THOUGHT in a perplexing world.
“Our core purpose commits us to redouble our effort to ensure that we narrow these divides to produce the science and scholarship that contributes to a better, healthier world for all.”

DEAR COLLEAGUES:

WELCOME TO SPH THIS YEAR, our School’s annual report.

Our School’s core purpose is “Think. Teach. Do. For the health of all.” This means to describe and animate what we do: we generate ideas through our scholarship and research, think; we transmit this knowledge to the next generation, teach; and we work to communicate these ideas and be a part of the action that contributes to a healthier world, do. This issue of SPH This Year focuses on our scholarship at a time when thought and science have become more important than ever.

Over the past year, we have seen the country—and to some extent, the world—engage in debate and discussion that challenge the foundations on which the health of the public is built. We have seen efforts to push back on gains around global environmental climate change, gender equity, and social and economic justice. This creates a dangerous world, one that has experienced repeated natural disasters and the US’s deadliest-ever mass shooting, and one that threatens to erode hard-fought gains in the health of populations. These shifts are, indeed, in many ways perplexing. But they also speak to some of the fundamental divides that color our world. Our core purpose commits us to redouble our effort to ensure that we narrow these divides to produce the science and scholarship that contributes to a better, healthier world for all.

The cover, a Rorschach blot comprised of hundreds of images reflecting some of the most important public health themes that rose to prominence over the past year, challenges us to ask what we see in these pictures, what we see overall, and where these narratives lead us. Most importantly, it challenges us to always ask what the role of public health is in these changing times. To that end, while in this issue of SPH This Year we feature the work of the School, we also feature 23 deans and program directors of other schools and programs talking about the role of public health in these times—their comments are captured on pages 46 to 49 of this issue and on the web at bu.edu/sph/thisyear17—who create a compelling portrait of the central role that academic public health stands to play in the years ahead. Thank you to all of our colleagues who participated in these interviews; we learned from all your comments and are excited to work together in the coming years.

I hope that all readers of SPH This Year enjoy this summary of our work. A hard-earned thank-you goes to the communications group responsible for producing SPH This Year. As important, a thank-you to all members of our community, including the faculty, staff, students, alumni, and friends of the School—some of whom are featured in this SPH This Year, but many more who are not—who make this a dynamic, forward-looking School, deeply committed to promoting the health of populations.

Warm regards,

Sandro Galea, MD, DrPH
Dean, Robert A. Knox Professor
Twitter: @sandrogalea

DEAR COLLEAGUES:
FEATURES

WEIGHT HISTORY CAN TIP SCALES OF HEALTH RISK. Extra weight at any time in life increases risk.

SPECIAL FEATURE

YOUR MONEY OR YOUR LIFE. Preventing a 21st-century health-poverty trap.

NO EASY Rx FOR POOR PHARMACEUTICAL ACCESS. Getting essential medicines to those who need them.

THERE’S SOMETHING IN THE AIR: PCBs. New Bedford Harbor is polluting the city’s air.

WHY ARE OUR MOTHERS DYING? Maternal mortality rates are up in the US.

UPENDING THE GUN DEBATE. Shifting the gun debate from control to safety.

SMALL BLOOD SAMPLES YIELD BIG CLUES ON LONGEVITY. Biomarkers predict aging and its related effects.

WEIGHT HISTORY CAN TIP SCALES OF HEALTH RISK.

HOW WE SEE IT: Public health professionals from across the US discuss today’s challenges.

FACULTY SPOTLIGHT

PROFESSOR RECEIVES PRESTIGIOUS BU TEACHING AWARD. Sophie Godley honored for inspiring students.

DEAN’S NOTE

IS JUSTICE CRUCIAL TO HEALTH? Shared justice can improve public health.

SIGNATURE EVENTS

SPH BY THE NUMBERS

FACULTY PUBLICATIONS

18
32
60
4
22
30
34
40
52
THE SURVIVAL GAP between the richest and poorest Americans is widening, with the richest 1 percent living 10 to 15 years longer than the poorest 1 percent, feeding the country’s growing health inequities, according to School of Public Health researchers writing in a special series in The Lancet.
“The rise in income inequality in the USA in 1980–2015 has coincided with widening inequalities in health and longevity. Not only do the poor have lower incomes, they increasingly live shorter lives than do higher-income Americans,” writes Jacob Bor, assistant professor of global health; Sandro Galea, dean and Robert A. Knox Professor; and Gregory Cohen, statistical analyst in epidemiology.

The five-paper *Lancet* series highlights the need for broad initiatives to address structural racism and inequality and health reform that moves toward a single-payer system to address growing health inequities and prevent a 21st-century health-poverty trap.

The SPH team reviewed studies assessing changes in survival gaps between Americans of different socioeconomic strata since 1980.

“The literature points overwhelmingly to the fact that socioeconomic health gaps are widening in the United States. This consensus is notable given current efforts to cut safety net programs that protect the health of the poor.”

SPH researchers say that behind changes in individual risk factors, such as smoking, obesity, and substance use, lie “distal factors” fueling the growth of survival inequities, such as unequal access to technological innovations, increased geographic segregation by income, reduced economic mobility, and increased exposure to the high costs of medical care.

They recommend further research into socioeconomic inequalities in illness, rather than just mortality: “Without interventions to decouple income and health or to reduce inequalities in income, we might see the emergence of a 21st-century health-poverty trap and the further widening and hardening of socioeconomic inequalities in health.”
When the Gloucester police chief went on Facebook to announce that his officers were going to place individuals into treatment instead of jail, he changed the conversation about how communities should deal with the disease of addiction. As a result, lives are being saved every day all over the country.

—DAVID ROSENBLOOM, PROFESSOR OF HEALTH LAW, POLICY & MANAGEMENT
Minorities, Latino Immigrants Face Greatest Risk of Workplace Injuries, Disability

According to a new study co-authored by an SPH researcher, Hispanic immigrant and African American men have a higher risk than other workers of getting injured on the job—and the disparity may be driven in part by discrimination.

Published in the journal Health Affairs, the study found that Hispanic immigrant workers ages 18 to 64 had the highest workplace injury rate—at 13.7 percent per 1,000 workers—followed by African American men (more than 12 percent) and US-born Hispanic men (nearly 12 percent). The injury rate for white men was 11.8 percent and for Asian Americans nearly 10 percent. Other ethnicities had a rate of about 11 percent.


