter the intensive care unit and receive life-extending procedures. By this stage, such measures are unlikely to provide any survival benefit but are very likely to decrease quality of life in the final days.



39%

increase in
cancer costs
by 2020

30%

increase in cancer
survivors between
2012 and 2020

45%

increase in
cancer incidence
by 2030

Q ▶ What does the future of cancer look like in the United States?

A ▶ Cancer-care costs are expected to increase by 39 percent between 2010 and 2020; current staff shortages in the cancer-care workforce also are expected to grow. Additionally, experts project a 30 percent increase in cancer survivors between 2012 and 2022, as well as a 45 percent increase in cancer incidence between 2010 and 2030.

It's important to remember that, after cancer treatment, survivors don't just return to their lives as they were. Many continue to deal with troublesome symptoms and supportive care needs such as pain, arm and leg swelling, loss of memory, fertility issues and financial difficulties. Life after cancer often is a "new normal" that still requires PSCC services.

Q ▶ What do you recommend for achieving equity in palliative and supportive cancer care?

A ▶ Let me mention two things.

We must move quickly to address the systemwide framing of PSCC, which currently is viewed as a referral service rather than an integral part of routine oncology care. For example, tumor board meetings are used widely and accepted in routine oncology care. These meetings bring together oncologists and other specialists to review patient cases and create comprehensive treatment plans.

Currently, palliative and supportive cancer-care specialists (e.g., pain specialists, chaplains and nutritionists) typically aren't part of these conversations. Integrating PSCC into routine oncology

care will go a long way toward improving access to PSCC services, especially for patients of color, who more often report unmet supportive care needs.

We also must do more to fight implicit bias (the attitudes and stereotypes that affect us unconsciously), especially in the context of pain and symptom management, an area in which patient perceptions and provider assessments are subjective and sometimes incompatible. Providers who underestimate the pain experienced by patients of color have an influence on the types of pain management these patients receive. For some, the physical and emotional distress associated with uncontrolled symptoms can lead to early discontinuation of potentially life-saving cancer treatment.

To bring about long-term change, we must address these provider- and system-level drivers of PSCC inequities. Health informatics is one tool we can leverage to make progress on these core problems. In my research, I am exploring the use of electronic patient-reported outcome tools to assess symptoms and supportive care needs in racially diverse cancer patients. By tracking and analyzing these data over time, we can provide race-specific feedback to providers and create transparency and accountability around how we monitor and manage palliative and supportive care needs for all cancer patients.

I am hopeful that this research will help raise red flags about systematic inequities in PSCC. Recognizing that a problem exists, after all, is the first step toward solving it. ■

HOW CAN WE IMPROVE THE HEALTH OF YOUNG WOMEN?

Camille McGirt, MPH

Gillings School alumna (health behavior, 2017)

*Co-founder, Healthy Girls Save the World
(healthygirlssavetheworld.org)*

Management Consultant, Booz Allen Hamilton



My answer is simple – *change the culture!*
Let's face it – young women in 2017 are influenced by many messages that may not have positive effects on body image, self-esteem, confidence and overall well-being.

According to the Pew Research Center, 73 percent of teens have access to a smartphone, meaning that the pressure to achieve a perfect body and perfect social life literally is always at the fingertips of many young women in the U.S. We must call for a culture shift in the way women view and treat their bodies. Young women must have safe spaces where they can be free to express themselves and have positive reinforcement for believing that they are beautiful and valued.

A young woman should be encouraged to be free in her spirit, body and mind – rather than being confined by society's standards and stereotypes. Girls must be made aware that the oversexualized images they see in magazines and on television are not real and are not worthy of emulation.

To be a part of the solution for these issues, my sister Rachel McGirt and I founded Healthy Girls

Save the World Inc. (HGSW) in August 2011. HGSW is a nonprofit organization dedicated to developing integrated and accessible programs that assist young, underserved girls in achieving their health goals through self-efficacy and SMART goal achievement. (SMART, which stands for “specific, measurable, achievable, relevant and timely,” is an evidence-based method of goal setting central to HGSW's core.)

We believe in Healthy Girls Save the World because we believe that every girl deserves a positive space



A young woman should be encouraged to be free in her spirit, body and mind – rather than being confined by society's standards and stereotypes.

► CAMILLE MCGIRT



Camille McGirt (at left, in pink) leads a “Healthy Girls” workshop while an undergraduate at UNC.

in her community where she can learn to be healthy, inside and out.

Healthy Girls uses an innovative business model that connects middle-school girls to colleges, mentors and holistic health programming. We provide opportunities for middle-school girls to participate in high-quality after-school programs and summer camps on college campuses that foster the development of healthy habits related to proper nutrition, physical activity and overall healthy lifestyles.

Informed by evidence-based curricula, our programming is a uniquely powerful combination of trained female student counselors, female varsity athletes, expert speakers and enriching activities led by community organizations.

To date, we have served 400 young women in N.C. and beyond.

Since starting the program, we have learned that too many girls feel the need to connect with other girls their age and have fun without judgment, bullying or acceptance/social issues. HGSW keeps the development of a safe and accepting environment at the heart of our program’s core.

More programs should aim to change the culture for girls and young women. Pre-adolescence and adolescence are difficult and confusing. Girls need safe spaces, mentors and role models. They need education about good nutrition, the value of physical activity and the importance of strong, positive relationships that support their mental health.

Our program inspires girls to be themselves—and to know that being oneself is more than “good enough.” *It’s great!* ■

WHAT ARE THE MOST PRESSING ISSUES IN GLOBAL HEALTH?

Margaret Bentley, PhD

Carla Smith Chumblee Distinguished Professor of Global Nutrition

Associate Dean for Global Health

Associate director, UNC Institute for Global Health and Infectious Diseases

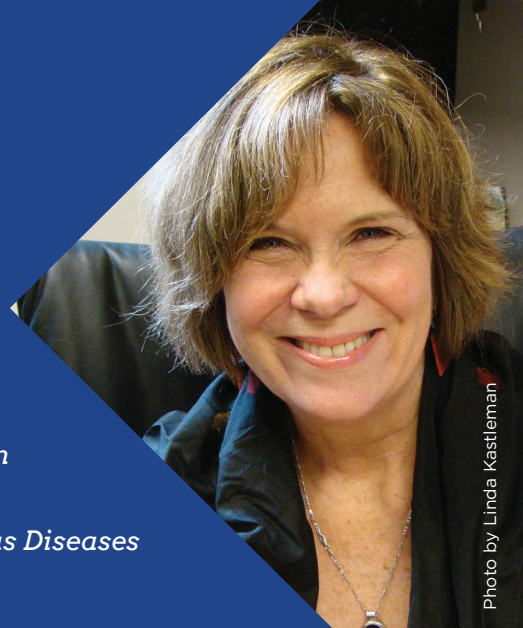


Photo by Linda Kastleman

There are so many! Perhaps the best place to start is with the United Nations' Sustainable Development Goals (tinyurl.com/UN-SDG.)

Officially titled "Transforming our World: the 2030 Agenda for Sustainable Development," the document proposes a set of 17 global goals with 169 targets.

Many of the goals overlap with global health, including reducing poverty and increasing gender equality, quality education, climate action and economic development. Others clearly have global and public health significance for action, such as zero hunger, clean water and sanitation, and good health and well-being for all.

I'll focus on two pressing issues that overlap with some of these goals and that have promising and feasible solutions – the convergence of infectious diseases and noncommunicable diseases, and food security, agriculture and malnutrition.

Q ▶ **What is the relationship between communicable and noncommunicable diseases (NCDs)?**

A ▶ Worldwide, NCDs are rising in low- and middle-income countries. These include rapid increases in diabetes, cardiovascular diseases (CVD), tobacco-related morbidities and mortality, and cancer – particularly cervical cancer.

Global mental health is at the top of the global burden of disease. Poor mental health can result from

depression, stress and anxiety and can lead to substance abuse. Several Gillings School faculty members, including Drs. Brian Pence and Joanna Maselko (in epidemiology) and Dr. Rohit Ramaswamy (in the Public Health Leadership Program), work with students to grow our capacity for global mental health research.

In the same countries, communities and households, infectious disease prevalence remains high. HIV/AIDS, malaria, tuberculosis, diarrheal diseases, respiratory illness and emerging infectious diseases are among those old foes. Again, our School and University have great expertise in infectious diseases research and prevention, including Drs. Mike Cohen, Steve Meshnick, Ralph Baric, Audrey Pettifor and Jennifer Smith (in epidemiology), Drs. Suzanne Maman and Vivian Go (in health behavior) and many more.

This convergence of infectious diseases and NCDs is called the dual burden of disease, and it represents a great challenge to governments, programs and policy makers who must allocate resources for prevention and treatment. Many at the Gillings School focus on the dual burden of disease, including myself, Dr. Barry Popkin and his large team, Drs. Shu Wen Ng, Linda Adair, Amanda Thompson and others, all in nutrition.

Q ▶ **What can be done?**

A ▶ Research and programs focus upon a promising innovation – the integration of

treatment and care of diabetes among HIV-positive individuals. The literature suggests that anti-retroviral (ARV) therapy adherence rises when we offer people diabetes management at the same point of health-care delivery.

Clare Bailey, a recent master's degree and registered dietician (RD) alumna, studied diabetes clinical care during her degree training and now is project coordinator for a National Institutes of Health-funded study in Tanzania that aims to integrate diabetes management and HIV/AIDS care.

Dr. Jennifer S. Smith's research in South Africa found that highly active antiretroviral therapy (HAART) helped to reduce the incidence of cervical precancerous lesions in HIV-positive women, compared to non-HAART users.

With colleagues at the University of San Francisco at Quito and the UNC Center for Galapagos Studies, Dr. Amanda Thompson (anthropology and nutrition), Dr. Jill Stewart (environmental sciences and engineering), and I are beginning interdisciplinary research in the Galapagos Islands.

Here, high rates of diabetes and obesity affect adults, and poor water quality causes high rates of diarrheal diseases, especially in children. There are also serious food security issues because of lack of agriculture, accessibility and price – leading to stress and anxiety among caregivers.

Our work in this World Heritage site will identify strategies for working with communities to prevent these problems – so we can ensure better health and well-being across the life cycle.

What can be done?

A Nutrition is a continuum. At one end is under-nutrition, which particularly affects children and women. Faculty members, including Drs. Linda Adair, Amanda Thompson, Penny Gordon-Larson and others, are at the forefront of this work on the developmental origins of disease related to under-nutrition.

At the other end is overweight and obesity, now a global epidemic. Dr. Barry Popkin published *The World is Fat* in 2009, and since then, the world has become fatter, even in very poor settings. This is related to over-

consumption of highly processed foods and beverages that contain high levels of oils, sugar and salt – as well as more sedentary lifestyles.

More people in the world are now overweight and obese than are under-nourished. In India, more than half of all children are malnourished and stunted, but the prevalence of obesity, overweight and noncommunicable diseases is rising rapidly, even in rural areas. Alas, we have exported our western diets and lifestyles – a negative outcome of globalization.

What can be done?

A We know what should happen. Interventions to improve under-nutrition among children may include food and micronutrient supplements, improved breastfeeding and complementary feeding, and reduction of infectious diseases. Agriculture also has a key role in diversifying crops, improving yield and promoting home gardens and animal husbandry.

We have many examples of cutting-edge research conducted by our faculty. The Measure Evaluation project, which includes several Gillings School faculty members and has been funded by the U.S. Agency for International Development for nearly \$600 million, examines how the “Feed the Future” program in Malawi can improve under-nutrition by integrating agriculture through more efficient value chains.

