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Bridges

WINTER 2015-2016

COEH faculty member **Rachel Morello-Frosch's** chemical exposure and breast cancer study targets San Francisco's female fire fighters. The story begins on page 8.

Smoking Prevalence Drops as Wages Rise



A new study from UC Davis finds wage increases are associated with lower smoking prevalence, particularly for male workers and those with a high school education or less.

The study concluded that a 10 percent increase in wages is associated with about a 5 percent reduction in smoking prevalence among men who have high school educations or less. Wage increases during the study period improved the chances of workers quitting the habit by up to 3.4 percentage points, reported researchers Juan Du and COEH faculty **J. Paul Leigh**, professor of public health sciences and researcher with the Center for Healthcare Policy and Research.

Published in the August 2015 issue of the *Annals of Epidemiology*, the study demonstrated that low wages lead to

more smoking, providing additional evidence that lower income contributes to poor health habits. "Our findings are especially important as inflation-adjusted wages for low-income jobs have been dropping for decades and the percentage of workers in low-paying jobs has been growing nationwide," Leigh said. "Increasing the minimum wage could have a big impact on a significant health threat."

The national study drew data on wages, smoking status, and state of residence for full-time workers aged 21-65 years from the Panel Study of Income Dynamics from 1999 to 2009. Researchers restricted their study sample to those who smoked during the study period or when they were younger. On average, 52 percent of the sample smoked in any given year.

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Winter 2015-2016 Letter from the Director



John R. Balmes

Reviewing this issue of Bridges, it strikes me that it does a great job of highlighting the impressive contributions of women. To begin, we feature two stories related to women in a traditionally male-dominated field. Fire fighting is one of the world's oldest professions – dating back to Ancient Egypt – and it remains a difficult and dangerous job. There are two main types of firefighters, structural and wildland, and this issue of *Bridges* features stories about both.

The first story (found on [pages 8-9](#)) is about women structural firefighters and their exposure to chemicals that may increase the risk of breast cancer. Why do we have to be concerned about chemical exposures during structural fire fighting? Don't firefighters wear self-contained breathing apparatus (SCBAs) for their protection? Yes, but they often take off their SCBAs during the mop-up and tear-down phase of fighting a fire. It is an unfortunate practice because during mop-up and tear-down, exposures to toxic chemicals may be greater than during the primary fire fighting effort. There is relatively complete combustion when the flames are high whereas, during mop-up, smoldering materials are characterized by incomplete combustion leading to pyrolysis products that may be carcinogenic. Other sources of firefighter exposures to hazardous chemicals are the foams used to fight certain fires and fire engine diesel exhaust.

Several years ago two UC Berkeley Environmental Health Sciences graduates, **Megan Schwarzman** and **Sarah Janssen**, were supported by a grant from the California Breast Cancer Fund to investigate and list chemicals for which there is evidence of a link between exposure and increased breast cancer risk. Their work, the Breast Cancer and Chemicals Policy Project (coeh.berkeley.edu/greenchemistry/cbcrp.htm), listed over 200 chemicals for which there is animal evidence of mammary cancer risk. Based on this list, it is reasonable to be concerned about the breast cancer risk of women structural firefighters.

To address this concern, COEH faculty member **Rachel Morello-Frosch** teamed up with San Francisco women firefighters to conduct a novel bio-monitoring study, again funded by the California Breast Cancer Fund, that will screen for exposure to over 700 compounds. As is often the case with a Morello-Frosch study, the firefighters themselves have been involved in the study design. I look forward to seeing their findings – I think they will have a major impact on how best to protect all structural firefighters, not just those who are women.

The second story (found on [page 10](#)) involves the exposures of wildland firefighters, some of whom also happen to be women, including the featured firefighter in the story, **Kathleen (Kat) Navarro**. In full disclosure, Kat is my doctoral student, but nonetheless I am in awe of her courage and physical endurance. When she told me that she wanted to study the exposure of wildland firefighters to ambient polycyclic aromatic hydrocarbons (PAHs), I had no idea that she would end-up undergoing difficult training to become a certified US Forest Service firefighter.

Monitoring ambient exposures of wildland firefighters is extremely important because, unlike structural firefighters, they cannot wear effective respiratory protective gear since no such gear currently available is practical. US Forest Service "Hotshot" crews like those Kat works with have to hike to fires over difficult terrain carrying heavy packs of equipment and have to spend long hours on the fire lines. SCBAs that weigh 25 pounds when their tanks are full only last for 30 minutes or so and clearly cannot be used by wildland firefighters. In other words, these

firefighters who put themselves at great risk to protect our forests and adjacent homes have no protection from inhalational exposure to fire smoke.

Wood smoke consists of toxic gases and carbon particles that have complex hydrocarbons on their surfaces, some of which are carcinogenic. Moreover, with climate change we can expect more catastrophic wildfires and thus more exposure of wildland firefighters. The fact that we have not yet discovered an effective way to provide respiratory protection to wildland firefighters is a glaring gap in occupational safety and health.

Continuing with the theme of women's contributions, [pages 12-13](#) features three of our COEH graduates who are taking leading roles in academia. We are proud of **Rachel Jones**, **Dana Drew-Nord**, and **Sa Liu**, and pleased that they are helping to fulfill the COEH mission of training and inspiring future generations of leaders in occupational and environmental health.

Our student internship profiles feature women's leadership around the world, including **Amee Reval's** work with the Indian Institute of Public Health in Ahmedabad, Gujarat ([page 6](#)) and **Dawn Surratt's** work with the National Guestworker Alliance in New Orleans ([page 11](#)). And of course, it is always inspiring to see up-and-coming women leaders such as those involved in LOHP's Teens Lead @ Work Program ([page 14](#)).

2 OCCUPATIONAL & ENVIRONMENTAL MEDICINE SYMPOSIUM

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Smoking Prevalence Drops as Wages Rise

continuing from page 1

The researchers showed that, for women, smoking rates were not affected by wages, suggesting that wage and smoking correlations are stronger for men than for women. The study also took into account other family income that might confound the analyses, but found additional income sources had no effect on the results. The authors are not aware of any previous studies "that specifically address the separate effects of an individual's wages versus all other income."

Du and Leigh's findings result from the novel use of a statistical model traditionally employed in economics called instrumental variable analysis, which is designed to simulate a randomized, controlled medical experiment. To their knowledge, the technique has not appeared in studies of the effects of wages on smoking.

According to the American Heart Association, smoking is the most preventable cause of death in the United States. Du and Leigh note that, given the well-known associations between smoking and health insurance premiums as well as between smoking and productivity, their study gives employers incentive to pay higher wages to reduce smoking incidence among their workforce.

The study received funding from the National Institute for Occupational Safety and Health.

Read the UC Davis press release: <https://www.ucdmc.ucdavis.edu/publish/news/newsroom/10250>.



LOHP offered an introduction to the new Total Worker Health™ (TWH) initiative at COEH's 2015 Summer Institute in July 2015. A relatively new concept introduced by the National Institute of Occupational Safety and Health, TWH integrates workplace injury and illness prevention programs with workplace health promotion.

NIOSH defines Total Worker Health as "policies, programs, and practices that integrate protection from work-related safety and health hazards with promotion of injury and illness prevention efforts to advance worker well-being." The goal is to focus on the whole worker by addressing both job-related and lifestyle issues that shape worker wellness.