The researchers found that a higher than expected workplace injury rate was linked to an elevated risk of disability, especially for older workers (ages 50 to 64). African Americans in this age bracket had a 4.4 percent rate of work-related disability, followed by foreign-born Hispanics (4.2 percent), Asian Americans (4 percent), and US-born Hispanics (3.5 percent). Older whites had the lowest disability rate at about 2.5 percent.

The researchers did not identify the underlying causes of the disparities but noted that discrimination has long been a factor in poor worker safety.

“Policymakers and regulators may need to review whether employers are systematically assigning people of different races and ethnicities different jobs or job tasks according to their risk,” they wrote.

The researchers did not identify the underlying causes of the disparities but noted that discrimination has long been a factor in poor worker safety.
A SUPERFUND CLEANUP OF NEW BEDFORD HARBOR IS RELEASING TOXIC PCBs FROM THE HARBOR FLOOR INTO THE ATMOSPHERE.

THERE’S SOMETHING IN THE AIR: SEDIMENT CONTAMINATED WITH POLYCHLORINATED BIPHENYLS, OR PCBs, from the bottom of New Bedford (MA) Harbor is the number-one source of airborne PCBs in the neighborhoods surrounding the port, according to a study by researchers from SPH and the University of Iowa.
In fact, airborne PCB emissions are so high that researchers say the harbor is the single largest continuous source of airborne PCBs ever measured from natural waters in the United States or Canada, according to SPH research published in *Environmental Science & Technology Letters*.

Currently undergoing cleanup, the harbor is one of the largest PCB Superfund sites in the nation. The US Environmental Protection Agency (EPA) has monitored airborne PCB levels near the harbor since 1999. The levels measured in the study are consistent with levels measured by the EPA, but this is the first time that researchers have focused on the harbor as a unique source of airborne PCBs.

Residents have been concerned with air quality since dredging to clean the port started in 1994. Industry in the area used PCBs to produce electronic devices from 1940 until the late 1970s, when the EPA banned the manufacture of PCBs due to health concerns.

“As our knowledge grew about the high levels of PCBs in the sediments and water, we began to question the air from this site,” explained Karen Vilandry, president of the community-based group, Hands Across the River Coalition.

Wendy Heiger-Bernays, associate professor of environmental health, said the New Bedford area community requested the study and “played an integral role in its completion.”

Researchers used calculated emissions and atmospheric dispersion modeling to confirm New Bedford Harbor as the source of airborne PCBs, which are released from the sludge at the bottom of the port and escape into the water and air.

The research team worked with residents affiliated with the Hands Across the River Coalition to select air-sampling locations at 18 sites in New Bedford, Fairhaven, Dartmouth, and Acushnet; air samples were taken during three consecutive periods from July to November 2015. The highest readings for airborne PCBs were from sampling locations closest to the harbor.

PCBs can cause a variety of adverse health effects, including an increased risk for cancer in humans, and the effects of long-term inhalation of airborne PCBs are still unknown.

Keri Hornbuckle, professor of civil and environmental engineering at IIHR-Hydroscience & Engineering at the University of Iowa and core leader of the Iowa Superfund Research Program, said the study made it clear that PCBs are coming from the harbor and “not from a variety of sources.” Community engagement in the study was assisted by Alternatives for Community & Environment (ACE) and the Toxics Action Center.

Co-authors from SPH included Madeleine Scammell, assistant professor of environmental health, and Kathryn Tomsho and Komal Basra of the BU Superfund Research Program.
School Shootings Less Likely in States with Background Checks on Gun Purchases

ACCORDING TO A STUDY led by researchers from SPH and the School of Medicine and published in Injury Prevention, school shootings are less likely in US states with mandatory background checks on gun and ammunition purchases and with higher levels of spending on mental health services and public education.

The authors noted that the 2012 Sandy Hook Elementary School shooting in Connecticut, during which 20 children and six staff members were shot dead by a lone gunman, prompted much soul-searching about the possible factors involved, but to date, there has been little in the way of hard evidence to inform these discussions.

In a bid to address this issue, the researchers drew on a systematic analysis of media coverage of school shootings between 2013 and 2015 to see if the frequency of these incidents might be linked to particular state-level factors.

The number of school shootings was lower in states with mandatory background checks for gun and ammunition purchases, higher spending on mental health and K–12 education, and in those with a larger proportion of the population living in towns and cities, the research team found.

The study was led by Bindu Kalesan, assistant professor of community health sciences, and co-authored by Dean Sandro Galea.

Researchers cautioned that media reports are not always the most reliable sources of consistent and comprehensive information, and that they also did not have information on the perpetrators’ mental health.

Still, they said the rising incidence of school shootings emphasizes the need for a national registry to monitor mass and school shootings in order to better inform the debate around the drivers and consequences of these traumatic events.

Probing Soda Company Sponsorship of Health Groups

THE NATION’S two largest soda companies sponsored at least 96 national health organizations from 2011 to 2015, dampening the health groups’ support of legislation to reduce soda consumption and impeding efforts to combat the obesity epidemic, SPH and MED researchers have found.

According to the study in the American Journal of Preventive Medicine, in the same five-year period the Coca-Cola Company and PepsiCo lobbied against at least 28 public health bills intended to reduce soda consumption or improve nutrition. The companies “used relationships with health organizations to develop positive associations for their brands,” said lead author Daniel Aaron, a BU medical student who co-wrote the study with Michael Siegel, professor of community health sciences.

Aaron and Siegel researched sponsorships and lobbying efforts by the two soda companies to come up with a list of 96 national health organizations that accepted money from the companies. Twelve organizations accepted money from both companies; one accepted money from just PepsiCo; and 83 accepted money from only Coca-Cola. The authors note that the count could be skewed because Coca-Cola publishes a list of its recipient organizations, while PepsiCo doesn’t.

The sponsorship totals include two diabetes organizations—the American Diabetes Association and the Juvenile Diabetes Research Foundation—a finding that the authors called “surprising, given the established link between diabetes and soda consumption.”

The study also identifies 28 bills or proposed regulations, including soda taxes and restrictions on advertising, that were opposed by the soda companies or their lobbying groups. Siegel and Aaron said these efforts demonstrate the companies’ “primary interest of improving profit at the expense of public health.”
“What do you do in the face of uncertainty? What do you do in the face of uncertainty when delaying action because of uncertainty has predictable costs?”