Individual behavior-change strategies can be successful in dealing with over-nutrition. Many of our faculty have demonstrated this in North Carolina and across the U.S., including Drs. Alice Ammerman (see page 33), Dianne Ward, Deborah Tate (see page 25), Leslie Lytle and others.

A major impact can be achieved through structural changes – e.g., tax policies and price increases to reduce demand (see page 23) and by making neighborhoods more conducive to active lifestyles. The most promising strategies should integrate these through interdisciplinary, team-based approaches with solid evaluation of “what works.”

Do what works. That applies to any pressing global health problem. We need to know what works and how, and then apply the solutions to scale. With the Gillings School's strengths in implementation science, the solutions definitely are within view. ■

HOW CAN WE BE USEFUL IN CONFLICT ZONES AND COMPLEX EMERGENCIES?

Dilshad Jaff, MD, MPH

*Adjunct assistant professor of maternal and child health
Program coordinator for solutions to complex emergencies,
Research, Innovations and Global Solutions*



Photo by Jennie Saia

Let me begin, if I may, by describing some of my history and experience. I'm a native of the disputed territories between the central government in Baghdad and the Kurdistan region of Iraq. I trained as a physician and found myself in the center of the U.S. war in Iraq in 2003.

One must learn to adapt quickly in circumstances such as those. Once, I volunteered to manage an emergency room in a hospital that had no electricity or water. These things can be done with planning, creativity, collaboration and patience.

I've led mental health care, health education and vaccination programs at a primary health care center in Iraq. I've taught triage techniques, pharmacy management and infection control to nurses and others who didn't know the most basic hygiene practices or how to provide quality care.

Recently, I've begun to work more with agencies, helping them become aware of the many layers of dysfunction in health-care systems in conflict-ridden countries.

The collapse of the health system – and of health care access and safety/security – in wartime makes those in need of care so vulnerable. These circumstances also endanger and dishearten the health-care providers.

Education is an important basic need.

Education is crucial in developing infrastructure and delivering medical training – but it's also essential to populations at large.

Imagine that a whole generation is disrupted, kept from schooling, denied education that gives them job skills. It isn't so hard to imagine – globally, in 2016, 50 million children were uprooted and became immigrants or refugees.

Those who are poor and without refuge are vulnerable to every dangerous belief system. Either we educate these who are lost, or they choose violence. It is as simple as that. Public health professionals must confront the lack of education and be on the front lines in bringing people together and healing wounds.

Educated people learn to reason and make decisions about their lives. They learn how to understand and tolerate others. Teaching will create generations of peacemakers who will work to make our world a better place. If I could convince charitable organizations of one thing that would improve the lives of people in war zones – and ultimately would improve the standing of us in the U.S. – it would have to do with education – *and more education!*

Now more than ever, it is critical to push education to the top of local and global priorities. Public health is one of the best ways to innovate and support education in these settings.

► **DR. DILSHAD JAFF**

Build schools, provide books and other tools for learning, share cultural experiences. Improve curricula and train teachers and other educators, remembering that in areas disrupted for long periods by conflict, a generation of people can be lost. Now more than ever, it is critical to push education to the top of local and global priorities. Public health is one of the best ways to innovate and support education in these settings.

Storytelling, which has a valued role in many societies, is an effective way to educate.

Researchers in health behavior are aware of this. Whole communities have been educated when they hear the personal stories of people who have smoked tobacco and suffered terrible health consequences. Smokers become isolated because so many now have accepted that “smoking hurts people.”

In my own work, I have studied the impact of female genital mutilation. Elders often want to hold on to traditional ways, but telling the stories of girls and women who have experienced the procedure may finally make it unacceptable to allow this traumatizing and physically dangerous act to continue.

I believe that sharing more local and global stories will contribute to peace-building and will ensure improved health and safety for future generations.

Q ► **Aren't you afraid when you place yourself in a conflict zone?**

A ► I am terrified. Of course, I am – because I'm human. But there are things that must be done because they are the right thing to do. I am

sometimes more, and sometimes slightly less, terrified than the people I am trying to serve. However, I think we must push past what we think we're capable of so that we can give hope and opportunity to those who otherwise have no escape from the madness of war and the crimes of ignorance.

In addition to advancing principles that preserve life and health, the field of public health offers us these wonderful opportunities to be human with – and learn from – one another. ■

Learn more at tinyurl.com/UNICEF-uprooted-children.

**63.5
MILLION**
people are forcibly displaced **worldwide**.

**50
MILLION**

children were uprooted and became refugees in 2016.

53% of refugees are from Somalia, Afghanistan and Syria.

Source: U.N. Refugee Agency



PROTECT THE ENVIRONMENT

Our Strategic Theme:
Healthy people, healthy planet



Photo by Johnny Andrews

Dr. Jamie Bartram

WHAT IS OUR BIGGEST GLOBAL HEALTH CHALLENGE?

Jamie Bartram, PhD

Don and Jennifer Holzworth Distinguished Professor of environmental sciences and engineering

Director, The Water Institute at UNC

Water, no doubt about it. Globally, water problems go hand in hand with poverty, inequality and injustice. Whether contamination of ground water, inaccessibility to water sources or outdated infrastructure, those who can and do invest in taking care of this limited resource are those willing to invest in the future.

At The Water Institute, we work worldwide, especially with low- and middle-income countries and communities, to steer efforts and investments – to improve health, reduce poverty, erode inequalities and right injustices. Transitioning to infrastructures that deliver what communities want and need to achieve these benefits is key. The village hand pump is outdated, too – it often fails and does little to prevent disease or reduce the burden of collecting water. Recent innovations offer opportunities for radical improvements. For example, we should turn to solar pumping and disinfection – with the potential to deliver safe water, household by household. These are key demands under the Sustainable Development Goals. (See www.who.int/sdg/en.)

Collecting water can require more than 20 percent of a woman's day (yes, overwhelmingly women) in some low-income countries. Imagine, instead, investing these hours in business-building, leading community efforts, caring for children or growing nutritious crops. It is not so hard to locate, transport and deliver potable water – for all, and not just for us privileged few.

Hand in hand with the water crisis loom the massive but unpredictable consequences of climate change. Those involved in extending the benefits of safe drinking-water cannot afford to be believers or deniers of climate change. The water crisis is immediate and demands adaptation. It is doubly challenging because we cannot predict precisely what to plan for in any one place – more frequent or more extreme droughts; more frequent or more extreme floods, storms and cyclones. At the same time, the investments are long-term. Hand pumps may last 20 years; buried water distribution networks, a half-century. Developments – in technologies, in management, in policy and financing

Hand in hand with the water crisis loom the massive but unpredictable consequences of climate change. Those involved in extending the benefits of safe drinking-water cannot afford to be believers or deniers of climate change.

► DR. JAMIE BARTRAM

– are evolving rapidly. This is no time for posturing around denial or belief. Adaptation is an immediate and urgent need.

Q ► How will the U.S. fare in all this?

A ► As elsewhere, without central (federal and state) policy, planning and investment, the poorest will be hit hardest – poor communities and poor households in ordinary communities. For decades, we've under-invested across the U.S., reaping the benefits of investments by previous generations. Each year of recent decades, we have not paid our share of the cost of renewing basic drinking water and sewerage infrastructure, pushing those costs onto the next generation. Not dealing with water pollution and conservation increases costs and makes the best solutions increasingly unaffordable.

Our president says he wants to see massively increased investment in infrastructure. If so, I have four hopes for what happens next.

First, I hope we do not see a splurge of business-as-usual. The challenges of the past are not those of the future, and long-term infrastructures may not be fit

Collecting water can require more than 20 percent of a woman's day in some low-income countries. Imagine, instead, investing these hours in business-building, leading community efforts, caring for children or growing nutritious crops.

► **DR. JAMIE BARTRAM**

for purpose in a half-century's time. We need simple, effective legislation that gives utilities incentives and flexibility to adapt creatively to climate change, whether through financing or hardware.

Second, I hope we improve the way we do business. There are win-win options that deliver greater benefits for similar costs. Water Safety Plans have improved water quality, compliance and health at little cost.

Third, incentives must deliver improvements for small communities – where safety is lowest and reliability least – as well as big population centers. That means extending utility services to marginalized adjacent settlements and delivering oversight and support to smaller rural communities. Otherwise, these communities will bear the greatest adverse impact and hold back overall benefits.

Finally, we are wedded to two costly and contaminating approaches – municipal sewers demanding costly treatment and septic systems that are also costly, haphazard and under-regulated. In this country of innovation, we should be able to do far better – cheaper, less-polluting systems ought to be conceivable.

Q ► Are you hopeful that we can solve our water problems – or not?

A ► When I came to UNC in 2010 to launch The Water Institute, water already was understood as the defining health challenge of the 21st century. How we now navigate our waters over the next decade or two will signal our ability to determine our own future.

Some signs are positive, such as the massive gains in drinking water and sanitation access in poorer countries. Some are negative, including stagnation in developed nations like the U.S. New factors also challenge us, such as managing the consequences of migration, encumbered international scientific exchange and discourse, and uncertainty about how specific places will experience climate change.

I believe we're smart enough to develop and implement the solutions for the water crisis, but we're very slow coming to the table and slow to make informed important decisions. There's little time to make the urgent changes we need. ■

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2018 conferences hosted by
The Water Institute at UNC!

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CAN ENTREPRENEURSHIP HELP ADDRESS THE THREAT OF CLIMATE CHANGE?

Donald A. Holzworth, MS

Executive in Residence at the Gillings School

Adjunct professor of health policy and management

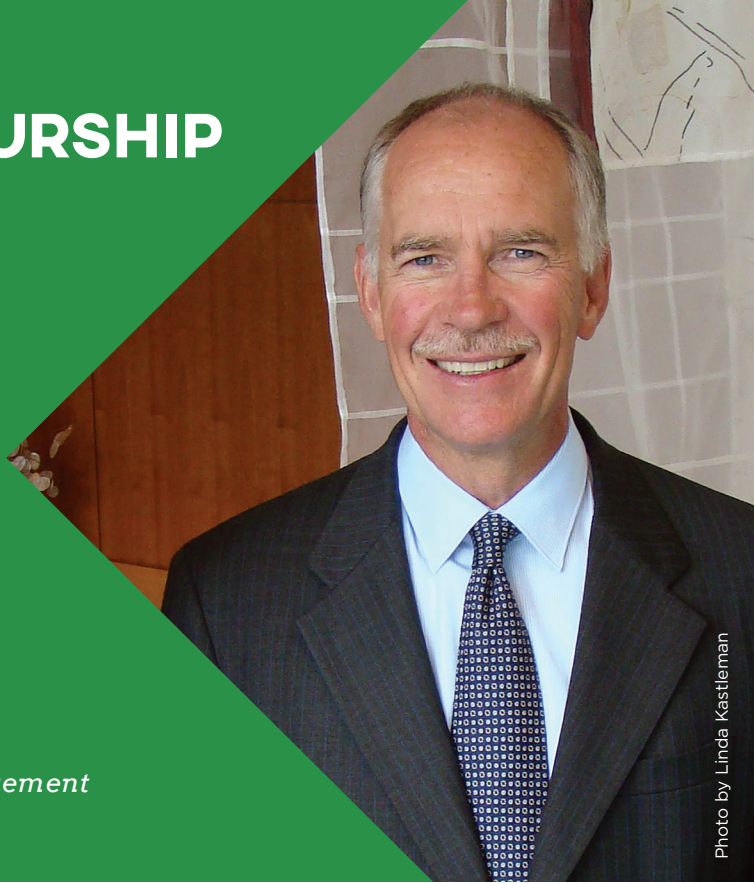


Photo by Linda Kastleman

There is no greater public health threat than a dying planet. The implications for public health professionals' not addressing climate change as a public health threat are profound, but so is the potential for entrepreneurial thinking.