"Many traditional wellness programs focus exclusively on behavioral issues – trying to get people to eat right or exercise more, stop smoking – all of these are valuable and important. But the one thing they're missing is the contribution of objective and structural issues that influence people's health," says **Laura Stock**, director, LOHP. "Do you have access to fresh and healthy food? Do you live in a community where it's safe to get exercise? Are you exposed to hazardous conditions at work? Our perspective is not to focus interventions solely on individual choices, but to look at the conditions in which people are living and working, which are the major determinants of health."

In keeping with its mission, LOHP is looking at how these programs impact low wage, vulnerable workers. "That's one thing that we're trying to bring to this discussion," says Stock. "We know that, in many cases, workers or the unions that represent them have a lot of resistance to wellness programs that seem to blame workers exclusively for their ill health, while not simultaneously trying to improve or to control exposures in the workplace that contribute to their health status. Acceptance will increase if it goes hand-in-hand with

an employer commitment to improve working conditions."

The TWH course offered by COEH's Summer Institute was designed for industrial hygienists, ergonomists, union representatives, human resource managers, OSH committee members, and workplace wellness coordinators. The lead instructor Laura Punnett, Professor of Work Environment, University of Massachusetts Lowell, is a leader in developing TWH programs and the co-director of Center for Protection of Health in the New England Workplace. Participants ranged from highly resourced institutions like Kaiser Permanente to smaller organizations that might find it more challenging to find the resources to address health risks associated with unhealthy working conditions, according to Stock.

LOHP's Healthy Jobs Initiative aims to promote a comprehensive approach to occupational health by examining the structure of jobs. LOHP defines a healthy job as one that provides a living wage, protects against workplace hazards, supports healthy lifestyles, limits stress, provides reasonable workloads, and is free from harassment and discrimination. As part of this initiative, LOHP will begin partnering with interested organizations to explore ways of integrating occupational health and wellness in the workplace towards the goal of promoting healthy jobs.

LOHP has also recently become a member of the NIOSH Total Worker Health Affiliate Program whose mission is to foster integration of worker health protection and health promotion through collaborations with public and not-for-profit organizations.

Learn more about LOHP's Healthy Job Initiative: <http://lohp.org/healthy-jobs-initiative>

Visit NIOSH to learn more about TWH: <http://www.cdc.gov/niosh/twh/total-health.html>

Musculoskeletal Injury Prevention: A New Digital Story Series Educates Dental Hygienists



A still image taken from Video 1: Introduction to Musculoskeletal Disorders.

For dental hygienists, spending hours treating patients in a stooped posture while forcefully gripping hand tools can aggravate muscles and joints of the back, neck, shoulder, arm, and hand. If ignored, occasional symptoms of stiffness and pain may lead to career-ending chronic injury, according to the California Department of Public Health (CDPH).

To prevent or reduce musculoskeletal disorders (MSDs), COEH faculty

David Rempel, in partnership with the California Dental Hygiene Association and the Occupational Health Branch of the CDPH, launched an innovative 'Digital Story' series for dental hygienists. The course focuses on common MSDs and their causes, how hygienist and patient positioning can prevent injury, and how to select dental instruments that will help alleviate pain.

Registered dental hygienists in the state of California can earn Continuing

Education credits by completing a home-study course of the series called, "Dental Hygiene Work: Pain is NOT in the Job Description."

Learn more by visiting the University of California's Ergonomics program website: <http://ergo.berkeley.edu/research>

Watch the videos made available by the CDPH: <http://www.cdph.ca.gov/programs/ohb/Pages/ErgonomicsDentalHygiene.aspx#CEUs>

Spotlight on r2p

Roadmap Breaks New Ground

Ambitious academics equate success with publishing breakthrough research in peer-reviewed journals. "Publish or perish," the saying goes. Yet funders, such as NIOSH and CPWR – The Center for Construction Research and Training, which serves as NIOSH's National Construction Center, increasingly emphasize how research needs to reach the hands of real-world end-users.

To bridge the gap, CPWR instituted a Dissemination Roadmap in 2013 in collaboration with COEH and the Labor Occupational Health Program (LOHP) as part of a larger research to practice (r2p) initiative in construction health and safety, led at the time by **Robin Baker**, director, Research to Practice,

COEH. Now, after two rounds of piloting the tool with 25 CPWR-funded projects, LOHP has adapted a version for general industry and is ready to disseminate the Roadmap to construction health and safety researchers as well as others in occupational health and safety who want to kick-start their r2p strategy.

"Research to practice can be so overwhelming to think about," says **Charlotte Chang**, LOHP's coordinator of r2p and evaluation and who works on CPWR's r2p Roadmap team. "Having a tool to help you consider important questions about audiences and dissemination partners, where you want your research to end up, and strategies to get there, is a helpful start."

The Roadmap tool consists of a guidance document and a worksheet. Step by step, the tool helps researchers plan their r2p goals during the research process and breaks dissemination planning into discrete chunks. Research teams are encouraged to work together to map their r2p plans. "We've heard from research teams that this is helpful because it makes sure everyone's on the same page," says Chang.

"With some of our researchers, we are trying to create other tools that will help them plan for the dissemination that makes the most sense for them. For example, CPWR's Data Center research team does a lot of surveillance research. We've made a simplified worksheet for them to really think about their main

Environmental Research Center Awarded to COEH Faculty at UC Davis

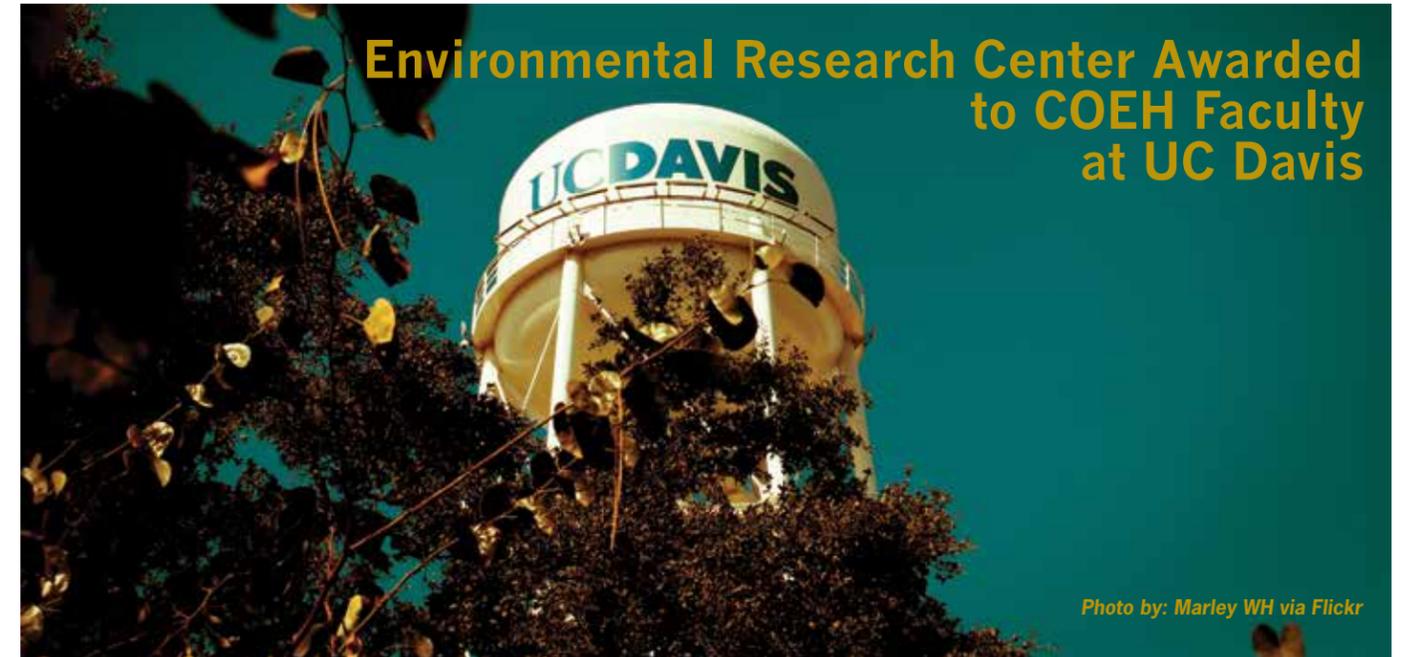


Photo by: Marley WH via Flickr

The National Institute of Environmental Health Sciences (NIEHS) awarded COEH faculty **Irva-Hertz Picciotto** and **Kent Pinkerton** a 5-year, \$8 million grant to fund the new UC Davis Environmental Health Center. The center joins a network of 21 federally funded core centers tasked with addressing the nation's most pressing environmental health issues.