RONALD BAYER, PROFESSOR, SOSMEDICAL SCIENCES, COLUMBIA UNIVERSITY MAILMAN SCHOOL OF PUBLIC HEALTH
TWENTY-FIVE YEARS after the first Gulf War, scientists still do not know the exact biological mechanisms that are making about one-third of the 697,000 veterans who served in the war sick.

But a new multi-institution study in the journal Neurotoxicology & Teratology co-authored by SPH researcher Eric Jacobson offers evidence that Gulf War Illness (GWI) stems from neuronal and glial injury affecting both the gray and white matter cells of the brain, and identifies serum autoantibodies that may prove useful as biomarkers of the illness.

The research team found “significantly elevated levels” of eight autoantibodies linked to certain central nervous system cytoskeletal proteins in a sample group of 20 Gulf War veterans—a finding that suggests a “possible new avenue” for identifying an objective biomarker of Gulf War Illness.

According to the study, “These results confirm the presence of neuronal injury/glia activation in these veterans, and are in agreement with the recent reports indicating that 25 years after the war, the health of veterans with GWI is not improving and may be getting worse.”

Study co-principal investigator Kimberly Sullivan, a research assistant professor of environmental health and principal investigator on the Gulf War Illness Consortium project, said the new study provides “objective, blood-based evidence of damage to the brains of sick Gulf War veterans.” Sullivan said she was hopeful that the work would lead to a simple blood test for GWI, and perhaps other toxicant-induced disorders. “If our larger, ongoing study shows the same promising results as this initial study.”

ACCORDING TO A STUDY led by an SPH researcher, parents in sub-Saharan Africa are less likely to report episodes of fever and diarrhoea among their female children compared to males, suggesting a gender imbalance in reporting that undercuts accurate estimates of child illness.

Published in the American Journal of Tropical Medicine and Hygiene, the study recommends more research into the possible reasons and “practical impact” of the apparent disparity, saying the underreporting of symptoms in girls may indicate that “a tremendous amount of untreated illness goes unnoticed.”

Using national surveys based on parental reports of their children’s health, the authors investigated differences in symptom reporting by child gender in a sample of countries in sub-Saharan Africa. Overall, both fevers and diarrhoea were reported significantly less often for girls than boys under age 5.

The authors speculated that differences in reporting could stem from several factors. Parents may interact more with boys, leading to better recognition of symptoms, or they may interpret information conveyed by boys about symptoms differently than by girls. Alternatively, gender differences in reporting could reflect a more general form of gender inequality in society.

Lead author Peter Rockers, assistant professor of global health, believes that regardless of the reasons for the disparity, the imbalance in reporting has profound implications for child health.

“From a public health perspective, parental underreporting of symptoms in girls may indicate a tremendous amount of untreated illness that goes unnoticed,” Rockers said.
WHY ARE OUR MOTHERS DYING?

Despite a worldwide decline, mortality rates are up in the U.S., especially among blacks and women over age 40.
DESPITE AMBITIOUS UNITED NATIONS MILLENNIUM DEVELOPMENT GOALS and a 44 percent decline in maternal mortality worldwide from 1990 to 2015, maternal death rates have not improved in the United States and appear to be increasing, researchers have found.

In fact, according to a study co-authored by School of Public Health researchers, the estimated maternal mortality rate for 48 US states and the District of Columbia actually increased by 26.6 percent from 2000 to 2014. Published in the journal Obstetrics & Gynecology, the study found that the estimated maternal mortality rate in the US, excluding California and Texas, was 23.8 per 100,000 live births in 2014—up from 18.8 in 2000.

It also found that earlier estimates significantly underreported maternal deaths, largely because of delays on the part of some states to adopt a “pregnancy question” on standard death certificates. Because of those delays and the resulting discrepancies, the US has not published an official maternal mortality rate since 2007.

“The current maternal mortality rate places the United States far behind other industrialized nations,” said study co-author Eugene Declercq, professor of community health sciences. “There is a need to redouble efforts to prevent maternal deaths and improve maternity care for the four million US women giving birth each year.”

Declercq and colleagues noted that the World Health Organization has reported that 157 of 183 countries have shown decreases in their maternal mortality rates since 2000. The current estimated US rate is comparable to that of Iran and Ukraine, and among 31 industrialized countries, only Mexico has a poorer rate.

The research team analyzed detailed mortality data available from the National Center for Health Statistics and the Centers for Disease Control and Prevention. Their calculations indicate that the last official US maternal mortality rate—12.7 deaths per 100,000 live births, reported in 2007—was significantly underestimated.

In a related study published in the journal Obstetrics & Gynecology, researchers called for efforts to improve reporting of maternal mortality data to identify trends and at-risk populations. That study reaffirmed findings of widespread racial and ethnic disparities in mortality, with deaths of black women 2.8 times more likely than whites and 3.6 times more likely than Hispanics, in 27 states and the District of Columbia.

Based on a new US standard pregnancy question on death certificates, researchers examining deaths of women while pregnant or within 42 days of the end of pregnancy found that the maternal mortality rate increased by 23 percent from 2009 to 2014 in the 27 states and DC.

About one-third of the reported maternal deaths in 2013–2014 were women 40 and older compared with just 3 percent of live births, suggesting what the authors said was “a possible overreporting of maternal deaths of older women” that should be further examined.

Declercq noted that maternal mortality in the US “continues to rise, at a time when it is dropping internationally” and that while the US “continues to have maternal mortality rates for non-Hispanic blacks that are several times that of whites, the rate for whites alone is still higher than virtually all other industrialized countries.”

DESPITE A 44 PERCENT DECLINE IN MATERNAL MORTALITY WORLD-WIDE FROM 1990 TO 2015, MATERNAL DEATH RATES HAVE NOT IMPROVED IN THE UNITED STATES AND APPEAR TO BE INCREASING.


↑ 23.8 PER 100K LIVE BIRTHS THE ESTIMATED MATERNAL MORTALITY RATE IN THE US, EXCLUDING CALIFORNIA AND TEXAS, IN 2004—UP FROM 18.8 IN 2000.
Restrictive alcohol policies—such as those limiting liquor store density or imposing taxes on alcohol—have been shown to have a “protective effect” in reducing suicides, according to a review led by an SPH researcher.

Published online in the journal Alcoholism: Clinical and Experimental Research, the review examined associations between alcohol policies and suicides, as well as alcohol levels among suicide decedents, in 17 studies conducted between 1999 and 2014.