Entrepreneurs typically can distinguish between what people think they need in the present versus what they may want or need in the future. In other words, they create a demand for a product or solution that does not yet exist – or at least anticipate those demands. Consider the rapid rise of alternative energy solutions in the face of decades of resistance from special interests such as electric utilities and the fossil fuel industry. Now, solar and wind energy are more cost-effective than any other source of fuel, and economic forces have begun to drive changes that cannot be stopped. Witness how the introduction of the iPhone changed the ways people work and communicate.

Governments, on the other hand, typically respond to immediate problems or perceived threats after the fact, in ways that are driven by political expediency. The responses to recent hurricanes serve as an example. A majority of Americans understand

“
*There is no greater
public health threat than
a dying planet.*”

► DONALD HOLZWORTH

that climate change is real – just as cancer and heart disease are real – but different from the way they perceive those other chronic problems, people do not have a clear sense of climate change's impact on them personally. They are therefore not moved to complain to their representatives, and nothing happens.

Meanwhile, entrepreneurs – along with some enlightened corporate, state and local officials – see this challenge as a business opportunity and recognize that market forces, unless impeded by restrictive regulation, ultimately will drive meaningful positive change.

Can this happen soon enough to avert environmental and human catastrophe? That's the question.

Public health professionals, including environmental scientists, must be trained as ‘communication entrepreneurs’ to better communicate the immediate public health threat posed by climate change.

► **DONALD HOLZWORTH**

Q ► Why is public health a perfect background to inform and drive this kind of work?

A ► The threat of climate change is difficult to communicate because the changes are gradual and pose no immediate apparent threat – until now. At this writing, we have witnessed Hurricane Harvey, a 1,000-year flood event in Houston and its surrounding communities. Harvey was preceded immediately by two 100-year flood events in the same area in 2015 and 2016. Florida stared down the barrel of Irma, the strongest hurricane ever recorded in the Atlantic. Then, the state was hit hard by Hurricane Maria, which also devastated Puerto Rico. Data clearly show that the magnitude and frequency of such storms has been increasing. We also know that ocean temperatures are rising, which leads to more moisture being pumped into our atmosphere. While other factors also play a role, increased moisture in the atmosphere coming from warmer oceans is the “fuel” that hurricanes need to intensify.

While the media generally focus on property destruction and family dislocation, public health professionals play a critical role in monitoring and addressing both the potential and real spread of disease through contaminated water and crowding. They work to solve issues related to people’s mental and physical health needs. Over the years, public health entrepreneurs have played a significant role in inventing technologically driven rapid data collection, analysis and communication tools that can be used in the field to speed response to health emergencies.

Q ► What training is needed to better prepare public health students and practitioners to become environmental entrepreneurs?

A ► Consider the critical role played by public health professionals in responding to the threat of infectious diseases, such as smallpox, polio, malaria and HIV – or their fight against cancer and heart disease. These threats were apparent. Virtually everyone could name a family member, friend or acquaintance on whom these diseases had a direct impact. The public outcry initiated the political will to address these problems.

Except for the possibility of nuclear war, we have not previously faced a real and ever-present threat to the public’s health and the planet we live on. People understand and respond to health threats. Therefore, public health professionals, including environmental scientists, must be trained as “communication entrepreneurs” to better communicate the immediate public health threat posed by climate change.

As with all great entrepreneurs, public health professionals must see beyond immediate threats by literally “looking into the eye of the hurricane.” I call upon them to deliver effective messages that lead to a public outcry for resources and policy responses. We have witnessed the outcry and response for past and present global diseases. How much more adamantly should we demand solutions for climate change, which endangers all of us? ■

CAN WE REDUCE DEATHS ASSOCIATED WITH AIR POLLUTION?

Jason West, PhD

*Associate professor of environmental sciences
and engineering*



Photo by Linda Kastleman

Few people realize how many lives are lost each year to air pollution.

The best estimates today, consistent with estimates from my lab, suggest that about 4.5 million people die prematurely each year due to ambient air pollution exposure. This is about one in 12 deaths globally. This health burden is greater than that of any other environmental risk factor, and is comparable with risk factors such as high body mass index, high cholesterol and high sodium intake.

In addition to the deaths from ambient air pollution, roughly another 2.9 million deaths occur each year from exposure to very concentrated air pollution from burning solid fuels, such as wood and coal, to heat homes and cook. Overwhelmingly, these deaths occur in less-developed regions of the world, where many buildings lack proper ventilation.

Q ▶ What is the current status of air quality in the U.S.? How about globally?

A ▶ In the U.S., about 100,000 deaths occur each year due to exposure to ambient air

pollution – this represents about 1 in 25 deaths. Air pollution now kills more Americans than Alzheimer's disease, diabetes, all vehicle accidents or all gun-related violence. As terrible as the recent explosion of drug overdoses in the U.S. has been, air pollution still kills about twice as many people.

Air pollution simply has not gotten the attention it deserves, in part because it is not listed as the cause of death on any death certificate. Rather, it is a risk factor that influences several of the most common causes of death, including heart attacks, stroke, pulmonary disease and lung cancer.

While the health burden is large, air quality in the U.S. has improved substantially since 1990. Starting with the 1990 Clean Air Act Amendments, air pollution regulations, along with advancements in vehicle and smokestack emission controls, have been instrumental in improving our country's air quality. More recently, cheap natural gas and the growth of wind power have led to the closing of many old and inefficient coal power plants, with substantial benefits for air quality and health. Average life expectancy in the U.S. likely has increased by several months as a result of improved air quality alone.



*In the U.S., **about 100,000 deaths** occur each year due to exposure to ambient air pollution – this represents **about 1 in 25 deaths**. Air pollution now kills more Americans than Alzheimer’s disease, diabetes, all vehicle accidents or all gun-related violence.*

► **DR. JASON WEST**

Despite this success, epidemiologic studies have shown that more benefits are to be gained from cleaner air, even below the current standards for pollution set by the Environmental Protection Agency (EPA).

On a global scale, air pollution currently is most severe in China, India and other areas that have a huge population exposed every day to heavily polluted air. China now shows signs that its leaders are turning a corner toward cleaner air, even as their economy and energy use continue to grow. In coming decades, Africa may emerge as the world’s most polluted region due to rapid population growth, increased use of energy and ineffective government regulation of air pollution.

Q ► What does the future of air pollution look like?

A ► I am optimistic, but I know that cleaner air will require a sustained effort. The U.S. and Europe already have improved air quality substantially and, despite current political efforts to weaken the EPA, I expect that this progress will continue through increasingly stringent regulations – in part because of the compelling effects of air pollution on public health. Elsewhere, e.g., in India

and Africa, the situation probably will get worse before it gets better.

As the 21st century unfolds, climate change likely will be a significant driver of air quality. Climate change speeds the chemical reactions that form pollutants such as ozone. It increases pollution where rainfall becomes less frequent, and it increases emissions from trees and fires.

Addressing climate change, through reductions in greenhouse gas emissions, can result in huge benefits for air quality and health, as we move away from highly polluting fossil fuel energy sources. Switching from coal power plants to wind and solar, for example, reduces greenhouse gases and improves air quality, addressing climate change and air pollution at the same time.

My lab has estimated that a global effort to slow climate change significantly would avoid about a half-million premature deaths from air pollution in 2030 and 2.2 million deaths in 2100. Our study also showed that the monetized benefits of these health improvements exceed the costs of reducing greenhouse gas emissions.

We are at a crossroads. Many nations want to improve their air quality, but there are choices in how to do that. We can continue to use fossil fuels while implementing increasingly sophisticated emissions controls, thereby reducing air pollution but not addressing climate change – or we can emphasize energy efficiency and non-fossil energy sources that will combat air pollution and climate change simultaneously.

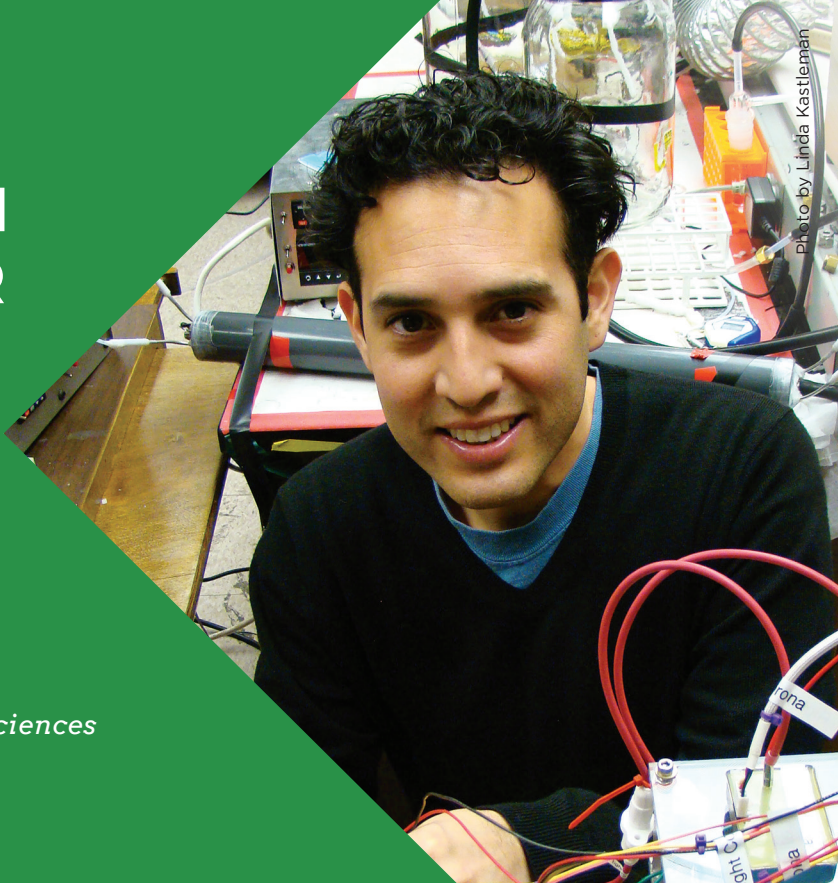
My hope is that society will recognize climate change as the global crisis that it is – and choose the greener path. |

Global efforts to slow climate change could save
500,000
lives in 2030 and
2.2
MILLION
lives in 2100.

HOW CAN WE ASSESS HEALTH RISKS FROM AIR POLLUTION?

William Vizuete, PhD

Associate professor of environmental sciences and engineering



Today, we regulate air quality as if humans are exposed to each air pollutant separately. In real life, though, we take in a mixture of these gases and particles every time we breathe. My work, and that of many others, attempts to determine the health impacts of the mixture of pollutants, as opposed to individual pollutants, and to establish whether our current air quality standards truly protect human health.

The composition of particles changes in the atmosphere. Work from my laboratory has shown that the composition influences the toxicity of particles. Right now, we base air-quality regulations solely upon the mass of particles in the air; regulations do not take

into account the composition of particles. This means that two particles of equal mass have differing toxicities based upon their composition – but federal regulations categorize them as equal. We need more research to determine whether we can develop smarter regulations.

Q ▶ Are there other emission sources that become toxic when they interact with the sun and atmosphere?

A ▶ A leading cause of death from air pollution is exposure to tiny particles in

*More than **4.5 million** people die each year from air pollution-related causes. That's way too many. As a chemical engineer, I wanted to find a way to help reduce this number.*

▶ **DR. WILLIAM VIZUETE**

the atmosphere. These particles are so small that, when breathed in, they become deposited deep in the lungs. The particles consist of many different types of chemical species, some of which are created when gases interact with the sun.