"The inclusion of UC Davis as a new core center brings their unique research facilities, broad collaborations, and community-engagement to our network," said Claudia Thompson, chief of the Population Health Branch at NIEHS. "This important addition will advance NIEHS' goals of promoting state-of-the-art research and understanding how the environment affects people's lives."

UC Davis has scientific experts in four

schools — medicine, veterinary medicine, engineering, and agricultural and environmental sciences — who will collaborate on studies of toxins that affect brain, lung, immune system, reproductive, and metabolic health.

Exposures of special interest, according to Hertz-Picciotto, director of the center, include particles and compounds in ambient air, contaminants and pesticides in drinking water and food, and chemicals in household products or personal-care items. A significant focus will be the San Joaquin Valley.

One of the major strengths of the UC Davis center is that it includes experts in both veterinary and human medicine, along with scientists in the College of Engineering, according to co-director Pinkerton, a specialist in lung biology. That combination gives

human-health researchers unique access to laboratory resources, field studies, and animal models for testing the health outcomes of toxic exposures.

Another focus will be training the next generation of environmental scientists in collaboration with the UC Davis Clinical and Translational Science Center.

"The funding gives us an opportunity to reinvigorate environmental health science," Hertz-Picciotto said. "We are excited about the partnerships we can inspire and the potential for finding answers to the persistent environmental problems that are impacting the health of people in our region."

Condensed from a UC Davis press release. Read the press release: <http://www.ucdmc.ucdavis.edu/publish/news/newsroom/10268>

audiences, which are a little bit different than some of the other end-user audiences for interventions that have been developed. Maybe they're not trying to directly reach contractors or workers. Maybe they're really trying to inform government agencies and advocacy groups for impact."

LOHP and CPWR plan to revise and improve the Roadmaps as they continue to receive feedback from participating research teams.

Learn more about both the General Industry and Construction Industry Dissemination Roadmaps at <http://lohp.org/research-to-practice-r2p-roadmap> and <http://www.cpwr.com/research/r2p-tools-roadmaps> or contact Charlotte Chang at cychang@berkeley.edu.

"The roadmap tool helped us identify the principle components necessary for developing a dissemination

plan for our research. It provided a conceptual framework that helped us identify the key audiences. When we used it I was struck by how we changed our approach and even our language based on simply identifying the key audience for our research."

Jack Dennerlein, Professor, Department of Physical Therapy, Movement & Rehabilitation Science, Northeastern University

Investigating Health Issues in a Global Context

Every summer COEH graduate students step out of the classroom and into the field to collect data for their thesis projects. Many travel to foreign continents for the first time – enhancing their understanding of how cultural, social, and environmental factors play into global health.



Dr. Priya Dutta from IIPH-G and Ameer Raval administering a questionnaire to a study participant.

study site – quantitative data Raval will analyze as part of her thesis. She also administered base-line and biweekly questionnaires to investigate heat-related symptoms, local adaptation strategies, and barriers associated with strategies to confront heat.

Currently, the research team is comparing the WBGT and personal temperatures collected during the pilot with city temperature data captured by the Indian Meteorological Department.

They are also analyzing the questionnaire data to in order to make

After experiencing the intensity of congested traffic junctions in a rapidly urbanizing city like Ahmedabad, Raval says she left with an immense amount of respect, gratitude, and concern for the police officers that work in these environments every day. “The combination of extreme summer heat, smoky air pollution, and loud noise from honking creates a dangerous and stressful work environment that has significant implications for the officers’ health and well-being,” says Raval. “It is crucial that our findings are linked with policy recommendations to expand protective gear and cool-

Ameer Raval, a graduate student in the UC Berkeley Industrial Hygiene and Global Health and Environment program, led a pilot study assessing environmental heat exposures among a cohort of traffic police at four traffic intersections in Ahmedabad, Gujarat (India). These workers are particularly susceptible to heat stress because of their uninterrupted sun exposure in a hot climate – temperatures average over 100°F during the summer months.



Wet-bulb globe temperature (WBGT) Monitor up-close at Pakwan Traffic Junction.



Dr. Abhijant Tiwari from IIPH-G taking infrared photos of study site.

For the past several decades, India has experienced an overall increase in heat waves accompanied by an increase in heat-related deaths, Raval reports. In May 2015, over 2,000 died during what is considered the fifth deadliest heat wave in history.

Her research, a joint project between the Indian Institute of Public Health, Gandhinagar, and the Natural Resources Defense Council involved measuring weekly heat exposures among traffic police using a wet-bulb globe temperature (WBGT) area monitor as well as personal monitoring. The project team also captured infrared photos of heat-emitting sources at each



Ameer Raval measuring height of a study participant.

recommendations to Ahmedabad City Police’s Traffic Commissioner related to personal protective equipment and uniform improvements.



Helmet Circle Traffic Junction has a designated office area for shade and water. WBGT monitor placed on lefthand side of the office.

ing resources by the City Traffic Department.”

Raval’s fieldwork was made possible through COEH’s Suzanne Llewellyn Student Award, which funded her research costs as well as travel and living expenses.



An advertisement near the 880 highway showing the full body exoskeleton.

Logan Van Engelhoven flew to Tokyo and Fukuyama, Japan, to investigate methods to reduce the risk of injury to the shoulder joints during overhead tool manipulation.

Van Engelhoven’s project is part of a COEH NIOSH-funded grant that is creating a full body exoskeleton to relieve stress in the injury prone joints of industrial workers, specifically the shoulders, low back, and knees. The project is collaboration

with UC Berkeley and US Bionics. Van Engelhoven, a PhD student in Mechanical Engineering, is working on the arm module of the exoskeleton.

In Japan, he observed and interviewed workers to determine how they can benefit from exoskeleton technologies. Based on worker feedback, he plans to refine and add functionality to the device, particularly to protect the elbow joint during lifts.

The experience had a lasting impression. “It is very important to observe the workers in their own environment to properly understand what exoskeletons must be capable of in the future and to make the maximum positive impact in people’s lives,” says Van Engelhoven.

To learn more about the project, visit <http://www.usbionics.com/modular-agile-exoskeleton-max>.

This year **Graham Flitz** travelled to Chikwawa, a town in Southern Malawi, to participate in the *Adult Lung Health Study*, which is an investigation of whether a cook stove intervention can reduce the prevalence of chronic obstructive pulmonary disease (COPD), a major cause of illness and mortality in areas of the world that rely on biomass fuels for cooking and heating.

data to Flitz’s computer database for analysis.