They found that, overall, higher alcohol taxation was associated with lower rates of suicide. Similarly, studies gauging the effects of policies limiting liquor outlet density found an association between lower availability of alcohol and lower suicide rates, as well as lower odds of alcohol involvement (BAC levels) in suicide deaths. Other policies such as “zero tolerance” laws for underage drinkers who drive while intoxicated also were associated with a decline in suicides among young adults.

“By making alcohol less available, it is possible to reduce the average risk of suicide, especially those where alcohol is involved,” the researchers wrote. “Departing from approaches that narrowly target members deemed at ‘high risk’ and that commonly address suicidal behaviors almost exclusively as problems of individuals, this population-based approach is likely to maximize public health benefit and to show long-lasting influence on reducing suicide.”

Ziming Xuan, associate professor of community health sciences and the study’s lead author, said “these findings highlight the importance of population-based alcohol policies in suicide prevention.”

Research

Adolescent-Dating Violence Fuels Re-Victimization in Adulthood

According to a study co-authored by an SPH researcher, people who experience dating violence as adolescents are more likely to report physical intimate-partner violence as adults, demonstrating that early dating experiences contribute to a cycle of interpersonal violence through adulthood.

Published in the Journal of Adolescent Health, the study analyzed data from a nationally representative sample of US high school and middle school students ages 12 to 17 who were followed into adulthood five and 12 years later. Compared to people who were not victimized in adolescence, those who experienced teen-dating violence were more likely to report physical intimate-partner violence in those later years.

Controlled for a variety of risk factors, the study, according to the authors, demonstrates that adolescent-dating violence (ADV) “is uniquely implicated in a cycle of interpersonal violence from adolescence to adulthood, even when differences between victims and non-victims are carefully accounted for.”

That finding underscores the “critical need to intervene with adolescents experiencing dating violence, to prevent this cycle from beginning. It also adds to the literature demonstrating the key importance of adolescent romantic relationships in shaping youth development.”

Co-author Emily Rothman, associate professor of community health sciences, said the findings suggest that more needs to be done to identify adolescents who have experienced dating violence, through screenings in pediatric offices, school-based health centers, and other healthcare settings.

“We need to find ways to better support adolescents who are identified as victims of dating violence and provide effective wrap-around services that address the risks these adolescents may experience,” she said.
EMILIA JAVORSKY (SPH’10) believes most medical innovation is technology driven. “It starts with someone developing a new technology solution, then trying to find medical problems to use it for,” says the physician-scientist, who was included in the 2017 Forbes 30 Under 30: Healthcare list. “I’m part of the school of thought that takes the converse approach.”

How did your time at SPH influence your career path?

I most definitely would not be in this line of work if not for my time at the School of Public Health. Prior to matriculating at SPH, my only exposure to the macro-level factors in medicine had been a bioethics course in undergrad. All of my coursework and research was in basic science. It wasn’t until I was at SPH that I became fascinated with the fact that the science of medicine and the practice of medicine are two parts of the large, complex ecosystem that is health care in the United States. And I realized that I loved it.

Do you see a link between your studies in public health—with a focus on health policy and management—and your technological approach to medical solutions?

Absolutely, because once you define a problem really well, then you start thinking, “How does this problem exist in the broader ecosystem of health care?” When developing a solution, you may get the clinical problem right or the science right, but then there are all of these other factors involved in getting your product to patients, from the intellectual property considerations to regulation, reimbursement, or comparative efficacy. That’s in addition to determining whether this is something that is needed; something that customers would be interested in using.

A STUDY led by SPH researchers shows that despite significant reductions in neonatal mortality previously reported in south Asia, applying a chlorhexidine wash to newborns’ umbilical cords in sub-Saharan Africa did not reduce deaths. Published in The Lancet Global Health, the study calls into question recent efforts to scale up the use of antiseptic chlorhexidine cord washes globally as a strategy to reduce neonatal sepsis and mortality. “Although chlorhexidine is potentially beneficial in places with a high neonatal mortality rate and home-based delivery environments in south Asia, the treatment had no effect on neonatal mortality in Zambia, an environment with a lower neonatal mortality rate (and) more facility-based deliveries.”

The results of the two-year analysis of more than 37,800 live births in Southern Province, Zambia, come as researchers worldwide have been trying to find ways to reduce neonatal mortality, defined as death within the first 28 days of life. Globally, 3 million newborns die each year, with infection responsible for approximately 13 percent of these deaths.

“Rolling out chlorhexidine to all low-income and middle-income settings risks the misuse of resources—time, money, political capital, and—most importantly—patient trust,” said senior study author David Hamer, professor of global health and of medicine at MED. Hamer and co-principal investigator Katherine Semrau, a former assistant professor of global health, said the study points to the need to identify more effective care that will reduce the risk of death in these lower-mortality settings.

Globally, 3 million newborns die each year, with infection responsible for approximately 13 percent of these deaths.
The progress and challenges of the 30 years since are detailed in the Lancet Commission on Essential Medicines report, co-authored by Associate Professor of Global Health Veronika Wirtz.

Challenges are not limited to low-income countries, Wirtz said. The report covers five key areas: financing; affordability; quality and safety of medicine products; improving the use of medicines; and developing new essential medicines, which the World Health Organization defines as “those that satisfy the priority healthcare needs of the population.”

The Lancet tapped Wirtz two years ago to co-chair the commission with Hans Hogerzeil of the University of Groningen in the Netherlands, and Andy Gray of the University of KwaZulu-Natal, South Africa.

“The high price of medicines is one of several challenges affecting high-income countries, and one that stands out,” she explained. “Medicines mostly for specialty care, cancer medicines in particular, and in areas of infectious disease—hepatitis C is the example that comes up in the news nearly every day—are unaffordable, even for high-income countries.”

The United States is one of the countries raising the most concern in that area, she said.

The report highlights some high-income countries—in the European Union, as well as Australia and New Zealand—that have formalized systems for assessing the value of new healthcare technologies and negotiating prices with manufacturers.

“Many people, including Barack Obama, have made the point that the US government, via Medicare, should be allowed to negotiate price,” Wirtz said, yet the problem is allowed to persist and “likely worsen if no action is taken.”

She also pointed out that where the report looks at how medicines are paid for, the US receives another poor grade: “We have huge inequities, with estimations that part of the population is really struggling, even with commonly used medicines such as insulin.” The US “is a country that stands out with really imminent, immediate challenges.”