Recently, scientists, including Dr. Jason Surratt, associate professor of environmental sciences and engineering at the Gillings School, have discovered a new source of these particles – from gases that are emitted by plants. This is an exciting discovery. Right now, my work is focused on understanding the chemistry that leads to the formation of these particles and makes them toxic. Our recent work has shown that particles formed from these emitted gases cause increases in toxicity, as measured by exposing them to human lung cells (outside the human, of course).

Q ▶ Tell us more about your work.

A ▶ More than 4.5 million people die each year from air pollution-related causes. That's way too many. As a chemical engineer, I wanted to find a way to help reduce this number. I began work to improve air-quality models that simulate the environment. If we can develop models that accurately mimic the real atmosphere today, we can use them to predict the atmosphere a few days from now, a few months from now or even many years from now. These predictions can help guide policy decisions that will make a real impact on air quality. We can use these models to predict, for instance, the effect cleaner power plants or cleaner cars would have on our air quality.

Air quality models being used by scientists now are better than they have ever been. Still, they don't simulate air quality as accurately as they might.

My team works with the U.S. Environmental Protection Agency and others to incorporate into the models the latest scientific discoveries about how air pollution is formed. This is trickier than it may appear, as the models and the air chemistry we are studying are so complex. Each time we modify one part of the model, we must consider the effect that change will have on the rest of the model. We work with chemists



Dr. Will Vizuete prepares to take air samples in Boulder, Colorado.

and other engineers to evaluate the model predictions against data collected in the field to determine how close they are to reality.

The models we create ultimately help guide decisions made by state and federal regulatory agencies to protect the public's health. ■



HARNESS BIG DATA

Our Strategic Theme:

Harness big data for health and well-being



Photo by Brian Strickland

Dr. Michael Kosorok

HOW WILL BIG DATA TRANSFORM THE FUTURE OF PUBLIC HEALTH?

Michael R. Kosorok, PhD

W.R. Kenan Jr. Distinguished Professor and chair of biostatistics

Professor of statistics and operations research

Co-principal investigator, Big Data to Knowledge training grant

The meaning of “big data” can be summarized this way: *Data are much more complicated than they used to be.*

They’re more complicated in several ways – in total amount (think of the billions of Facebook users we can now access online); in amount per person (with fitness trackers, we can gather vital statistics every few seconds for months, which yields an incredible amount of information for one individual); and in level of detail (brain imaging provides us with millions of pixels per image, all of which contain data ripe for analysis).

Big data also can move fast. There are many scenarios in which scientists need systems that can both gather data and continuously update the analysis of those data to create near-real-time monitoring. Imagine a program that screens emergency room data on a national level. As patients are admitted, the program monitors for any uptick in similar cases that might indicate an emerging trend. An abnormally high number of flu cases, for example, might lead researchers to identify a new influenza strain and activate an early response to it.

Big data hold nearly infinite possibilities for public health.

Q ▶ **What are some of the most promising developments in big data?**

A ▶ mHealth is a new arena for public health centered on digital interactions and the collection of remote sensing data. Here at the Gillings School, I work with Dr. Beth Mayer-Davis, Cary C. Boshamer Distinguished Professor and chair of the Department of Nutrition, to develop a wearable device that can monitor patients with Type 1 diabetes and intervene immediately to maximize their health and well-being. This device conceivably will collect data on metrics such as blood glucose level, heart rate and sleep quality.

By storing and continuously analyzing these data in the cloud, the device could track progress on fitness goals, warn a patient of danger (e.g., if they are on the verge of hypoglycemia and need a snack) or suggest

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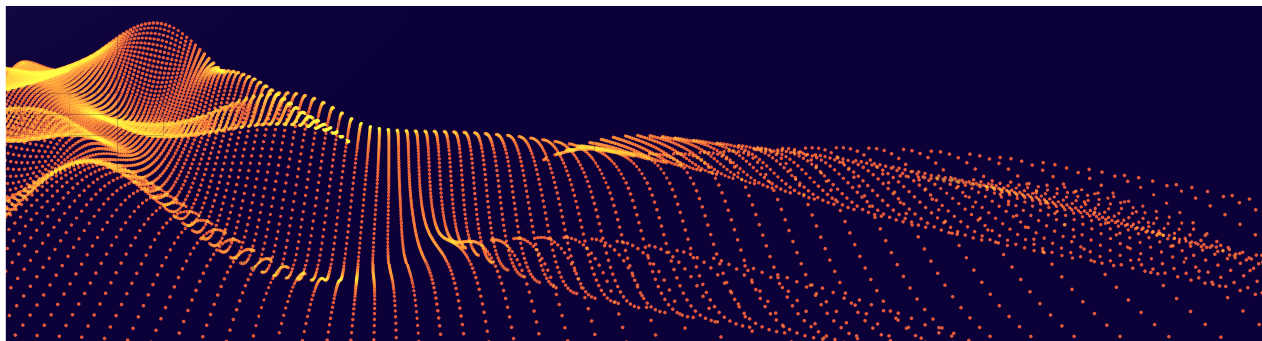
▶ **DR. MICHAEL KOSOROK**

strategies for healthful living, such as prompting a walk in a nearby park, based on a user’s GPS location.

As co-principal investigator for a National Institutes of Health-funded grant called “Big Data to Knowledge,”* I also have a view of how big data are being used to solve various biomedical problems. Our training program gives doctoral students a fundamental grounding in big data – they don’t become advanced experts, but they learn how to approach the data so they can lead collaborations addressing issues such as the opioid epidemic or schizophrenia. This training program involves more than 20 departments across the University – an example of how the best big data work is interdisciplinary.

Ambitious projects require many types of experts. In past years, a researcher might deliver his or her study data to a single analyst. The analyst would return the results, and that was that. The kinds of complex questions we’re asking today require working closely with multiple experts over time to approach problems in creative ways.

One project might involve a data scientist, a computer scientist and a biostatistician (to build data collection and analysis programs), experts in a specific domain, such as nutrition (to design the study or intervention), experts in user interfaces (to ensure the final product works well for patients), and experts in



Big data are complicated, can move fast and hold nearly infinite possibilities for public health.

policy and implementation science (to build political will for an intervention and make it happen).

We now have the capacity to collect staggering amounts of information. Our capacity to comprehend the data and apply it for the public good is limited only by our imagination.

Q ▶ What should we keep in mind as we participate in the big data revolution?

A ▶ We don't use the data we already have particularly well. The trajectory of big data will be defined by how quickly we learn to design better data collection systems that give us the right information, as well as analytics programs that transform those raw data into something useful. In our biostatistics department, we recognize the tremendous potential for creating new artificial intelligence (AI) tools that will change the face of public health research.

Many new developments involve something called “deep learning,” a very impressive type of AI that analyzes data to solve incredibly difficult problems. For example, a program exists – developed by Andre Esteva, doctoral student at Stanford University, and colleagues – that can access photos of individuals online and identify with great accuracy whether they have a particular type of skin cancer.**

When creating programs such as this, which work with people's medical information, we always have to keep in mind the ethics of data sharing. As researchers, we shouldn't invade people's privacy or make it easy for others to do so.

We also must be committed to scientific integrity. Anyone working with big data should understand

“*We now have the ability to collect staggering amounts of information. Our ability to comprehend the data and apply it for the public good is limited only by our imagination.*”

▶ DR. MICHAEL KOSOROK

statistical inference issues and avoid big-data hubris. Bad design, biases and uncertainty all are enhanced when more data points are involved.

As we continue improving the technical tools and study designs we use to work with big data, we must remember not to put everything into one box. Big data represent a continually evolving and fast-moving new area. If we can avoid constraining it too early, I think it will surprise us with the places it can take future research. ▮

* Kosorok's co-principal investigator on the *Big Data to Knowledge* grant is M. Gregory Forest, PhD, Grant Dahlstrom Distinguished Professor of Mathematics, director of the Carolina Center for Interdisciplinary Applied Mathematics and associate chair of the Department of Applied Physical Sciences at UNC-Chapel Hill.

**See Esteva et al. (2017). *Dermatologist-level classification of skin cancer with deep neural networks*. *Nature*, 542, 115-118.

HOW CAN WE IMPROVE THE PROCESS FOR DEVELOPING NEW MEDICINES?

Paula Brown Stafford, MPH

*Adjunct professor of public health leadership
Gillings School alumna (BSPH and MPH, biostatistics)
President of Quintiles (retired)*



Photo by Tom Fuldner

In the United States, an average of 31 new medicines and medical devices are approved by the Food and Drug Administration (FDA) each year. To give that number some context, approximately 3,500 treatments currently are being tested. Of those that enter clinical trials, only 12 percent will make it to the market.

If the goal of clinical research is to enhance the lives of patients through new drugs and treatments, then improving how we run clinical trials is a public health priority.

Throughout my career, I've worked in companies that have enrolled more than a million patients in clinical trials at nearly 100,000 investigative sites globally. I know from experience that modernizing these trials is critical to delivering better medicines faster, at less cost, to patients who need them.

While the biopharmaceutical industry and the FDA have made great strides already, I think the key to our future progress lies in three areas:

- Utilizing big data approaches to find the right patients for clinical trials;
- Improving our focus on patients, both in how we explain participation benefits and how we share findings; and

- Establishing alternative development pathways to speed the introduction of new therapies.

Q ▶ How can big data help modernize clinical trials?

A ▶ More new medicines are developed in the U.S. than in any other country. That process takes seven to 10 years, on average, and we should never forget that patients in need are waiting at the end of the line.

One issue that slows the creation of medical therapies is the sheer expense of their development. The cost increases year after year, and some promising drugs never reach patients because biopharmaceutical companies have to choose which treatments to prioritize.

This is why using the big data available to us – such as insurance claims and disease registries – is vital to finding the right patients for clinical trials in a timely way. Having the ideal study population enables us to learn the most from each trial, which lowers development costs.

Q ▶ How must researchers improve the focus on patient participants?

A ▶ First, we should do more to build awareness about the possible benefits to patients who join clinical trials. Some see their disease states treated, as in the case of patients in one trial who entered infected with Hepatitis C and left Hep-C-negative. Other patients may experience an improved quality of life or have their life extended beyond what was expected.

That was the case with my father, actually. He participated in a clinical trial for an oncology product currently on the market. Although we now believe that drug extended my father's life by one to two years, he passed away before learning the results of the research to which he contributed.

Second, we must commit to contacting patients involved in clinical trials directly, and in a timely manner, to share the outcomes of our research. Some degree of transparency already is required by the FDA, but many companies are so leery of competitors stealing their data that they take quite a while to share heavily-redacted findings.

The truth is that patients who volunteer for clinical trials are contributing to the health and well-being of future generations. They deserve to know whether their participation will go on to improve public health, potentially on a global scale – and they deserve to be thanked.

Q ▶ How will alternate development pathways impact clinical research?

A ▶ In December 2016, Congress passed what is known as the 21st-Century Cures Act. In July 2014, I attended a Congressional hearing to provide expert testimony on this issue. In my statement, I supported the creation of a formal option for companies to use alternate development pathways when researching new medical treatments; this previously had been allowed only on a case-by-case basis.

“
*Having this leeway
in how we study
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companies to develop
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innovative medicines more
quickly and affordably.*

▶ PAULA BROWN STAFFORD

The new law modifies the FDA's drug approval process to officially permit the use of these pathways – which include using data summaries and real-world evidence versus full clinical trials – when appropriate.