His study also involves validating the air monitors to ensure data integrity in collaboration with **Kirk Smith’s** lab at UC Berkeley and with **Suzaynn Schick** of UCSF. In November, Flitz returned to Malawi to test that the monitors work the same in the field as they do in a laboratory setting.

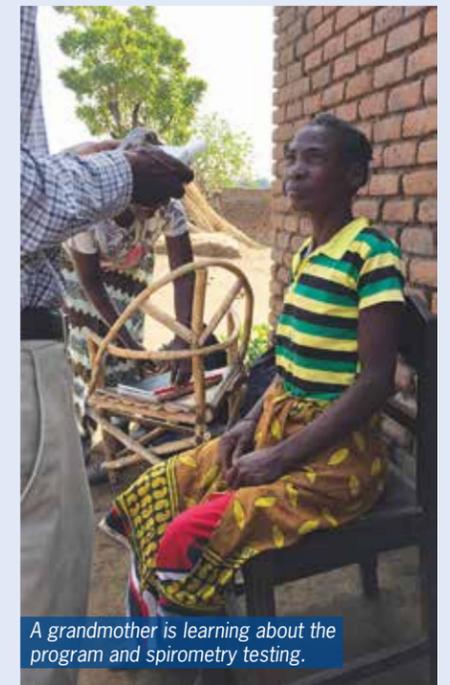
The study builds on two research projects out of the United Kingdom – the *Cooking and Pneumonia Study* and the *rural Burden of Lung Disease* study on which **John Balmes** is collaborating. Flitz, a master’s student in the UC Berkeley Global Health and Environment program, accompanied research teams to remote villages in Malawi where over 1,200 residents were recruited for the studies.



Helping reduce COPD for the future generations in Malawi.

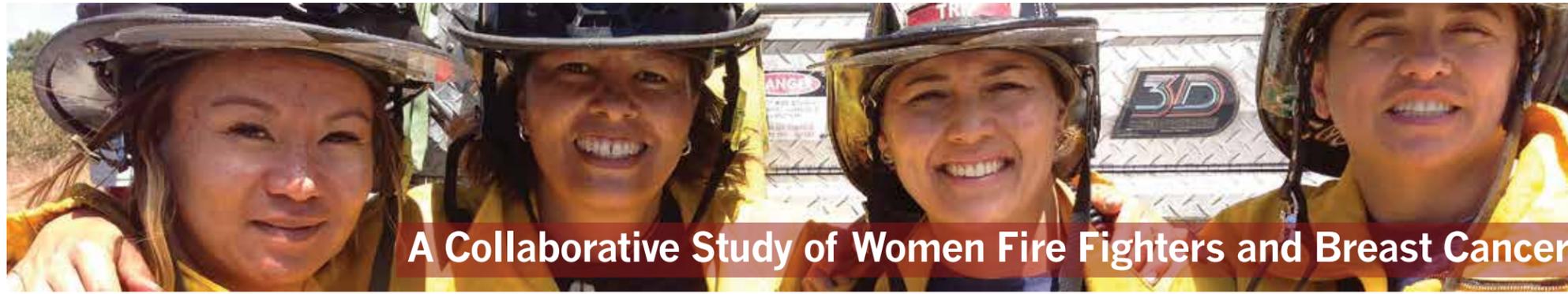
After measuring lung function and administering a questionnaire on lung health and living conditions, researchers gave participants a backpack with an air monitor to wear for 48 hours. Two days later, they picked up the monitors and download the

“It has been eye opening to measure just how big of an impact cooking can have on lung health,” says Flitz. “In Malawi, where cooking is done outdoors, the data is showing that villagers are being exposed to levels of PM_{2.5} well above what is considered



A grandmother is learning about the program and spirometry testing.

safe. Applying this thinking globally, it is clear that household cooking is a major contributor to lung disease. As the study continues, it will be important to see how much clean cook stoves are able to reduce the risks rural villagers face from such a basic human activity.”



A Collaborative Study of Women Fire Fighters and Breast Cancer

With 225 women on the force, the San Francisco Fire Department stands out as a leader in the nation for recruiting females in a field vastly under-represented by women. But within this tight community, leaders from the United Fire Service Women and the San Francisco Firefighters Cancer Prevention Foundation recently became concerned about a perceived increased risk of premenopausal breast cancer among its ranks.

They reached out to COEH faculty **Rachel Morello-Frosch** and researchers from the Silent Spring Institute, UCSF, as well as environmental health advocates Commonweal and the Breast Cancer Fund. The result is the first-ever community-led health study exploring associations between women fire fighters' chemical exposures and breast cancer.

Morello-Frosch, professor, UC Berkeley Department of Environmental Science, Policy, and Management in the School of Public Health, says even though the San Francisco Fire Department has one of the highest number of women in the force, the population is small for a health study aimed at detecting a relationship between breast cancer and job-related exposures.

After much discussion, the team decided to conduct a chemical biomonitoring study that uses traditional methods combined with a novel, discovery-driven approach called non-targeted analysis or general suspects screening. Targeted biomonitoring requires a priori selection

of chemicals to study, which limits the number of chemicals that scientists can measure in a study population. However, non-targeted analysis enables scanning of human tissue samples (e.g. serum



SFFD Engine 14 crew members: Firefighter/Paramedic Holdcroft, Captain Paratley, Firefighter Minogue-Reidy, and Firefighter Jensen.

and urine) from study populations to identify novel chemicals and metabolites that have not yet been previously studied. According to Morello-Frosch, this discovery-driven approach to human biomonitoring for environmental chemicals facilitates the selection of novel compounds for confirmation and quantification based on a general suspect screen that yields concrete and unprecedented information about their likelihood of detection in a study population. More than 200 chemicals have been shown to cause mammary tumors in animals, according to the Breast Cancer and Chemicals Policy Project, and with this innovation, researchers can screen for over 700 compounds.

Levels of confirmed compounds will be compared between women firefighters and a group of female civilian workers.

The health risks of the polybrominated diphenyl ether flame retardants, or PBDEs, are well established, but the team is also examining levels of certain flame

Photo: SFFD firefighters on a wildland deployment. Firefighter/Paramedic Estevez-Reis, Firefighter/Paramedic Johnson, Lieutenant Triplitt, and Lieutenant Mathews.

retardants that are likely substitutes for the ones that have been phased out in California. "This non-targeted approach can also facilitate discovery of certain chemical substitutes that we may not know about, in part because industry and manufacturers are not required to disclose what they put in our consumer products," says Morello-Frosch.

The study team will examine other occupational factors – such as night shift work and chronic stress. They will also measure biomarkers including, disruption of thyroid hormones (that regulate the body's metabolic functions); lower levels of melatonin (a hormone that regulates sleep/wake cycles); and changes in telomere length (a biomarker of cellular aging). "There are studies that suggest that women who do shift work, like the graveyard shift, have an increased risk of breast cancer, so we thought it was important to look at this as a primary exposure of interest," says Morello-Frosch. "We want to examine whether we see differences in melatonin levels in firefighter women compared to non-firefighters who don't do night shift work."

"We're also interviewing women about their perceptions of exposure to chronic stress – either in their jobs or in other aspects of their life. There is a significant amount of literature, although it is by no means unequivocal, suggesting that exposure to chronic psychosocial stress can erode the immune system, potentially enhancing the toxic effects of environmental chemical exposures. We've seen this in studies, for example, of the health effects of air pollution, so we wanted to examine this in our population in relationship to telomere length."