The report argues for a different attitude on data and information-sharing that emphasizes both access and innovation.

“Information and data become a public good,” Wirtz said. “I think that is potentially part of a cultural shift, a tremendous shift in thinking.”

That shift will need to extend far beyond the pharmaceutical industry and involve a range of stakeholders.

“Some people immediately think the pharmaceutical industry is the culprit,” she says. “But there are many more actors whose role is also critical when it comes to promoting equitable access, such as governments, insurers, and providers.”

“All actors need to be held accountable.”

IN 1985, IN NAIROBI, KENYA, the World Health Organization brought together governments, pharmaceutical industries, and patient and consumer organizations to discuss the availability, affordability, quality, and use of essential medicines.
SPH BY THE NUMBERS

SPH CAMPAIGN UPDATE
$52.3M TOTAL RAISED BY SPH SO FAR
87% OF GOAL
CAMPAIGN GOAL $60M BY 2019

RANKING
U.S. NEWS & WORLD REPORT
10 BEST GRADUATE SCHOOLS OF PUBLIC HEALTH

APPLICATION NUMBERS
TOTAL APPLICATIONS, FALL 2017
2,691

STUDENTS
1,177 STUDENTS AT SPH

FACULTY
333

2016 GRADUATE EMPLOYMENT
EMPLOYED FULL TIME OR PURSUING ADVANCED EDUCATION WITHIN 6 MONTHS OF GRADUATION
93%

STAFF
225

EMPLOYED IN DOMESTIC PUBLIC HEALTH POSITIONS
83%

17% EMPLOYED IN GLOBAL HEALTH POSITIONS

SCHOLARSHIPS
$8,057,500 SCHOLARSHIPS AWARDED IN 2017

RESEARCH AWARDS
$48M IN 2017

MEDIA MENTIONS PEER-REVIEW PUBLICATIONS
3 PER BUSINESS DAY
5 PER BUSINESS DAY

8,939 ALUMNI LIVING IN 117 COUNTRIES

52.3M TOTAL RAISED BY SPH SO FAR

SPH CAMPAIGN UPDATE

RANKING
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8,939 ALUMNI LIVING IN 117 COUNTRIES
IN AN UNPRECEDENTED CALL TO ACTION, public health leaders from Boston University and other top schools have urged consensus building rather than confrontation on gun safety, writing that the election of President Donald Trump has “changed the national conversation on firearms” and made federal policy changes unlikely.
Writing in the American Journal of Public Health, researchers from nine leading medical and public health schools—speaking for a larger group of 82 academics and advocates who convened at SPH in November to discuss gun violence—presented “Academic Public Health and the Firearm Crisis: An Agenda for Action,” which seeks to engage gun owners and manufacturers in discussions about reducing the public health ills associated with firearm ownership rather than continuing what they called a “polarizing debate.” According to these experts, “In the United States, nearly 10 times more guns are in civilian hands than in the next closest country, with up to 300 million guns in circulation. The country also has a significant gun culture. This situation suggests that there will be no easy solutions that will garner widespread popular support, and that any comprehensive approach to the problem will require the engagement of partners across many sectors.”

Their agenda for action includes calling on private foundations and the business community to fund and support research to mitigate gun violence as a step to turn the tide on a crisis that they said costs the country an estimated $229 billion annually. They also note that congressional action in 1996 effectively ended federal funding for gun research, stymying “a generation of researchers in the field.”

The paper grew out of a November 2016 meeting at SPH of more than 80 representatives of 42 schools of public health and medicine from 22 states and 17 advocacy organizations. Organized by Dean Sandro Galea, the meeting featured presentations by prominent researchers, including Daniel Webster of Johns Hopkins Bloomberg School of Public Health and David Hemenway of the Harvard T.H. Chan School of Public Health, as well as Massachusetts Attorney General Maura Healey. The group is calling for:

• Focusing on state-level initiatives, especially those rooted in “non-threatening messaging” about gun safety;
• Promoting discourse around gun safety versus gun control (they point out that few issues are as polarizing as guns, and that the gun lobby has been “extraordinarily successful” in framing the discussion as one that pits “deeply held views about individual rights” against concerns about public health);
• Engaging private industry, starting with healthcare entities. Industry involvement is needed for evidence-based initiatives to reduce gun injuries and deaths. The researchers cite findings that firearm violence depresses business growth and harms neighborhood economies;
• Building collaborations with opponents, including convening an “inclusive group” of firearm owners, manufacturers, police, pro-gun advocates, and public health scholars to develop common ground around the issue of reducing violence.

The paper’s senior author, Galea said that he hoped academia would be a catalyst for action on this issue that claims more than 30,000 lives a year in the US, and that public health leaders have a responsibility to speak with a “clarity of voice.”
Exposure to PCE-Contaminated Water Linked to Increased Risks of Teenage Drug Use

CAPE COD RESIDENTS who were exposed prenatally to both their mothers’ alcohol use and contaminated drinking water had higher risks of using multiple illicit drugs as teenagers, according to a study by SPH researchers. Published in the journal Environmental Health, the study found that residents born between 1969 and 1983 who were exposed in utero to tetrachloroethylene (PCE)-contaminated drinking water in eight Cape Cod towns had higher risks of drug use than those not exposed. Similarly, those with alcohol exposure had increased risks. Teenagers exposed to both had the highest risks of using multiple illicit drugs, suggesting an “additive effect of early life exposure” to both substances.

SPH researchers have been examining the health effects of PCE-contaminated drinking water that flowed through vinyl-lined pipes in eight Cape Cod towns from 1968 through 1980. The current study was based on self-reported information on illicit drug use from more than 660 children born to mothers exposed to PCE, about half of whom also were exposed to alcohol.

Lisa Gallagher, research assistant professor of epidemiology, Ann Aschengrau, professor of epidemiology, and Thomas Webster, professor of environmental health, co-authored the study.

Prior studies have demonstrated that exposure to PCE affects neuropsychological function and risk-taking behaviors, while prenatal alcohol exposure has been shown to increase the risk of alcohol disorders later in life. Since PCE and alcohol are both solvents, the authors said “it is plausible that they act by similar mechanisms on the behaviors under study.”

C-Section Rates Level Off after Sharp Increases

AFTER YEARS of sharp increases that were termed “inevitable” births by cesarean section have plateaued in industrialized countries in recent years—but rates in many countries remain high, according to a study led by SPH researchers.