Having this leeway in how we study therapies will empower biopharmaceutical companies to develop the next generation of innovative medicines more quickly and affordably. In our fast-moving world, scientists generate new molecular knowledge about diseases every day. From this knowledge, we will continue to create drugs that will change the face of public health around the world. ■

Brown Stafford also is chief development officer at Novan Therapeutics, managing director of Habergeon LLC, and board member at Health Decisions and Novan.

HOW CAN WE USE BIG DATA TO SAVE CANCER PATIENTS' LIVES?

Stephanie B. Wheeler, PhD

Associate professor of health policy and management

Yes, big data can save lives. My work uses complex computer programs to simulate how public health interventions and policies are likely to play out in reality. Think of it as “Sim City” (tinyurl.com/wiki-sim-c) for fighting cancer. I start by asking key questions, such as *Which intervention is most cost-effective?* and *Which policy results in the best health outcomes over time?* Then I build a realistic synthetic population and run different mathematical models to see how that population will respond.

My goal in these simulations is to inform public health policy and decision making. I want to see decision makers directing money and energy toward

the courses of action that are most likely to be successful and valuable in the long run.

Q ▶ **How do simulations work? What are their pros and cons?**

A ▶ Simulations start with surveillance. To build a program that examines cancer, for example, we first have to identify the “hot spots” of cancer mortality, both geographically and within specific sub-populations, such as rural or minority groups.

We collect and analyze data from multiple sources, from cancer registries to census data to

Simulations can be built to model all kinds of public health concerns. Partnerships are essential to this work. The future of public health, in my opinion, is about changing how we work.

▶ **DR. STEPHANIE WHEELER**

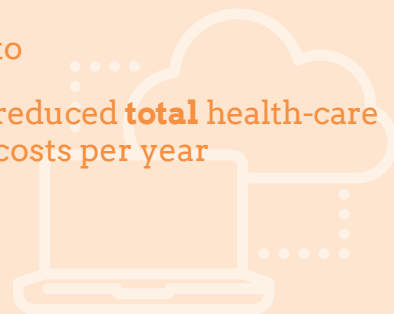
Integrating big data and health care could lead to

\$300 BILLION

reduced **total** health-care costs per year

\$1,000

reduced costs **per person** per year



health insurance claims, and program those into the simulation to create a digital representation of a group of people. Once we identify a group of people with a disproportionate burden of cancer – for example, low-income people in rural North Carolina – we are able to overlay metrics from research studies that represent possible interventions and policies that could help address the gap in cancer outcomes.

The biggest “pro” of working with simulations is that they offer data-guided decision making and can be used to examine the role of uncertainty in our understanding. In addition to offering information on likely outcomes, they can reveal possible unintended consequences of an intervention. For example, when more people get screened for cancer and live longer as a result, what potential cost burden is added to the health-care system?

A primary “con” is that there’s still some resistance among medical providers and others to accept simulations as valid tools. Some people think of simulations as “glorified weather forecasting” – and, as my dad would say, the meteorologists always get it wrong! The reality is that we offer our

conclusions with uncertainty analyses built in. Anyone working in simulation modeling has to be able to embrace uncertainty.



▶ **How can simulations be used to reduce health disparities?**



▶ Public health has been characterizing health disparities for five or six decades

now, and yet, very little meaningful progress has been made in reducing those disparities. My work is an attempt to follow through on those findings and proactively address health disparities.

While my current research focuses on cancer prevention and treatment, simulations can be built to model all kinds of public health concerns. Partnerships are essential to this work. The future of public health, in my opinion, is about changing how we work. Epidemiologists, health services researchers, economists, engineers, clinicians and behavioral scientists all need to sit at the same table together; that’s what we do in my research teams. I have learned more from my colleagues than I ever could have learned on my own or siloed within my discipline.

We need to make the leap from tackling one little piece of a large problem in isolation to working in interdisciplinary teams with leaders who can translate between fields – that’s the path to meaningful change in public health policy and outcomes. ■

HOW HEALTH CARE CAN BENEFIT FROM BIG DATA:

- ▶ Reduce waste
- ▶ Reduce costs
- ▶ Improve patient care
- ▶ Improve drug development
- ▶ Improve digital health monitoring

Wheeler is recipient of UNC’s 2017 Philip and Ruth Hettleman Prize for Artistic and Scholarly Achievement by Young Faculty.



LEADERSHIP



Dean Barbara K. Rimer

WHAT DOES IT MEAN TO LEAD A SCHOOL OF PUBLIC HEALTH?

Barbara K. Rimer, DrPH

*Dean and Alumni Distinguished Professor of health behavior
Chair, President's Cancer Panel*

Leadership is an essential element of a consistently high-performing school of public health, which the Gillings School is. Leadership reaches for the stars with one's feet firmly planted on the ground. It requires being brutally honest about one's own strengths and limitations and those of the organization one leads.

A vision for the future helps a leader obtain needed resources and develop teams to solve today's problems while extending our reach beyond what we can grasp at present. We exist in those multiple worlds.

Leadership is more demanding than ever before, and that is especially true in a public university. We embrace the public nature of the University of North Carolina at Chapel Hill and the Gillings School. We are, as our Chancellor's *Blueprint for Next* articulates, of the people and for the people. We are focused on what is good for North Carolina even as we look beyond to the nation and the world. We are rooted in the soil of the state, feel the pain and potential of its people, seek to solve problems within the state and recognize, as Edward Kidder Graham said in his inaugural speech as president of the University, that the boundaries of the university are coterminous with the state.

That allows us to see the world through the lens of the state. Being a public university today means that we must navigate the current political climate. I write in my blog (mondaymorning.web.unc.edu) about issues such as the appropriateness of a monument to the Confederacy on the campus of a university that seeks diversity and inclusion – but to assure that my voice has meaning and impact, I must choose a finite number of topics about which to speak.

Leadership requires attention to the everyday – managing budgets, hiring, dealing with myriad requests from across the School, University and beyond, hiring, sometimes disciplining, and in general, showing up when a leader's presence is required and needed. Of course, no leader can and should do all those things alone. In our School, we have strong leadership teams, and I have great admiration and respect for members of those teams. Within the University, as the dean of the Gillings School, I am both a tireless advocate for the School and someone who must consider what is good for the larger University.

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*Leadership requires
investing in one's
intellectual bank – learning
new things, reading widely,
getting excited about
ideas, listening to people,
questioning oneself and
finding moments in which
to renew.*

► DEAN BARBARA K. RIMER

Vision, innovation, a clear view of what the future could be (and then developing the strategy to get there) – those are the truly exciting and transformational aspects of leadership and legacy. When we received the Gillings gift and were among the first schools of public health to develop innovation centers within the School – Gillings Innovation Laboratories – it gave us the means to take risks, invest intentionally in areas important for the future and encourage an even higher level of interdisciplinary collaboration, without boundaries. We say that UNC-Chapel Hill is a place of low stone walls, but resources help to keep those walls low. Vision and innovation apply to our research, service and academic programs but also to how we are organized to do our work.

Leadership requires guiding change by providing a compelling rationale and vision and being “all in” each step of the way. I am excited by changes we are making in our academic programs, the move to Gillings One MPH, redesign of our Master of Public Health degree programs, with a new, integrated approach to core courses. It requires careful, painstaking effort to bring our community along, to seek input, listen and adapt, and work hand-in-hand with department chairs and other leaders. We've adapted our governance model to give leaders within the Gillings School more authority for decision making regarding the MPH program. We

believe the changes will result in even higher quality and consistency, with more opportunity for educational innovation. We aim to meet the needs of 21st-century students and employers, to address critical issues in public health and to prepare students for the century's great challenges.

Change is a necessary part of life. We cannot stay the same if we intend to remain a top school of public health.

Good performance metrics are essential to leadership because they tell us how we are doing. We also use metrics to educate our faculty, staff, students, board members and others. Metrics allow us to be grounded in the reality of our own performance.

Leadership also means striving continually to create and sustain a School that is open, diverse, inclusive and caring – a place that is built upon a culture of health, one that encourages the health and growth of every person within it. While we are limited in many ways by constraints of the state system and by years of budget cuts, every person associated with us should feel valued.

Life happens along the way, and many people carry heavy burdens. While helping people navigate those challenges, we seek to create an environment permeated by joy, discovery, celebration, wonder, growth and collegiality.

Leadership means being a role model. People look to the behavior of leaders as setting standards for what is acceptable and aspirational.

Leadership requires investing in one's intellectual bank – learning new things, being aware of what is being done elsewhere, reading widely, getting excited about ideas, listening deeply to people, including our faculty, staff and students, questioning oneself and finding moments in which to renew. It requires resilience, because sometimes we must accept and recover from difficult situations. Gratitude, too, should be part of leadership.


It's never done and always new. ■

We asked the Gillings School's academic unit leaders three


QUESTIONS ABOUT LEADERSHIP



How do you **prepare your students** to be leaders?



What has changed about **your approach** to leadership since you became a chair or director?



What **characteristics** are most important?

Dr. Michael Kosorok, chair of biostatistics, addresses another set of questions and is featured on page 56.

Two others – faculty member **Dr. Claudia Fernandez** and alumna **Dr. Amy Lansky** – discuss unique leadership issues.

BARBARA J. TURPIN, PHD

Professor and chair, Environmental
Sciences and Engineering



Photo by Linda Kastleman

A science-literate public is essential to a functioning democracy and to public health protection.

► **DR. BARBARA TURPIN**

Q ► What do you tell your students about how to prepare to be leaders in public health?

A ► We – you and I – are privileged to have this opportunity to expand the frontiers of knowledge. Spreading science literacy is part of our obligation to give back. A science-literate public is essential to a functioning democracy and to public health protection. Take the time to learn how to communicate with those outside your field – and practice this skill in informal settings on a regular basis.

Q ► How has your approach to leadership changed since you became a chair at the Gillings School?

A ► I am quicker to ask for help from my colleagues. They appreciate being asked, and we move forward together with stronger initiatives.

Q ► What characteristics are most important in public health leaders today?

A ► Team-building is a vital skill for any public health leader. No matter how knowledgeable one is, an individual cannot possibly have all the expertise needed to address today's problems. Foresight in the setting of goals is essential – as is the educational breadth and humility to recognize what expertise is needed and the skill to foster a team culture. ■

Environmental changes threaten food security and the quality of our water and air. Our department is uniquely positioned to advance solutions to these and other looming problems.

– **Dr. Barbara Turpin**

ANDREW OLSHAN, PHD

Barbara Sorenson Hulka Distinguished
Professor in Cancer Epidemiology
Chair, Epidemiology
Associate director of population sciences,
UNC Lineberger Comprehensive Cancer Center



Photo by Brian Strickland

Q ▶ What do you tell your students about how to prepare to be leaders in public health?

A ▶ Of course, students have to be well-grounded in the fundamentals of their disciplinary areas (e.g., epidemiology) and public health more broadly. I tell them to embrace all aspects of their graduate training as many of these experiences will not only make their training richer (and fun), but also will build skills for future success, including leadership roles. For example, I encourage and help support students' engagement as part of teams, working with faculty, staff and other students.

In these settings, it's important that students be given leadership roles to better learn effective leadership through communication, goal-setting and working with others. Learning teamwork and seeing first-hand examples of good leadership are essential to being a successful public health scientist and leader.

Being engaged in research or other work that leads to encounters with study participants, community members and others outside of academia is also critical to a student's full appreciation of the impact of public health and the needs and perspectives of the public.

Finally, I encourage the development of "soft skills," such as time management, organization and giving presentations to both scientific and lay audiences as an important part of developing mastery of a subject area and gaining confidence.