The community-led approach offers insights into occupational hazards women fire fighters encounter that don't always jump to mind. "During a fire event, right after the flames have been extinguished firefighters begin the demolition of a building that has recently

burned. That's the time when some of the exposures can be quite high, and that's also a time when it's not uncommon for firefighters to remove their protective gear and breathing apparatus," says Morello-Frosch.



Firefighter Denise Elarms

"Other concerns are within the fire house itself," Morello-Frosch adds. "A lot of the vehicles are powered by diesel. If there's poor ventilation and an inadequate separation between the living quarters and the equipment room where there are trucks and other vehicles, you could have chronic exposures from some of the equipment. The products they use, such as fire fighting foams, have chemicals of potential concern. And their turnouts (fire fighter uniforms) can contain perfluorinated compounds."

Although the study, funded by the California Breast Cancer Research program, is not going to answer directly whether women in San Francisco face higher breast cancer rates because of chemical exposures on the job, Morello-Frosch says it will elucidate what kinds of compounds appear to be highest in this population. "We can then use these results to think of ways to intervene, in cooperation with the fire department, with occupational safety steps or broader policy changes that could reduce chemical exposures and better protect all firefighters."

Asa Bradman Appointed Chair of Biomonitoring California's Scientific Guidance Panel

COEH faculty affiliate **Asa Bradman** from the UC Berkeley School of Public Health became chair of Biomonitoring California's Scientific Guidance Panel (SGP) effective November 2015. Dr. Bradman has been a member of the SGP since 2007, first appointed by Governor Arnold Schwarzenegger and later reappointed by Governor Jerry Brown.

Dr. Bradman will coordinate with the Office of Environmental Health Hazard Assessment (OEHHA), one of three state departments that implement Biomonitoring California, to facilitate three SGP meetings annually.

"Dr. Bradman is a leading expert on exposure to environmental contaminants, such as pesticides, volatile organic compounds, and flame retardants, in California communities. His research also investigates potential links to health effects in vulnerable populations, including pregnant women and children. He brings a rich and wide-ranging perspective on issues of great importance to Biomonitoring California, and we look forward to working with him as the new SGP Chair," said Dr. Lauren Zeise, Acting Director of OEHHA.

Biomonitoring California measures levels of synthetic chemicals and pollutants in Californians, establishing trends in the levels of these chemicals over time. The program also assesses the success of regulatory programs designed to reduce exposures.

"We know for example, when lead was removed from gasoline, blood lead levels declined in children. Now there's some evidence that, with the reduction of PBDE (polybrominated diphenyl ether) flame retardant use in furniture, body burdens of PBDEs are declining," says Bradman. "California has had

much higher PBDE exposures than any other population in the United States because we've had a fire safety standard that was met using chemicals. Governor Brown supported a revision to those rules in 2014 (Senate Bill 1019) that will maintain fire safety, but also reduce the need for chemicals to meet the standard."



Asa Bradman

"The Scientific Guidance Panel contributes to the list of potential chemicals to monitor," adds Bradman. "We can add chemicals and elevate certain chemicals on the base list to a higher priority. We also provide input on laboratory issues and quality assurance. Importantly, Biomonitoring California is also pioneering strategies to

return individual test results to participants, a provision of SB 1379, the law creating the program. The Scientific Guidance Panel has provided substantial input on this important aspect of the program."

Bradman also serves on the Science Advisory Council for the National Center for Healthy Homes, the California Child Care Regulatory Work Group, and the Eco-Healthy Child Care program of the Children's Environmental Health Network.

COEH affiliates on the nine member Scientific Guidance Panel include **Megan Schwarzman** from the UC Berkeley School of Public Health and **Thomas McKone**, a retired senior scientist at the Lawrence Berkeley National Laboratory and an adjunct professor in the UC Berkeley School of Public Health.

For more information on Biomonitoring California, visit <http://www.biomonitoring.ca.gov>.

Navarro Goes into the Wild to Measure Firefighters' Exposure to PAHs

By anyone's standards, **Kathleen Navarro** a PhD student in the UC Berkeley Industrial Hygiene program, has gone to extraordinary lengths in recent months to collect field data for her PhD thesis. For her study, she is assessing wildland firefighters' exposure to polycyclic aromatic hydrocarbons (PAHs) during fire fighting activities and while off-duty at base camps. Studies show that PAHs, formed by the incomplete combustion of carbon-containing materials such as wood, adversely affect lung function and the cardiopulmonary and immune systems.

But to sample air quality at a wildland fire event, her collaborators at the United States Forest Service required her to first complete Basic Fire Training, a 32-hour course mandatory for all personnel engaged in fireline operations, including emergency firefighters. "Every rookie wildland firefighter goes through the training," says Navarro. "It's four days of eight hours in a classroom. Then the last day you do a field hike to cut a fire line up and down a hill."

She was one of three women in a class of 35. "The training was very much like a boot camp." After returning from morning break on the first day, four people were late. The result? Ten push-ups for every late person. "It spiraled from there," says Navarro. "Every morning and afternoon we'd get quizzed on fire fighting safety and standards. For every wrong question, Monday it was 10 push-ups, Tuesday it was 20, Wednesday it was 30, Thursday it was 40."

"It was literally the hardest thing I've ever done. It tested my mental and physical limits," added Navarro. On the last hike, people were dropping out from the stress, but for Navarro, quitting was not an option. "What it came down to was, I realized if I want to do this project, this is what is required of me. It sparked me to become fully certified as a firefighter."

Qualified as a Wildland Firefighter Type II, Navarro took field samples last summer at the Rough fire in Kings Canyon National Park, which burned 151,623 acres, and the 5,700 acre Willow fire in the Sierra National Forest.

At the wildland fires, Navarro sent out monitors

with different crews and then joined a crew to fight the fire. "I figured I might as well help out and do what I can," explains Navarro. "Also, being out there on a fire line helped me think, if I want to reduce exposure, where in the fire fighting process could I possibly do it? It enabled me to visualize the problem."

Each year thousands of wildland fires burn millions of acres of forest, notes Navarro. As of November 27, 2015, there have been 56,186 fires in the United States affecting 9,798,953 acres. "With climate change and the drought conditions here in California, our fire seasons are going to be getting longer with more fires burning a larger area," says Navarro. "We need to start thinking about the health of the workers fighting these fires in the future."



Kathleen Navarro



Occupational Health Internship Program

Paid Summer Internship Opportunity Gain Hands-On Experience with Workplace Safety & Health Issues

Teams of two students are placed with a union or worker organization to investigate job-related health and safety problems among workers, often employed in an under-served or a high hazard job. Projects are designed to maximize interaction between workers and students.

OHIP is an applied research experience where students learn about the occupational safety and health field from the workers' perspective. Project work emphasizes worker interviews and work site evaluations. At the end of the project, teams provide a "give back" product to the workers and their host union/worker organization, present their project at a national NIOSH video conference, and produce a final report.

Commitment is full-time, including possible evenings or weekends.

Deadline
Friday, February 19, 2016

Compensation
Undergraduate Students = \$4,000
Graduate Students = \$5,200

For eligibility information, contact Elaine El-Askari or Diane Bush with LOHP at 510-642-5507 or visit: <http://www.aoc.org/ohip>.

OHIP Project with the National Guestworker Alliance Aids Shipyard Workers

The Occupational Health Internship Program (OHIP) expanded its reach to New Orleans this past summer with the first-ever study of hazards facing Latino immigrant workers employed in the shipyards of southeastern Louisiana. The National Guestworker Alliance (NGA), the host organization, had established relationships with the workers over the previous year. The NGA and Louisiana Occupational Health and Injury Surveillance (LOHIS) Program provided project oversight and guidance.