Published in the American Journal of Obstetrics & Gynecology, the study examined C-section rates from 1993 to 2013 in 21 wealthy countries with at least 50,000 births and found that the average increase in rates from 2008 to 2013 was only 1.5 percent—far less than the 40 percent average increase from 1993 to 2003. Of the 21 countries, six reported declines from 2008 to 2013, and none experienced a significant increase.

Led by Eugene Declercq, professor of community health sciences, the report shows seven countries had cesarean rates over 30 percent in 2013: Australia, Germany, Italy, Portugal, the Slovak Republic, Switzerland, and the US. Of those countries, Italy and Portugal saw a decline from 2008, while the others reported small or no increase.

Co-authors on the paper included Howard Cabral, professor of biostatistics.

“Cesarean rates in industrialized countries have generally plateaued, but at rates that are higher than recommended by WHO (the World Health Organization),” the study said. The WHO recommends an average of no more than 10 to 15 percent of births by C-section for optimal maternal and neonatal outcomes.

Declercq said that leading industrialized countries “have slowed or reversed trends of increasing cesarean rates by fostering policies encouraging that cesareans be done only in response to a medical indication. It’s a lesson that will hopefully be adopted by those countries still experiencing rapid increases in their cesarean rates.”
NEW RESEARCH BY SPH has found that healthy aging can be influenced by a combination of biology and lifestyle factors, with both biomarkers and investments in healthy living playing a role in longevity and wellness.

In a recent study published in the journal Aging Cell, scientists used biomarker data collected from the blood samples of almost 5,000 participants in the Long Life Family Study to identify an average “signature,” or pattern, of 19 biomarkers. Smaller groups of people had specific patterns of those biomarkers that deviated from the norm and were associated with increased probabilities of association with particular medical conditions, levels of physical function, and mortality risk eight years later.

In all, the researchers generated 26 different predictive biomarker signatures. According to their findings, “These signatures depict differences in how people age, and they show promise in predicting healthy aging, changes in cognitive and physical function, survival and age-related diseases like heart disease, stroke, type 2 diabetes, and cancer.”

Paola Sebastiani, professor of biostatistics, and Thomas Perls, professor of medicine at the School of Medicine and director of the New England Centenarian Study, led the study.

“Many prediction and risk scores already exist for predicting specific diseases like heart disease,” Sebastiani said. “Here, though, we are taking another step by showing that particular patterns of groups of biomarkers can indicate how well a person is aging and his or her risk for specific age-related syndromes and diseases.”

Perls said the study is an example of the usefulness of “big data” and the emerging research fields of proteomics and metabolomics: “We can now detect and measure thousands of biomarkers from a small amount of blood, with the idea of eventually being able to predict who is at risk of a wide range of diseases—long before any clinical signs become apparent.”

Recent studies show that, in addition to biology, lifestyle factors play a key role in wellness and longevity. An analysis by SPH researchers and colleagues revealed that older adults with the healthiest lifestyles could expect to spend less time disabled at the end of their lives, compared to their unhealthiest counterparts.

“We are not discounting the role of factors like income and chronic conditions,” Jacob emphasized. But by urging healthy lifestyles, “we may still be able to reduce the public health burden due to disability as more adults reach old age.”

The study participants were assessed for various lifestyle factors, including smoking habits, alcohol consumption, physical activity, diet, weight, and social support systems.

Across all the participants, the average number of disabled years directly preceding death—years when the person had difficulty eating, bathing, dressing, getting out of bed or a chair, or walking around the home—averaged 4.5 years for women and 2.9 years for men.

“Recent studies show that, in addition to biology, lifestyle factors play a key role in wellness and longevity. An analysis by SPH researchers and colleagues revealed that older adults with the healthiest lifestyles could expect to spend less time disabled at the end of their lives, compared to their unhealthiest counterparts.”

“Here, though, we are taking another step by showing that particular patterns of groups of biomarkers can indicate how well a person is aging and his or her risk for specific age-related syndromes and diseases.”
Opioid Users Understand Risks of Benzodiazepines, But Need Strategies To Stop Dual Use

BENZODIAZEPINE (BZD) USE among people with opioid use disorder is common and a major contributor to the overdose epidemic. But according to a study led by an SPH researcher, while most users understand the risks, many lack the motivation and strategies to quit BZDs.

In a study published in the Journal of Substance Abuse Treatment, a team of researchers surveyed more than 470 patients who initiated inpatient opioid detoxification and identified nearly half who reported also using benzodiazepines. BZD users were significantly more likely to be female, use concurrent substances, and report past year overdoses.

The study found that overall, nearly all BZD users endorsed “accurate beliefs” that benzodiazepines increase the risk of overdose and can be addictive. Study participants “were nearly universally aware that BZDs can be addictive, muddle one’s thinking, cause fatigue and driving accidents, contribute to overdose risk, and, if halted, produce withdrawal symptoms.”

However, the authors said that BZD users were less likely to believe that BZD use was associated with worsening depression, and that use interfered with methadone or buprenorphine treatment—despite evidence that BZD use negatively affects those outcomes. BZD use is a marker for psychiatric symptoms and mental health and addiction severity, and users entering treatment with unaddressed mental health problems are especially vulnerable to poor retention and treatment failure.

Lead author Michael Stein, chair and professor of health law, policy & management, said, “It’s been very difficult to develop effective interventions to reduce the use of BZDs by persons with opioid use disorders, but it’s a critical piece of the epidemic of overdose deaths,” and novel therapies for BZD misuse “should be one of the targets of research in our efforts to curtail the overdose epidemic.”
We had thought that the children who were spared transmission might have dodged the bullet, but it seems, instead, that some portion of them are more susceptible to illness and death. We don’t really know why, and given the serious health outcomes, we need to find out. —DONALD THEA, PROFESSOR OF GLOBAL HEALTH

GLOBALLY, there’s been dramatic progress over the last 15 years in reducing mother-to-child transmission of HIV, from a rate of more than 25 percent to less than 5 percent.

But according to an SPH-led study published in the journal AIDS, as one public health crisis has been addressed, another has emerged—children exposed to HIV, but not infected, have a 70 percent increased risk of dying, often within the first two years of life. Led by global health instructor Alana Brennan (SPH’15, ’17), the research team conducted the first-ever meta-analysis of more than 20 studies that have been done over the last 15 years on mortality among HIV-exposed children, many of them in sub-Saharan Africa. Nearly all of the studies showed a higher risk of mortality among young children born to HIV-infected mothers than among their non-exposed counterparts. The researchers said that while the exact reasons for the elevated risk remain unknown, they may include a combination of biological and social factors, including immune dysfunction in the child because of an abnormality passed on by an HIV-infected mother, poorer maternal health that impacts the quality of infant care, unrecognized non-HIV infections passed from the mother, side effects of HIV medicines given to the mother, and increased preterm or low birth weight outcomes for HIV-positive women.