Q ▶ How has your approach to leadership changed since you became a chair at the Gillings School?

A ▶ In the past 11 years as chair, I have learned a number of things about myself and about leadership. Over time, I have come to appreciate being more open to diverse ideas from others. I've learned to better understand what's important to faculty and students, to be more patient, and to be decisive while remaining diplomatic.

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As chair, I have learned a number of things about myself and about leadership. I have come to appreciate being more open to diverse ideas from others. I've learned to better understand what's important to faculty and students, to be more patient, and to be decisive while remaining diplomatic.

▶ DR. ANDY OLSHAN

I have learned much from working with and observing leaders in the School and elsewhere on campus – for example, the need to build a relationship with a wide network of leaders and faculty members, understand their niche areas and resources, and be able to draw on this knowledge to build collaborations, implement strategic initiatives, and increase the probability of new bridges for the department and School.

Q ▶ What characteristics are most important in public health leaders?

A ▶ First, remain optimistic! There is much uncertainty about federal funding and support for public health and health-related research more broadly. However, given the cyclic nature of politics and other factors, leaders must remain steadfast that the absolutely critical importance of

public health will prevail, as it always has. Today's leaders must be even more flexible and willing to take risks. Science and technology continue to evolve rapidly, and public health not only has to stay abreast of these developments, but also to be effective in evaluating and implementing relevant advances.

The speed of change is greater than ever, and leaders must be especially adroit at understanding change and its importance to public health. This speaks to the importance of collaboration. Although the concept of team science has had a high profile for at least a decade, the relevance of working across boundaries is essential. Leaders will have to understand how to work effectively in this interdisciplinary environment and how to develop structures, training and a culture that fully leverages it.

Academic leadership is quite challenging for many reasons. However, service through leadership can be especially gratifying as one provides support for such an important endeavor as public health. ■

KURT M. RIBISL, PHD

Professor and chair, Health Behavior
Co-program leader for cancer prevention and control,
UNC Lineberger Comprehensive Cancer Center



Photo by Brian Strickland

Q ▶ What do you tell your students about how to prepare to be leaders in public health?

A ▶ I sometimes think students believe that they need lots of leadership training to be a leader – or that ‘other people’ are leaders and they don’t need to step up and lead. I encourage students to take on

leadership roles while they are training here. Put yourself out there – you will make mistakes and quickly learn from them. Don’t be afraid. This is the mouse race before you start the rat race.

Years ago, epidemiology doctoral student and entrepreneur Nabarun Dasgupta told me about the book, *The Lean Startup: How Today’s Entrepreneurs Use Continuous Innovation to Create Radically Successful*

Businesses, by Eric Ries (2011). The book promotes agile development methods used for software, but its key point can be applied to leadership. You should create a “minimum viable product” and invite users to provide feedback on it so you can continually improve it.

Don’t obsess or wait years to develop a program in your area of public health – start drafting something and iterate it. Start with something – it may be embarrassing – but continually improve it. You will be better off than if you had waited and waited to have something “perfect.”

Q ▶ How has your approach to leadership changed since you became a chair at the Gillings School?

A ▶ I have only been chair for a few months, so it has not changed that much yet. My other leadership positions had a much narrower focus – I led a cancer research network and a large tobacco center grant. However, the chair job has many more diverse constituencies. Every day, I am now balancing the needs and aspirations of our students, faculty and staff members, and alumni. I really enjoy working with all of these groups, especially the students.

Q ▶ What characteristics are most important in public health leaders?

A ▶ We need to listen, be nimble and take on tough challenges. I am working with a leadership coach, and he reminds me that I need to listen more because I naturally want to solve things quickly. I am meeting with all of our faculty and staff and our student leaders – about 50 meetings altogether – and I’m nearly two-thirds done. I had a fairly solid command of many of the key issues, but there are many other issues that are salient for students and staff that are new to me. Leaders must adapt and be nimble. We must embrace change.

Some tough issues are set on the back burner, but I have learned they ultimately will start a conflagration unless we address them head-on.



Don’t obsess or wait years to develop a program in your area of public health – start drafting something and iterate it.

Start with something – it may be embarrassing – but continually improve it. You will be better off than if you had waited and waited to have something “perfect.”

▶ **DR. KURT RIBISL**

For instance, we have not had enough discussions about diversity and inclusion within our department and at the national level. I appreciate that my predecessor, Dr. Leslie Lytle, started a dialogue on these topics – and we will continue it. These conversations stir up strong feelings and can be intense, but we need to have them. Sometimes they are awkward and painful, but that cannot deter us.

I really want our department and the Gillings School to make a difference, and I am optimistic that we will be a major force for change. ■

MORRIS WEINBERGER, PHD

Vergil N. Slee Distinguished Professor of Healthcare
Quality Management
Chair, Health Policy and Management
Professor of medicine, UNC School of Medicine



Photo by Linda Kestleman

Q ▶ What do you tell your students about how to prepare to be leaders in public health?

A ▶ Public health leaders must be prepared for change that is different from the past. As researchers, we've been taught to build knowledge incrementally, that is, to use results from one study to design the next one.

However, the world now changes at breakneck speed, and the sheer volume and types of data and technology available to leaders is increasing. With the rapidity of these changes, our students should expect to lead transformational changes in their organizations. They will need to be agile, curious, innovative and persistent as they become leaders in public health. They will also need softer skills, including knowing how to communicate with diverse stakeholders.

Q ▶ How has your approach to leadership changed since you became a chair at the Gillings School?

A ▶ Although I've held a number of leadership positions in the past, the role of department chair is new to me. I have gained a deeper appreciation for the complex relationships among administrative units at the University, School and department levels. I've become more aware of how important it is to build and trust a team –

pulling together with clear goals in mind – to face whatever challenges arise.

I value input from students, faculty and staff. Part of leading is listening to all the sides and resolving differences. When making decisions, I strive to be as transparent as possible, so others understand why I made a decision, even if they disagree.

As a professor, I've had the opportunity to lead through mentorship. Our students are still at the core of what I love about being at the Gillings School, and I'd never want to diminish those relationships. Finding time to juggle students' needs, my research and the department's administrative needs can be a challenge, but doing so is well worth the effort.

Q ▶ What characteristics are most important in public health leaders?

A ▶ Public health leaders must be able to identify the most pressing problems facing their organizations, develop innovative strategies to address those problems and understand how to evaluate whether those strategies were effective. In addition, they often will need to apply systems thinking if they want those changes to be sustainable.

Public health will continue to require thinking outside the box. We can find the creative solutions we need if we keep ourselves open to inquiry and challenges. ■

CAROLYN HALPERN, PHD

Professor and chair, Maternal and Child Health



Photo by Linda Kastleman

Q ▶ What do you tell your students about how to prepare to be leaders in public health?

A ▶ There are multiple ways to prepare, both structured and unstructured. One important way is to learn from the effective leaders you admire. What qualities do these leaders have that enhance their leadership? How do they interact with others to inspire enthusiasm and commitment? How can you cultivate those strengths?

One way to cultivate leadership skills is by identifying a mentor who embodies those qualities. Another is to take advantage of other available resources. Sign up for workshops, classes and other activities that will help you enhance your leadership skills. Volunteer for opportunities that allow you to practice your leadership skills. As with any skill, the more you practice, the better you get. We learn from constructive feedback and mistakes, and move on to better performance the next time.

Q ▶ How has your approach to leadership changed since you became a chair at the Gillings School?

A ▶ I don't know that my approach has changed much. I lead in much the same way that I mentor – i.e., I practice what I preach and try to serve as a good role model. I listen more than I talk, and work to build consensus and a supportive culture. I reflect on

my efforts and try to improve weaknesses. I strive to be forward-thinking and to anticipate opportunities and potential pitfalls.

However, one important aspect of my leadership style has developed since I became chair. I am more aware of and sensitive to balancing the best interests of an individual faculty member, staff member or student, with the best interests of the department and the School. Sometimes, this involves difficult choices.

Q ▶ What characteristics are most important in today's public health leaders?

A ▶ I'll start with these:

- Be willing to “keep your ear to the ground” to anticipate change and optimize it.
- Be willing and able to create and support successful interdisciplinary teams that reflect the diversity of the population.
- Manage conflict successfully.
- Understand cultural differences and use differences to build more effective teams and work contexts.
- Communicate effectively.
- Keep learning and keep up with the field.
- Practice ethical behavior and demand the same of other team members.
- Be willing and able to train and mentor the future workforce and leaders. ■

ELIZABETH MAYER-DAVIS, PHD

Cary C. Boshamer Distinguished Professor of
nutrition and medicine
Chair, Nutrition



Q ▶ What do you tell your students about how to prepare to be leaders in public health?

A ▶ I ask my students to think about why we do what we do. Being a public health leader requires being motivated by something you value, something that inspires you to make an impact.

I focus on questions such as, *What is your mission? What do you want to accomplish? How are you going to provide leadership to have a direct impact on whatever that goal is?* Once students do that, they can begin to think about the present opportunities that will guide them toward their goals. It's important to experience and practice leadership, early and often. Sometimes, you learn great skills and good ways to handle things, and other times, you may learn how not to handle things. All those lessons are valuable. Just get out there, and look, listen and contribute.

Q ▶ How has your approach to leadership changed since you became a chair at the Gillings School?

A ▶ I don't think my leadership approach has changed, but I do think it has been gradually informed, refined and reinforced as a function of my experiences.

For example, I came into this role well aware of the great talent in the nutrition department – among

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*It's important to experience and practice leadership, early and often. Sometimes, you learn great skills and good ways to handle things, and other times, you may learn how not to handle things. **All those lessons are valuable. Just get out there, and look, listen and contribute.***

▶ **DR. ELIZABETH MAYER-DAVIS**

faculty members, students and staff. As we've gone through different administrative processes, in some cases leading to significant changes, I continue to be impressed with the creativity and willingness to contribute. I've wanted to take advantage of everyone's skills, and now that's been reinforced many times. We don't always agree about what to do or how to do it, but that's the point of having broad-based discussions. People have a range of opinions, and I absolutely rely on those differing views.

As a leader, you must be ready to take whatever comes at you and not get flustered. I am mission-driven

and goal-oriented. The challenge and pleasure of leadership is to find that energizing blend of staying ahead of the curve, being goal-oriented, being forward-thinking and creative, but also listening and incorporating input from other really smart people – all at a pace that moves you forward at a reasonable speed with efficiency and clear communications.

You have to make decisions and take risks. Not everyone will like what you decide all the time, but your team needs a chance to voice their opinions on the big decisions – and to know they’ve been heard.

Q ▶ What characteristics are most important in public health leaders?

A ▶ Stay mission-driven. There are so many pressures these days because of our political, social and cultural climate. It’s easy to get distracted.

We have to keep focused on the fact that all of us are here to improve public health in North Carolina, the country and the world.

I have to come back to the initial questions – *What is your mission? What are your goals?* Many people look at the current political climate and see the limitations and barriers. A good leader looks at the landscape and asks, *Where are the opportunities for advancing my mission and goals? How can I leverage* – [whatever it is – a change in government perspectives, or funding or societal focus] – *into opportunities?*

Our advantage is that no matter where people stand on specific issues, most people care about health. Their concerns may be framed differently; they may care about one component of health more than another. Exploring those differences, though, leads to common ground and opportunity. Asking the difficult questions and managing the avenues of change – those are the spaces in which creative, innovative leaders thrive. ■

ANNA SCHENCK, PHD

Professor of the Practice
Director, Public Health Leadership Program
Associate Dean for Practice



Photo by Linda Kastleman

Q ▶ What do you tell your students about how to prepare to be leaders in public health?