OHIP intern **Dawn Surratt** – a graduate student in UCSF's Occupational and Environmental Health Nursing program and her colleague, Adam Kline, a public health undergraduate from Tulane University, conducted 32 quantitative surveys and 12 qualitative interviews with the shipyard workers to identify experiences of intimidation, retaliation, and discrimination that undermined protection and health. Fifty-six percent of the workers reported feeling pressure to work faster

than non-immigrant American co-workers, often at the expense of safety.

Confined space violations and heat exposure were also prevalent. For instance, over 50 percent of workers reported feeling nauseated,

them from taking a break to cool off. Surratt and Kline also assessed the workers' exposure to other shipyard hazards; histories of occupational injuries and illnesses; capacity to access medical treatment and worker's compensation; levels of job-related stress; and knowledge of OSHA.

At the end of the project, Surratt and Kline presented their findings to the workers and OSHA-Baton Rouge staff with the objective of improving working conditions for Latino immigrant shipyard workers.

This project was selected for presentation at the 2015 American Public Health Association conference held in November in Chicago, Illinois. Ms. Surratt's travel to the conference was made possible by a Cook-Snyder Scholarship from the Association of Occupational and

Environmental Clinics – an award that provides funds to occupational and environmental health students like Surratt who attend professional meetings to disseminate their survey results.



The NGA-LOHIS-OHIP research team: (left to right) Dawn Surratt (OHIP), Michele Lackovich (LOHIS), Daniel Castellanos (NGA), Adam Kline (OHIP), Jocelyn Lewis (LOHIS), and Daniela Conde (NGA).

lightheaded, or dizzy due to working in the sun or hot enclosed spaces, with a majority experiencing more severe symptoms such as muscle cramps and generalized weakness. Another 35 percent reported their foreman prohibited

COEH Loses Friend, Dr. Julia Quint, Occupational and Environmental Health Leader

Dr. Julia Quint, one of the Bay Area's most respected public health advocates, passed away on November 14, 2015, at age 75. Retired Chief of the Hazard Evaluation System and Information Service (HESIS), an occupational health program of the California Department of Public Health (CDPH), Dr. Quint worked as a research scientist at UCSF and the Lawrence Berkeley Laboratory before joining CDPH in 1981.

Dr. Quint devoted her career to furthering programs and policies focused on the protection of workers, communities, and the environment. She served on the California Department of Toxic Substances Green Ribbon Science Panel, the Scientific Guidance Panel of the California Biomonitoring Program, the CDC/NIOSH World Trade Center Scientific and Technical Advisory

Committee, the National Healthy Nail Salon Alliance Research Advisory Committee, the CDPH Environmental Health Tracking Advisory Group, and



Julia Quint

the National Academy of Sciences Committee on Health Impact Assessment. She earned her PhD in Biochemistry from the University of Southern California.

"I know I speak for all of us at COEH in saying that Julia was an inspiration. She had a major impact on our field on so many levels. She had tremendous integrity as both a scientist and an advocate – a combination that few can maintain so graciously," said **Robin Baker**, director of Research to Practice (r2p).

"HESIS and COEH worked hand-in-hand as both organizations were founded and grew up together," added Baker. "Julia provided major thought leadership in this development. She was endlessly generous with her time and expertise and was a great booster of the Labor Occupational Health Program and, in general, of making technical information readily available to workers and communities."

continues to page 16

Alumnae Shine in Academia

COEH graduates pursue many career paths in public health, yet three leaders are closing the gender-gap for women in the field of academia.

Rachel Jones
PhD '08 MPH '03

Microbial risk assessment has been a central theme of Rachel's research since a graduate student at UC Berkeley. Now an assistant professor and associate director of the Industrial Hygiene program in the Environmental and Occupational Health Sciences Division, School of Public Health, University of Illinois at Chicago (UIC), Jones' expertise in the field began during her PhD training through a collaboration with **Mark Nicas** at UC Berkeley, an emeritus professor and an investigator in the Center for Advancing Microbial Risk Assessment.



Rachel Jones

The Center, established by the United States Department of Homeland Security and the Environmental Protection Agency, is a consortium of international scientists, researchers, and students interested in risk assessment for microbial agents and control of infectious diseases.

Through the Center, Jones broadened her professional network and observed first-hand how a multidisciplinary team of scientists can collaborate to improve public health. Recently, Jones received a \$2.2 million, 3-year cooperative agreement from the Centers for Disease Control and Prevention (CDC) to establish the UIC Epicenter for Prevention of Healthcare Associated Infections, one of six centers in the United States working to develop a comprehensive strategy to protect health workers who care for patients with Ebola and other infectious diseases.

The goal of the Center is to integrate multidisciplinary perspectives and approaches to infection control and industrial hygiene to find effective ways to prevent health workers from acquiring infections as a result of their occupation.

Jones says UC Berkeley gave her the skills she needed to launch a successful career in academia. "Mark Nicas was very influential on my development as

a researcher, and I felt well-prepared to establish an independent research career as a result of his mentorship and collaboration," reports Jones. "Mark's

Exposure Assessment class was important for me because it demonstrated how to think quantitatively about complex problems, and this is the foundation for my research."

A member of the American Industrial Hygiene Association (AIHA) Exposure Assessment Strategies Committee, Jones also teaches a professional development course about mathematical modeling of occupational exposures at the annual AIHA conference.

Dana Drew Nord
PhD '09 MS '06

Dana was enjoying a highly successful career in occupational health before a chance meeting with **Barbara Burgel** at UCSF's Occupational Medicine Continuing Education conference sold her on the idea of returning to school to become an Occupational Health Nurse Practitioner (NP).

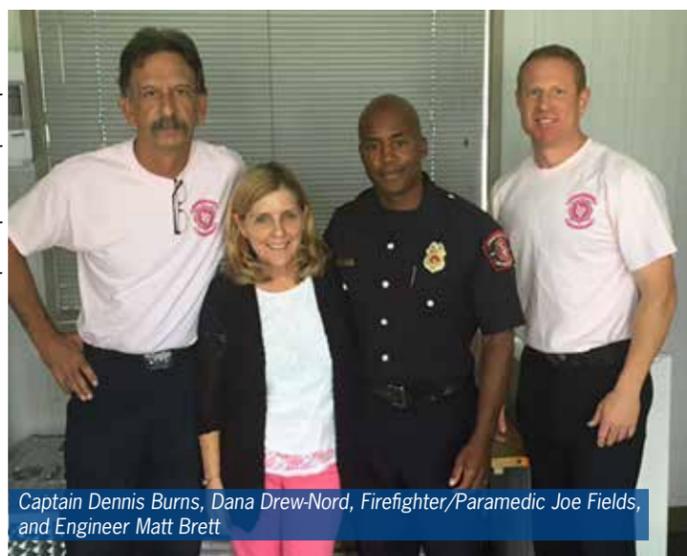
After 10 years developing and implementing local, regional, and

national occupational health programs at a senior management level, she had opened her own clinic in 2001, Premier COMP Medical Group, along with her husband and business partner, Stephen Nord, a physician Board Certified in Internal Medicine and Occupational Medicine.

With their practice thriving, she and Dr. Nord were considering adding another medical provider to meet demand. But Burgel's enthusiastic presentation at the OccMed conference of the NP role – and the program at UCSF – gave her an alternate idea. "What do you say I go back to school and do my NP and become the other provider?" she said to her husband when he arrived at the conference. Soon after, she began the program, completing her MS in 2006 and her PhD in 2009. She has been a UCSF faculty member ever since.