“We had thought that the children who were spared transmission might have dodged the bullet, but it seems, instead, that some portion of them are more susceptible to illness and death. We don’t really know why, and given the serious health outcomes, we need to find out.” —DONALD THEA, PROFESSOR OF GLOBAL HEALTH
HOW WE SEE IT.

Public health leaders share perspectives on today’s challenges and opportunities.

PUBLIC HEALTH is about creating the social, economic, political, and cultural conditions that make people healthy. Academic public health does this in three ways: We generate the knowledge that informs the political, cultural, and economic conversation; we train the next generation of students to know how to use that knowledge; and we engage.

We engage in translating our knowledge, making sure our knowledge doesn’t just sit on the shelf, and we engage in the broader political, economic, and cultural conversation.

And in more troubling times—like the ones we’re in right now—academic public health plays a more assertive role.

We should continue to generate knowledge and educate the next generation of students, but we should also take the steps necessary to make sure that our work is clearly and widely accessible—make sure that the broader conversation is about awareness of what it takes to generate health, and what we are doing that might be harming health today and 10 years from now. I think that is why academic public health plays a role now more than ever.

We reached out to some of the leading deans and directors, past and present, from schools and programs of public health around the country to ask them how they believe we should advance public health in an unsettled climate. Here are their answers.

SANDRO GALEA
In challenging times, the way we train our students to express what they know is right, and correct, and meaningful is critically important. We need to make sure that there are policies and perspectives that understand the health problems in multiple looks from multiple perspectives, not just microbiology and not just mathematics, but the social sciences, the political sciences, and the humanities. If we are going to be the only developed country in the world that does not insure its population and public health people don’t speak up, who will?

The field has been built on diversity, inclusion, and the value of prevention and what kind of investments need to be made to avoid human illness. [Public health] requires multiple looks from multiple perspectives, not just microbiology and not just mathematics, but the social sciences, the political sciences, and the humanities. If we are going to be the only developed country in the world that does not insure its population and public health people don’t speak up, who will?

The first thing public health can do in times of uncertainty is to continue to do something that public health has always done, and that is to reveal the truth about what drives population health. It is the unpredictability of our world that makes it so fascinating. That is what drives us in public health. We in public health can’t continue to act as if we are working at the local and community levels. It’s our job to be curious, practical problem solvers. It’s our job to be curious, practical problem solvers.

We need to have a truly global approach linking domestic and international issues, and find solutions together. Public health embraces the challenge of ensuring that those without the time, or voice, or resources to advocate for their own needs will still get their needs met. We see you, and we are here for you.

We believe in educating the average American about the value of prevention and what kind of investments need to be made to avoid human illness. As some public health advances are being challenged, we need to step up and have our voices heard by state, federal, and international policymakers. We need to make sure that there are policies and perspectives that understand the health problems in multiple looks from multiple perspectives, not just microbiology and not just mathematics, but the social sciences, the political sciences, and the humanities. If we are going to be the only developed country in the world that does not insure its population and public health people don’t speak up, who will?

We have issues that relate to people who are marginalized and disadvantaged, and it is our goal and our mission to help to ensure their health as well as the health of the greater community. We in public health can’t continue to act as if we are working at the local and community levels. It’s our job to be curious, practical problem solvers. It’s our job to be curious, practical problem solvers. We have issues that relate to people who are marginalized and disadvantaged, and it is our goal and our mission to help to ensure their health as well as the health of the greater community.

We should approach issues from a nonpartisan perspective, letting science, data, and facts inform and shape discussions, but with openness and empathy. Public health embraces the challenge of ensuring that those without the time, or voice, or resources to advocate for their own needs will still get their needs met. We see you, and we are here for you.

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Professor Receives Prestigious BU Teaching Award

IF SOPHIE GODLEY (SPH’17), clinical assistant professor of community health sciences, gets her way, undergrads who previously planned to study engineering or medicine will instead consider careers in the far less lucrative field of public health after taking a class with her.

“I want to change their minds,” she says. “I have always felt that my not-so-secret agenda in all of my courses has been to ignite a passion for the subject in my students.”

Godley’s ability to inspire students earned her a 2017 Metcalf Award for Excellence in Teaching, one of the University’s highest teaching accolades, which she received at the University’s 144th Commencement in May. The award is the latest in a string of honors she has received as an educator, the most recent an SPH Excellence in Teaching award last year and the Norman A. Scotch Award for Excellence in Teaching in 2014.

In a letter recommending Godley for the Metcalf, Sandro Galea, dean and Robert A. Knox Professor, called her a “superb teacher…innovative, passionate, engaging, clear, and organized.”

Godley says her teaching is inspired and motivated by her work with impoverished and marginalized communities—she has been deputy director of the Massachusetts AIDS Action Committee and director of the Massachusetts Department of Public Health Office of Sexual Health and Youth Development, and is currently a consultant with ROCA, Inc., a performance-driven anti-poverty and anti-violence nonprofit in Chelsea, Massachusetts—and points out, “The mission of public health is to work with vulnerable communities and work with those who are the most disadvantaged. That’s our whole business; that’s why we exist.”

The Activist Lab: Theory into Practice

AFTER OUTLINING the kind of activist practice agenda a mission-driven school of public health should have, SPH launched the Activist Lab in 2016. Representing a dynamic way to operationalize public health practice, the lab works as a catalyst between SPH and the community to engage with partners in model programs, drive policy and system improvements, and inspire public health leadership.

According to Harold Cox, associate dean for public health practice, the Activist Lab aims to do three things. The first is to educate through university learning and workforce training programs to develop and maintain a skilled public health workforce, including running three major state and federally funded training centers and integrating advocacy training into the SPH community and curriculum. Secondly, the lab works to innovate by engaging local partners to find effective solutions to challenging urban public health issues, including helping residents of the Lower-Camden Housing Development in Boston’s Roxbury neighborhood access health and wellness programs at the nearby Blackstone Community Center. And finally, the lab advocates for better population health by championing smart, enduring policies around issues like gun violence and housing.