A ▶ I tell them that public health is a team sport – it’s by no means something one does alone. Public health requires personal vision and

strategizing, but it also demands collaboration. It takes leadership skills to craft a vision and strategic plan that is shared by others – and those same skills to solicit the collaboration needed to implement the strategies that will accomplish public health goals.

Students in the Gillings School’s Public Health Leadership Program (PHLP) are a special breed. Unlike other valuable leadership training programs at

the School, such as the health policy and management Doctor of Public Health program, we don't actively recruit people in leadership positions. We look for bright, passionate students who want to learn leadership skills.

I tell our students they will have many opportunities to be public health leaders – not only in their careers, but also as part of their families, faiths and communities. Everyone can – and will need to be – a leader in defense of public health.

Q ▶ How has your approach to leadership changed since you became chair/program director?

A ▶ When I came to the Gillings School in 2009, I did not have any academic experience (other than having been a student for many years). However, I was asked to lead an academic unit, and later, to lead practice and outreach efforts for the School. I always leaned toward a more collaborative leadership approach, but this has become even more important during my time at the Gillings School because I came in from the “practice world” and had different career experiences than the people I was leading. I found myself relying on their expertise.

Q ▶ What characteristics are most important in public health leaders?

A ▶ When I try to define good leadership, I think more in terms of actions than characteristics. As I said before, I believe that everyone can be a leader – there aren't “traits” with which a leader is born. The important actions include helping to create a common vision, engaging others to work toward the vision, helping create a sense of community by encouraging others, helping others develop and recognizing others' contributions. These actions define great leadership. ■



Jesse Milan Jr., JD
President and Chief Executive
Officer, AIDS United

Member, Gillings School
Advisory Council

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Leadership means being authentic about your convictions, having integrity by acting upon them, not waiting for someone else to speak or act, and being about something bigger than yourself. These marks of leadership do not require pay, position or power.

▶ **JESSE MILAN JR., JD**

HOW DOES A FOCUS ON LEADERSHIP TRANSLATE TO IMPROVED PUBLIC HEALTH?

Claudia S. Plaisted Fernandez, DrPH

Clinical associate professor of maternal and child health



Contributed photo

There is no more pressing crisis in America today than the fact that the zip code of a child's birthplace largely determines the course of his or her life. (The University of Washington's Institute for Health Metrics and Evaluation published the first study about this, in the *Journal of the American Medical Association*, in 2013.)

Poverty or wealth, food insecurity or nourishment, ineffective or engaging education, neighborhood violence or safety, and absence of or access to basic health care – all can be predicted by zip code, as a number of researchers have studied. These aspects of daily life make up the fabric of our communities, and how we address them in the future largely will determine whether we build a true culture of health in the United States.

The fact that a child's zip code of birth strongly predisposes how his or her life will unfold raises complex, cross-cutting issues that we call the “wicked problems” facing our society. These wicked problems will not respond to simple, technical solutions, even though those solutions represent our very best science.

The wicked problems are public health issues that require exceptional leadership – the type of boundary-spanning leadership that brings together individuals, teams, organizations and communities to address the core challenges that plague our country. These are the challenges that prevent our children from reaching their

full potential and keep our country at the bottom of international health rankings for developed nations.

Q ▶ How does your work address these ‘wicked problems’?

A ▶ At the Gillings School, we address these complex issues, in part, through our award-winning national and global leadership development institutes. Through these programs, mid- to senior-level public health leaders learn how to implement solutions more effectively by developing healthy organizational cultures that nurture high-performing teams.

Each year, we teach about 250 leaders how to foster thought diversity, employ effective communication skills, negotiate for win-win outcomes and promote innovation. Through our programs, leaders tackle projects that stretch their experience as they apply new skills to real public health issues affecting their home institutions and communities.

For more than 15 years, the Gillings School has provided this multifaceted and individually customized approach to maximizing leadership impact.

Participants in these programs have used their leadership skills to address a variety of public health concerns. One participant in the Maternal and Child Health Public Health Leadership Institute used her

Locally and globally, the goal is the same – for all to lead healthier, more productive lives, regardless of where they were born.

► **DR. CLAUDIA FERNANDEZ**

training to effect a change in Utah's state legislation that gave teen mothers who had been abandoned the right to consent for their own vaccines. Prior to the change, these young women did not have the ability to make decisions about their health care – no one did, because they had no guardians and were themselves not of age.

Currently, a team of participants with the Clinical Scholars National Leadership Institute is addressing the fact that children with special needs in Minnesota can seek dental care from only one provider in the entire state, resulting in months of waiting for routine and complex problems alike. Supported by the Robert Wood Johnson Foundation and co-lead by the Gillings School and the UNC School of Medicine, the Clinical Scholars program expands our ongoing work to improve the culture of health in the United States.

Q ► How will alumni of your programs create healthier communities in the future?

A ► Now more than ever, public health leaders must guide their teams in collaborating with communities, garnering diverse expertise and approaches to address the deep problems of society. It takes outstanding leadership to ensure that many voices are heard, competing concerns are considered and multiple needs are met.

The leaders we train come from health care, public health and higher education. In the upcoming year alone, they will address a variety of issues, including the opiate crisis, native health, mental health, teen violence, transgender health, access to

higher education, child health, access to women's reproductive health care, the "One Health" initiative and food insecurity.

Through the Gillings School, many of these leaders also make global connections. They carry their expertise abroad and bring back new perspectives when they return. By 2020, cross-cultural learning opportunities will have taken leaders in our programs to South Africa, Cuba, Vietnam, France and Costa Rica.

Locally and globally, the goal is the same – for all to lead healthier, more productive lives, regardless of where they were born. ■

Fernandez also is director of the ACOG National Leadership Institute, director of the leadership core of the Food Systems Leadership Institute, co-director and executive coach of the Clinical Scholars National Leadership Institute.

The Gillings School has received national recognition for several of its leadership programs. The Maternal and Child Health Public Health Leadership Institute, sponsored by the U.S. Maternal and Child Health Bureau, was named a 'Top 15' program in 2015. The Food Systems Leadership Institute received second- and third-place nods in a national competition in 2016, and the American Congress of Obstetricians and Gynecologists' Robert C. Cefalo Leadership Institute was named a "Top 10" leadership program in 2017.

HOW CAN WE BE INTREPID PUBLIC HEALTH LEADERS?

Amy Lansky, PhD

Alumna, health behavior (MPH, 1991; PhD, 1996)



Contributed photo

As we move further into the 21st century, consider this:

- Technology will advance in ways we may not predict.
- Public health will not be immune to fluctuations in politics, economics and law.
- Social and environmental factors will have an impact upon the public's health.

In the face of uncertainty, leaders can rely on foundational skills related to priority-setting, use of data and sustaining partnerships. Applying these skills within the context of national strategies to guide specific public health issues enhances the potential for impact, even in the face of changes in the broader environment in which we lead.

Most public health issues are complex, and data may be contradictory or evolving. It is a leader's job to determine the way forward – to make choices and define priorities.

The power to make a difference at a national level requires setting national priorities, driving sustained complementary efforts toward a few (three to five) priority goals that cascade to the state and local levels.

Some examples of this are the National HIV/AIDS Strategy (tinyurl.com/HRSA-HIV-AIDS), the National Viral Hepatitis Action Plan (tinyurl.com/cdc-hepatitis-plan) and the National Strategy

for Combatting Antibacterial Resistant Bacteria (tinyurl.com/cdc-ARB-strategy).

With a national strategy as a guide, leaders determine which goals, strategies and actions maximize their capacity to address the burden or disparities that characterize their jurisdiction.

Critical data skills for public health leaders are those that help them both understand and use data. Increased availability of all kinds of data – and novel ways to use information – means that leaders will need to know what data to ask for to inform the decisions they are required to make.

Leaders will be expected to see trends and ask tough questions – *Why is the trend going up (or down)? Why is the rate of change slow (or fast)? Where is the trend headed next? How do we accelerate the rate of change to achieve the greatest and fastest impact?* Indicators to measure progress are an integral part of national strategies.

Leaders will need skills to identify appropriate outcome and performance measures and use the data to communicate progress accurately and transparently. Communicating about priorities and progress means using the data to tell stories about people and communities – numbers reflect underlying stories and those stories reflect people. In these ways, data inspire continued action and

commitment toward achieving the priorities identified in national strategies.

Using national strategies to accelerate progress and increase the impact of public health action requires strong partnerships. Having the skills to cultivate partnerships is enhanced by having the will to do so – the deliberate intention to engage meaningfully with others.

Many of the national strategies noted above were developed and implemented by engagement at all levels – among federal agencies, between federal agencies and their state and local government and nongovernmental partners, and with communities. Building, sustaining and leveraging partnerships requires creativity and persistence. Relying on national strategies with clearly prioritized health outcomes, defined targets for measuring progress, and compelling data to illustrate need and direction can help attract and energize even the most (seemingly) incongruous or unwilling partners.

The pace of change in the environment in which public health leaders operate is likely to move faster over the next several decades. Having the vision to drive toward a small set of priority outcomes that are data-based and supported by stakeholders at all levels will be key to improving the public's health through the remainder of the 21st century. ■

Amy Lansky, PhD, is a senior adviser for strategy in the Program Performance and Evaluation Office at the Centers for Disease Control and Prevention. She formerly served as director of the White House Office on National AIDS Policy.

This article was written by Amy Lansky in her private capacity. No official support or endorsement by the Centers for Disease Control and Prevention, Department of Health and Human Services, is intended, nor should be inferred.

Lansky was selected as one of UNC's Distinguished Alumni for 2017 and was recognized at University Day festivities on Oct. 12.



Laura Linnan, ScD

*Professor of Health Behavior
Senior Associate Dean for Academic
and Student Affairs*



*To be a leader is to work
with a diverse group of
colleagues to create a
shared vision for reaching
established goals.*

► **DR. LAURA LINNAN**

I have been thrilled to work with Gillings School faculty, staff, students, employers and alumni to create a shared vision for academic planning.

That vision will help us continue our long-standing commitment to excellence in teaching and help prepare the next generation of public health professionals.

The vision and approach are being translated into exciting academic innovations that will be launched in 2018, starting with a new set of core courses in which content and educational approaches are integrated across disciplines for both residential students and those enrolled in a new online program, MPH@UNC, under an exciting new rubric of Gillings One MPH.

In the next issue...

Dr. Linnan and others will provide an in-depth report about changes in our academic programs.

My UNC public health degree put me in the right place at the right time

When Grover Wrenn left his hometown, Siler City, N.C., for college, he was certain of one thing. He wanted to make a big difference in the world.

As fate would have it, Wrenn was awarded a summer internship in health sciences after his junior year at Florida Presbyterian (now Eckerd) College, and he found his way to the master's program in environmental sciences and engineering at UNC's School of Public Health.

Wrenn has great stories about his years at UNC, notably about working with Dr. Lyman Ripperton, former chief chemist for the Los Angeles Pollution Control Office. During the McCarthy era, "Rip" had refused to sign a loyalty oath required of University of California faculty members – and had instead left for North Carolina to teach and conduct research on the health effects of smog.

Wrenn is perhaps proudest of having "recruited" UNC Professor Emeritus Harvey Jeffries:

At the end of the first year in the master's program, I contacted a college classmate who was completing his first year in the doctoral chemistry program at another university. He wasn't happy with what he was doing, so I invited him to Chapel Hill to check out the Department of Environmental Sciences and Engineering. He transferred to UNC, got his doctorate and conducted highly acclaimed research in atmospheric chemistry as a faculty member for many years. I always thought I made a great contribution to the UNC School of Public Health recruiting Harvey!