Drew-Nord research has focused on the cardiovascular risk factors of career firefighters. In addition to her teaching responsibilities in the Department of Community Health Systems in the School of Nursing, she is the co-coordinator of the Masters Entry Program in Nursing (MEPN) Screening Committee, which reviews all applicants to the program. She has mentored dozens of students over the years and considers it one of her most meaningful roles as a professor.

Her clinic, Premier COMP Medical Group, located in Pleasanton, California, offers a wide range of occupational health services, from beryllium screening for the employees of Lawrence Livermore National Laboratory, asbestos surveillance for the Calaveras Dam, hazardous material examinations for companies involved in major construction and



Captain Dennis Burns, Dana Drew-Nord, Firefighter/Paramedic Joe Fields, and Engineer Matt Brett

roadway projects, to annual Wellness-Fitness Initiative examinations for four East Bay Area fire departments. They also provide workers' compensation medical exams for employers spanning retail, construction, public safety, transportation, food service, and health care.

In 2007, the clinic became a training site for future generations of UCSF occupational health professionals by hosting an NP intern every quarter and an OEM resident each year. With Drew Nord's background, and her husband's expertise in Internal and Occupational Medicine, the clinic's interdisciplinary practice offers students diverse insight into the occupational and environmental health field.

Sa Liu
PhD '10 MPH '05

Sa, the assistant director of the UC Berkeley Industrial Hygiene program, currently works on two General Motor (GM) occupational epidemiological studies. The first, "Healthy Worker Effect, Occupational Exposure to PM and Cardiopulmonary Mortality," is led by Principal Investigator **Ellen Eisen** – head of the UC Berkeley Environmental Health Sciences (EHS) program – and funded by the National Institute for Occupational Safety and Health. The second, "Renal Disease, Kidney Cancer, and Metalworking Fluid Exposure in Autoworkers," is led by Principal Investigator **Kate Applebaum** from The George Washington University and funded by the National Institute of Environmental Health Sciences.

"My role in the first study is to compare physicochemical characteristics (polycyclic aromatic hydrocarbons and metal content) of metal working fluid (MWF) aerosols to those of ambient air pollution and second hand smoke, both of which are well established risk factors for cardiovascular disease and chronic obstructive pulmonary disease mortality," explains Liu. "In the second GM study, I examine workers' historical exposures to solvents, acids, and asbestos as potential confounders to their MWF exposure."

She is leading an international collaborative project, "Health Effects of Air Pollution on Children in Lanzhou, China," funded by the Chau Hoi Shuen Foundation Women in Sciences Program with Principal Investigator **S. Katharine Hammond**, a professor of

EHS in the UC Berkeley School of Public Health and the director of the Industrial Hygiene program.

Recently, she began working with COEH faculty **Stephen Rappaport** from UC Berkeley on a new project using an emerging scientific method, the untargeted adductomic approach, to better assess chemical exposures in occupational and environmental settings.

Liu says she honed her skills as a researcher while a PhD student in the EHS program, from hands-on air sampling planning and field sample collection, to conceptually generating research hypotheses and proving hypotheses through specific



Sa Liu

aims, including using statistical and mathematical tools.

She appreciates the collaborative culture at EHS. "It provides a very rich environment in which students are exposed to many research ideas and ongoing projects, and they have the opportunity to interact with faculty members and top researchers. I think this prepared me well for my career."

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Bridges

The Inside Take on Climate Change

Winter 2013 PDF

<http://coeh.berkeley.edu/bridges>

THE 2016 COEH M. DONALD WHORTON WRITING AWARD

The M. Donald Whorton Writing Award is offered by the Northern California Center for Occupational and Environmental Health (COEH). The award program strives to honor the late Dr. Whorton by encouraging and recognizing important new voices in occupational and environmental research.

Students and recent alumni (within five years of graduation) from any of the COEH affiliated programs are eligible to submit a manuscript for consideration. Papers may be co-authored; however the student/alumnus must be first or senior author. Papers must be recently published or accepted for publication.

The Award \$500.00

Plus recognition in the COEH Bridges newsletter and an invitation to present at a COEH event.

Due Date
March 1, 2016

Learn More
<http://coeh.berkeley.edu/students/WhortonAward.html>

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LOHP Promotes Workplace Safety for Teens

One hundred teens in Berkeley and San Francisco have taken part in the Labor Occupational Health Program's (LOHP) new Teens Lead @ Work project, an innovative health and safety training initiative launched in June 2015 designed for young workers ages 14-17.

Teens are twice as likely as adults to become injured on the job—every nine minutes another teen worker becomes injured in the United States. Fast food restaurants and retail businesses rank high among U.S. industries for risk of adolescent worker injuries, reports the National Institute of Occupational Safety and Health.

Led by LOHP research analyst and COEH alumna **Kelsie Scruggs**, Teens Lead @ Work disseminates health and safety information by hiring teens to educate their peers. This summer, LOHP hired four local students through a paid, part-time internship funded by YouthWorks, the City of Berkeley's youth employment program. Scruggs collaborated with the staff at YouthWorks to identify potential interns with strong public speaking and leadership skills and favorable reviews from previous employers.

After training at LOHP, the interns began delivering two hour workshops for teens on workplace rights and how to identify, problem-solve, and effectively address workplace health and safety hazards, with a focus on preventing workplace violence. They led workshops

at YouthWorks, the Berkeley YMCA-PG&E Teen Center, and Berkeley Youth Alternatives. They also travelled to San Francisco to train workers through the Latinos en Extasis youth program.

Positive feedback on Teens Lead @ Work opened the way for new partnerships – Berkeley High School will begin offering the program year-long through their College and Career Center. "They're really excited to bring more of a career preparation angle to what they've been providing, which historically has been college readiness and not career readiness," says Scruggs. "They're starting with youth who will be placed in internships."

LOHP's Teens Lead @ Work builds on a pilot funded by the Occupational Safety and Health Administration's Susan Harwood safety grant program, which supported curriculum

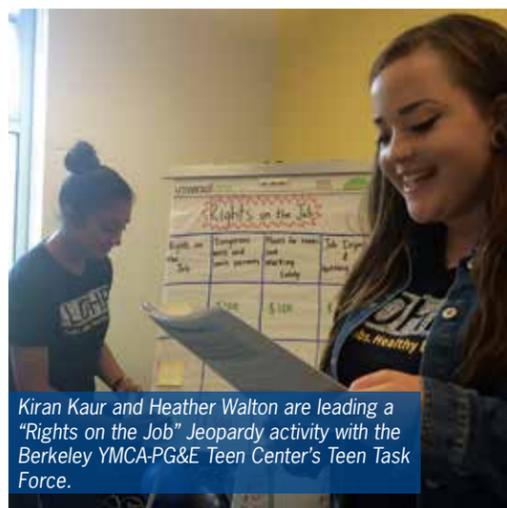
development and training from September 2013-2014. The program is also supported by a grant from the UC Berkeley Chancellor's Community Partnership Fund.

Read more: <http://youngworkers.org/wp-content/uploads/2014/05/Workplace-Violence-Prevention-Curriculum.pdf>.

Watch the video produced by LOHP's interns addressing sexual harassment, bullying, and discrimination in the workplace: <https://www.youtube.com/watch?v=EeY94V2F8Xc>.