“Now more than ever, we must educate ourselves about contemporary issues and participate fully in solutions to those problems,” Cox said. “We must also teach current and future leaders how to advocate about social issues, and speak out for marginalized individuals whose voices are often misunderstood or not heard at all.”
According to a study co-authored by SPH researchers, people who are obese or overweight at some point in their adult lives have an elevated risk of death from cardiovascular disease and other causes.

In a weight-related study in the Annals of Internal Medicine by SPH and the Harvard T.H. Chan School of Public Health, researchers found that those with a maximum body mass index (BMI) in the overweight or obese categories were at elevated risk for all-cause deaths, as well as deaths from cardiovascular disease, cancer, and respiratory disease. The highest risk for death occurred among participants who had significant drops in weight, which the authors said most likely reflected unintentional weight loss caused by illness.

Several prior studies have indicated that people who are overweight have a lower risk for death than those of normal weight, and usually measured BMI at one point in time and then collected information on whether participants were alive several years later.

Study co-author Andrew Stokes, assistant professor of global health, said that looking at weight history over a longer time shows a different association with risk for death than when using a single weight measurement at one point in time: “Having a history of being overweight or obese is linked to an increased risk for death from any cause.”

He also stressed that looking at weight across time reverses the “paradoxical association” between excess weight and mortality—from one that might appear protective to one that is harmful.

“Prior studies showing an association between overweight people and lower mortality carried the risk of reverse causation bias—in other words, the conditions leading to death are what might have caused the lower BMI, rather than the lower BMI causing death. By using maximum BMI in the context of an extended weight history, we were able to address the problem of reverse causation.”
Introducing Public Health Post

SPH LAUNCHED PUBLIC HEALTH POST (PHP) in fall 2016 as a core part of the School’s effort to use communication to improve the health of populations. Through its anchor news site publichealthpost.org, PHP engages policymakers, journalists, academics, and students who can effect change on a local, state, national, and global scale.

Led by David K. Jones, editor in chief and assistant professor of health law, policy & management, a team of student fellows produces original articles on everything from vehicle safety to gun violence to life after torture. Guest writers and profiled individuals have shared their unique insights from different fields, across the political spectrum, and around the world—including former Kentucky Governor Steve Beshear, Vox Senior Editor Sarah Kliff, Boston Police Commissioner William Evans, and Senegalese LGBT advocate Djamil Bangoura.

“It is exciting to publish a new story on public health policy every single weekday, pushing the conversation on important issues,” Jones said. Seeing the graduate student fellows grow as they work on PHP is gratifying to him, too: “Some have already been hired for jobs they probably could not have been before this fellowship.”

A digital portal housing numerous flexible educational resources, PHX is designed to connect public health professionals and new groups of learners from a wide array of disciplines with resources to update their skills and deepen their understanding of today’s pressing population health issues.

In summer 2017, PHX hosted its newly established Summer Institute, a robust program of 16 short courses on campus led by field experts from the School’s faculty and beyond.

PHX also offers year-round learning opportunities led by outstanding faculty and researchers both online and on campus, interactive online courses, custom programs, interactive case studies from the integrated core curriculum, webinars, podcasts, and much more.

According to Leslie T Tellalian, director of lifelong learning, PHX taps into the core mission of the School. “Our faculty have been incredibly engaged in developing channels to support continued professional development,” she said. “We invite everyone to share in this dynamic endeavor.”
IS JUSTICE CRUCIAL TO HEALTH?

PUBLIC HEALTH has, for this reason, long been shaped by its engagement with promoting justice. We have historically committed to reducing a range of inequities, mobilizing the universal drive for justice toward the narrowing of health gaps. Tackling the foundational causes of these problems means working for justice. So how might a call for shared justice, coupled with an approach to economic justice as a core motivation for public health, help us bridge the divides that can stymie efforts to create a healthier society?

A GREAT MANY OF THE WORLD'S
PUBLIC HEALTH PROBLEMS
STEM FROM UNDERLYING INJUSTICE;
FREQUENTLY ECONOMIC.
Economic justice has been defined as “a set of moral principles for building economic institutions, the ultimate goal of which is to create an opportunity for each person to create a sufficient material foundation upon which to have a dignified, productive, and creative life beyond economics.” An economic justice argument focuses on the need to ensure that everyone has access to the material resources that create opportunities in order to live a life unencumbered by pressing economic concerns. Definitionally, this recalls the broader view of health expressed by the World Health Organization: “A state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity.”

Although there is a robust academic debate about the exact architecture of the income and health relationship, there is little doubt that economics fundamentally drive a broad range of factors, including health. This would suggest that a focus on economic factors as foundational to the production of health stands to be both a rational investment in the drivers of population health and well-being and, potentially, a focus for collective efforts toward creating a better world. Unfortunately, efforts to tackle income and economic drivers often get tangled in ideological discussions, in clashes around visions for an economy that is driven principally by individual efforts versus government investment. This argument, while perhaps relevant at a political level, stymies efforts to improve our foundational economic function toward the end of creating healthier populations.

These efforts entail the often frustrating task of working within systems to effect change. This can open us to charges of partisanship. But health is inherently political. Hence, the utility of a shared-justice approach—of our potential to unite a range of constituencies by speaking to a common human need for justice, dignity, and health.

Throughout history, we have seen the power of a shared-justice focus to ignite, and unite, social movements. Public health is uniquely suited to mobilize all those who wish to be well—a potentially vast coalition—in pursuit of a healthier, more just world.

The degree to which justice—both shared justice and economic justice—informs how we structure our society is also, more often than not, the degree to which members of our society can expect to live full, productive lives, free from the burden of disease. The clearer we can make this, the more effectively we can pursue health efforts toward creating a better world. Unfortu-

According to the US Congressional Budget Office, the aggregate family wealth in this country was $67 trillion in 2013. At the time, families in the top 10 percent of the wealth distribution controlled 76 percent of this wealth. This is a significant increase from 1989, when families in the top 10 percent controlled 67 percent of the nation’s family wealth. Meanwhile, the share of the wealth controlled by families in the bottom half of the country’s wealth distribution declined during that period from 3 percent to 1 percent.

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<th>Year</th>
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A candidate transacting gene associated with homocysteine levels: HNPP and PTVS.


A Low-Frequency Variant in NGFR Is Associated with Cigarette Smoking Initiation and Progression of Chronic Obstructive Pulmonary Disease.


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