In 1972, Wrenn returned to the UNC public health school for two years as a research associate, leading a team of industrial hygienists in inspecting tire manufacturing and plastics plants. The team's directive



Contributed photo

Grover Wrenn

was to assess worker exposures to toxic substances and other occupational health risks.

The discoveries made by the research team, especially related to the toxicity of vinyl chloride, helped put pressure on the newly established Occupational Safety and Health Administration (OSHA) to take action to protect workers. Later, the problem was made more urgent by the announcement that four people in Louisville, KY, who worked in a plant where vinyl chloride exposure was high, had been diagnosed with a rare and fatal cancer.

Because of Wrenn's expertise, leaders at OSHA invited him to help prepare an emergency temporary standard for vinyl chloride – and subsequently appointed him director of health standards. He held that position for six years, during which time,



Grover Wrenn's love of nature photography has taken him around the world. Here (clockwise, from left), he photographs penguins in South Georgia, travels on safari in Kenya and hikes in Yellowstone National Park.

he directed the development of most of the health standards issued by OSHA.

"My graduate training at the UNC School of Public Health and the two years in the Occupational Health Study Group prepared me for the OSHA job," he said. "I was the right person with the right skills at the right time largely because of my UNC experience."

After his years at OSHA, Wrenn became an extremely successful entrepreneur and senior executive in a number of companies, amassing 40 years' experience in life sciences, environmental services and health-care services. As a retiree, he has traveled the world and developed his talents in photography (see wrennphotography.net), always aware that his training in environmental health gave him a unique and compassionate outlook on the world.

"I am grateful for my experience at UNC," Wrenn says. "It helped make me a more capable, curious and caring person – and provided the foundation for my career."

Higher education is central to the strength of our national economy and the well-being of all people, he says, and private support of public education is essential.

“”

I am grateful for my experience at UNC. It helped make me a more capable, curious and caring person – and provided the foundation for my career.

– Grover Wrenn

"We don't always appreciate the fact that public universities receive only a small part of their funding from the state," he says. "The money really comes from private donors who understand the importance of education to a society. Who are more plausible donors than alumni? We are the direct beneficiaries and know the value of education in our own lives."

133 Rosenau Hall is transformed...

Say ‘hello’ to the Joan Heckler



Above: Joan Gillings cuts the ribbon during the dedication of the renovated auditorium and enters with Dean Barbara K. Rimer, followed by others.

Thanks to a generous gift from Joan Gillings, longtime friend and benefactor of the School, our outdated Rosenau auditorium is reborn!

On May 3, close friends of Ms. Gillings and the School gathered at the auditorium for a ribbon-cutting and reception to celebrate the new venue, a mixed-use room that features cutting-edge technology and allows for flexible arrangement of seating and work space.

“We are extremely grateful to Joan Gillings for turning our outmoded auditorium into a technologically state-of-the-art,

vibrant, 21st-century space in which our faculty want to teach, where we want to hold events and where our students are exuberant about learning,” said Dean Barbara K. Rimer. “We so appreciate Joan’s devotion to our space and our students – and her generosity in allowing us to create a space filled with light, color and magnificent possibilities.”

“I was delighted to be a part of the renovation project,” Gillings said. “I enjoyed seeing the progress along the way – and the completed project is amazing.”

Gillings Auditorium!



At the dedication ceremony, Joan Gillings celebrates with friends, including [top left, this page] Betty Kenan (center) and Joy Douglass (right); Paula Brown Stafford (in red, above); and Dr. Gary Koch (standing with Brown Stafford, bottom right).

Kathy Anderson, PhD, associate dean for information technology and project planning, conducted a short demonstration of the technological improvements.

“The Joan Heckler Gillings Auditorium has been designed to support active learning, from floor to ceiling and wall to wall,” Anderson said. “Advanced ceiling audio and remote conferencing systems make it easier for students to collaborate within and outside the room, and movable seats and wireless presentation panels give small groups an easy way to gather and share their work.”

“For many years, I’ve been proud of the transformational work being done at the Gillings School,” Gillings said. “My hope is that the new auditorium will provide a space for innovative study and collaboration for years to come.”

For information on ways to support facilities at the Gillings School, please contact the School’s advancement office at (919) 966-0198 or giving.sph@unc.edu.

Ahdieh family pays it forward with scholarship gift



Contributed photo

Omid and Julie Ahdieh pose with their children (from left) Isabelle, Andrew and Evelyn.

In 1993, Julie Cashman was an unfulfilled American Studies major at UNC, and Omid Ahdieh was a frustrated pre-med student. Both were looking for a focus in their lives and a way to have meaningful careers that allowed them to serve their communities.

Enter the health policy and administration department at the UNC School of Public Health (now the Gillings School's Department of Health Policy and Management). The department offered a range of challenging classes – from epidemiology to health-care law – and both Julie and Omid were drawn to the interesting students and faculty members.

It didn't take them long to find each other. In 1994, before everyone had a Gmail account, Omid asked Julie on a date through the School's interdepartmental mail. Sixteen years of marriage and three beautiful children later, they are grateful to have found each other and are proud alumni of the School that brought them together.

Omid is now a managing director with Wells Fargo's Investment Banking Division, where he focuses on advising health-care companies in mergers and acquisitions. Before taking time off to raise children, Julie worked in the health insurance industry and for Novant Health.



Through the years, they have contributed to the Gillings School in various ways, but they decided recently to make a more significant contribution, one that could help other students have the important learning experiences they did.

This year, they established The Ahdieh Family Scholarship to support outstanding undergraduate students in the Department of Health Policy and Management.

"We both feel strongly that our successes have come from the people and institutions that supported us along the way," Julie says. "This includes our families and mentors – and certainly the Gillings School. Not only did we find each other there, but the School set us on our career paths. Whether you call it 'giving back' or 'paying it forward,' that's what we're trying to do."

Omid feels particularly close to the School and its mission. His family of origin emigrated from Iran in the mid-1970s and settled in the small town of Hamlet, N.C. After completing a medical residency, Omid's father became the first pediatrician in Richmond County, N.C. He served his entire career there, and Omid saw firsthand how important it is to have high-quality health care within the community.

“““

We believe strongly in the Gillings School's mission to improve public health and eliminate health inequities in North Carolina and around the world. As alumni, we want to remain engaged in this important work. Establishing this scholarship was one way we found to do our part.

– Omid Ahdieh

When Omid decided not to pursue a medical degree, he found the UNC School of Public Health a natural fit.

"We believe strongly in the Gillings School's mission to improve public health and eliminate health inequities in North Carolina and around the world," Omid says. "As alumni, we want to remain engaged in this important work. Establishing this scholarship was one way we found to do our part."

For more information about establishing a scholarship or other ways to support Gillings School students, please contact the advancement office at (919) 966-0198 or giving.sph@unc.edu.

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Karissa Grasty named new associate dean for advancement

Karissa Grasty, a seasoned development manager and sophisticated fundraiser with a diverse background in higher education and nonprofit organizations, has joined the Gillings School as its new associate dean for advancement, effective Nov. 1.

Grasty previously served as assistant dean for advancement for the University of Miami's College of Engineering and its School of Nursing and Health Studies. There, she was responsible for the design and overall development strategy for the two professional schools, both of which exceeded their annual fundraising goals under her leadership.

A North Carolina native and alumna of the University of Georgia, Grasty has more than 20 years' experience in fundraising and has held significant leadership roles at every stage of her career.

"We are delighted that Karissa will be joining us in this important leadership position," said Barbara K. Rimer, DrPH, dean and Alumni Distinguished Professor at the Gillings School. "The leadership team and I look forward to working with her to

increase opportunities for our students and faculty members and to bring to reality our exciting School priorities. She joins a great School and a very strong advancement team."



Karissa Grasty

Contributed photo

ANNOUNCING THE Peggy Leatt Fellowship fund

Dr. Peggy Leatt, emeritus professor and chair of health policy and management at the Gillings School, retired in 2013, after a long and successful career as a visionary leader, beloved teacher and mentor, and innovative scholar.

Her biggest admirer (and husband), Dr. George Pink, Humana Distinguished Professor of health policy and management at the School, now has established The Peggy Leatt Fellowship to honor her work.

"Her students were always Peggy's priority," Pink says. "She invested much of her energy in improving health policy and management education and the

student experience at the Gillings School, particularly for minority students. That's why I believe the fellowship will be such an important legacy for her."

To join in honoring Dr. Leatt, please visit sph.unc.edu/leatt-fellowship, or contact the advancement office at (919) 966-0198 or giving.sph@unc.edu.



Dr. Peggy Leatt

Contributed photo



DID YOU KNOW?

NEARLY 19,000 UNC PUBLIC HEALTH ALUMNI LIVE AND WORK AROUND THE WORLD!

The dots on the map represent UNC public health alumni in all 50 U.S. states and in more than 100 countries. To learn more about your colleagues, friends and fellow classmates, see our interactive map at sph.unc.edu/alumni-map.

As a graduate of UNC Gillings School of Global Public Health, you are a valuable member of our community, and we care about where your Carolina experience has taken you. Let us hear from you – and give us information about how you'd like to stay in touch.



WHY UPDATE YOUR CONTACT INFORMATION?

- Reconnect with former classmates and connect with others in your field or area, using the alumni directory of our online community, Gillings WellConnected (sph.unc.edu/wellconnected).
- Stay informed about the latest School and department news.
- Continue to receive *Carolina Public Health* magazine and other school communications.
- Find out about upcoming events at the Gillings School or in your area.
- And more!

Updating your information is easy! Fill out a brief form at sph.unc.edu/alumni-update, or go to sph.unc.edu/wellconnected to update your profile.

► **SAVE THE DATES**

going viral

Impact and Implications of
The 1918 Flu Pandemic

An interdisciplinary symposium to mark the 100th anniversary
of one of the deadliest pandemics in human history

Keynote Speaker: Gina Kolata

Kolata, two-time Pulitzer Prize-winning journalist from *The New York Times*, will deliver the Gillings School's 50th annual Fred T. Foard Jr. Memorial Lecture. Kolata is the best-selling author of *Flu: The Story of the Great Influenza Pandemic of 1918 and the Search for the Virus That Caused It*.

Symposium events will offer perspectives from the vantage points of medicine, health, social sciences and the humanities. Speakers include leading experts in epidemiology, virology, medicine, communications, literature, history, ethics, policy and other fields.

**APRIL
4-6, 2018**

Online registration opens in January 2018.

For more information, visit sph.unc.edu/1918flu.

Questions? Contact 1918flu@unc.edu.

Hosted by the Gillings School, UNC's Institute for Global Health and Infectious Diseases,
RTI International and the N.C. Museum of Natural Sciences

**Find the latest news
from the Gillings School at
sph.unc.edu/news.**

The news and awards sections of the magazine will return with the next issue.

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\$50,000

A full-ride scholarship for one student



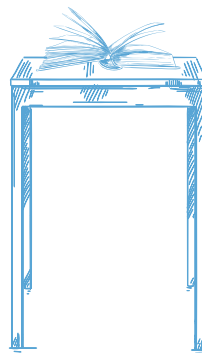
\$15,000

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\$5,000

A global experience for one Master of Public Health student



\$1,000

Purchase of one standing desk for use in a study area



\$500

Cost for one student to attend the annual APHA conference

Gifts to the Annual Fund allow us to respond quickly to the greatest needs and most promising opportunities. To make a gift online, please visit giving.unc.edu/gift/sph.

For more information, contact the advancement office at (919) 966-0198 or giving.sph@unc.edu.



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