The summer 2015 Teens Lead @ Work Peer Leaders. (left to right) Boris Fedorov, Sahar Hassounat, Kiran Kaur, and Heather Walton.



Kiran Kaur and Heather Walton are leading a "Rights on the Job" Jeopardy activity with the Berkeley YMCA-PG&E Teen Center's Teen Task Force.

IN THE MEDIA

COEH faculty were featured in a number of news outlets. Here are some highlights.

More stories and additional links can be viewed on-line at coeh.berkeley.edu/bridges.

In an interview on Michigan Radio's *Fresh Air* show on July 9, 2015, **John Balmes** explained how exposure to burn pits in Iraq and Afghanistan might be affecting the respiratory health of veterans.

Autism Daily Newscast covered the findings of a study by **J. Paul Leigh** published in the *Journal of Autism and Developmental Disorders*, which projects the life care costs for people within autism spectrum disorder in the United States. The study forecasts annual direct medical, direct non-medical, and productivity costs combined will be \$268 billion for 2025. The story appeared on August 2, 2015.

US News & World Report quoted **Dr. Paul Blanc** in an article investigating how the drought in the western United States is affecting lung health. The article appeared on August 11, 2015.

The Daily Californian quoted **John Balmes** in an article covering Berkeley City Council's proposal to increase the legal age of purchasing tobacco products and electronic cigarettes to 21 years. The story appeared on August 26, 2015.

The Fresno Bee quoted **John Balmes** on August 29, 2015, in a story highlighting the health risks of elevated air pollution stemming from the Rough fire in Kings Canyon National Park in California.

On September 10, 2015, *Medscape* interviewed **John Balmes** about the health effects of ambient air pollution, including the pathologic processes involved in several of the health outcomes.

The New York Times Contributing Op-Ed writer Mark Bittman drew national attention to CHAMACOS, the Center for the Health Assessment of Mothers and Children of Salinas, with a print story and video interview of Principal Investigator **Brenda Eskenazi** on September 24, 2015. He highlights the Center's efforts to measure the potential

health effects of increased pesticide exposure for children in the Salinas Valley born between 2000 and 2002. On September 25, 2015, *Berkeley News* covered Mark Bittman's video interview with **Brenda Eskenazi**.

The Daily Californian quoted **Asa Bradman** and **Nina Holland** about their study that showed switching children to organic diet could reduce their body burden of certain pesticides. "The purpose of the study was to see how much of children's exposure to pesticides results from their diet." The story covering their paper published in *Environmental Health Perspectives* appeared on October 12, 2015.

The Washington Post interviewed **Kirk Smith** for an article exploring the success of the Global Alliance for Clean Cookstoves launched by Hillary Clinton during her tenure as secretary of state, which plans to distribute 100 million cookstoves in the field by 2020. Smith recommends the alliance focus on cookstoves that use clean fuels, such as gas or electricity. The article appeared on October 29, 2015.

The Guardian quoted **Kirk Smith** in an article on October 30, 2015, about the viability of deploying solar cookstoves in the developing world to reduce the health effects of household air pollution. Smith argued "gas and electric are the best clean cooking options because they work regardless of the weather or time of day."

Call for Poster Abstracts!

We are pleased to announce a poster abstract session for the upcoming conference "Toxic Substances in the Workplace and the Environment."

The poster session, in conjunction with the opening reception, will take place Wednesday evening, March 9, with unobstructed viewing and interaction among participants.

Instructions and the submission form can be found at:

<http://bit.ly/225yr8q>

Division of Occupational and Environmental Medicine
Department of Medicine
University of California, San Francisco

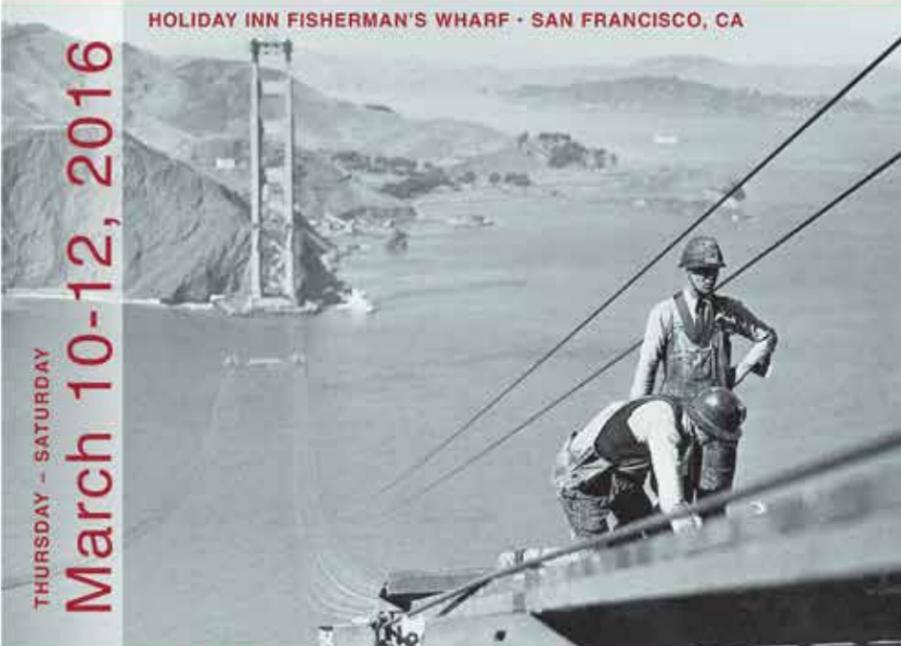
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Protecting workers and communities from occupational and environmental health hazards through teaching, research, and service

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COEH Bridges is published by the Center for Occupational and Environmental Health (COEH)

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Names in **bold** indicate COEH affiliation.

COEH Loses Friend, Dr. Julia Quint

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John Balmes, Director of the COEH, remembers Julia "as a toxicologist who used her training and expertise to protect worker health with consummate skill, tireless energy, and, above all with a passionate sense of fairness and justice. I feel a profound sense of loss with Julia's passing. She was truly one of a kind and will be greatly missed."

Dr. Quint received several public health awards during her career, including a lifetime achievement award from the Western Regional Pollution Prevention Network, the Helen Rodriguez Trias "Lighting the Way" award from the California Public Health Association, and the Health and Safety Activist award from the American Public Health Association.

The Dr. Julia Quint Work Environment Scholarship fund has been created in her honor within UC Berkeley's School of Public Health to support the next generation of public health students, following the vocation that Julia dedicated her life to pursuing. Donation checks can be mailed to UC Berkeley School of Public Health's Office of External Relations and Development or submitted online at <http://give.berkeley.edu/supporttph> (make a note that the gift is in memory of Julia Quint).

19TH ANNUAL SUZANNE LLEWELLYN COEH STUDENT PROJECT AWARD

The Center for Occupational and Environmental Health (COEH) invites applications from graduate students and medical residents wishing to conduct a multidisciplinary research project in occupational or environmental health. Teaching, service, community intervention, and policy projects will also be considered. The purpose is to encourage students to work in teams with students from other disciplines in order to better address real world problems.

REQUEST FOR PROPOSALS
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FOR A STUDENT PROJECT

Complete Information and Deadlines are listed on the COEH website: coeh.berkeley.edu

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Environmental Health Summer Internship for Undergraduates

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Interested in How the Environment Affects Human Health?

Gain valuable experience and join other students who are interested in careers in the environmental health sciences working on research projects that could be important for future academic and career opportunities.

Application Deadline February 26, 2016
Information and Application STEER.berkeley.edu

Photo by Daniel Parks