
EXPANDING

THE **CDM** FOOTPRINT TO
EAST AFRICA, CHINA,
GUATEMALA, PUERTO RICO

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Kavita Ahluwalia was only 17 years old when she left her native Kenya to pursue her education in the United States. Yet even then, she knew that she would one day return home to help her country address its oral health needs.

She is now doing precisely that—albeit on a scale her teenage self probably could not have imagined.

Now as associate professor of dental medicine at CUMC, Dr. Ahluwalia, who has DDS and MPH degrees, directs CDM's post-doctoral program in dental public health. In 2016 she conceived of, sought funding for, organized, and convened the first East African Oral Health Summit in Nairobi, co-hosted by Columbia Global Centers | Nairobi, Columbia University Medical Center, and the University of Nairobi, to launch an initiative to improve oral health care and disease prevention across the region.

Together with more than 100 stakeholders, including oral health experts, academicians, policymakers, researchers, and health care providers from East Africa and the United States, Dr. Ahluwalia helped create a blueprint for addressing pressing oral health issues in a sustainable manner and for integrating oral health care into general health prevention and education programs. The intent is to determine how best to integrate oral health and health both programmatically and through policy initiatives.

During the summer following the March 2016 summit, Dr. Ahluwalia

traveled to a village maintained by Nyumbani, Kenya's largest provider of AIDS services and home to 1,000 children and 100 grandparents who have been displaced by Kenya's AIDS epidemic. Under her mentorship, five students from CDM, the Mailman School of Public Health, and the Columbia School of Nursing assessed the oral health needs of the community's children.

Later last year, Dr. Ahluwalia invited Regina Mutave, PhD, dean of the School of Dental Sciences at the University of Nairobi, to meet with faculty and students at CDM to discuss ways to advance oral health in Kenya at the community level.

Dr. Ahluwalia's ambitions are not limited to Kenya, however. With support from the Columbia Global Centers and an array of local partners (corporations, clinicians, researchers, NGOs, and government agencies), she plans to broaden her efforts to include Uganda and Tanzania through an ambitious to-do list: Empower communities to improve oral health, build capacity at the local and national levels, and collaborate on research projects with African colleagues, all while helping Columbia students acquire the experience, knowledge, and skills that come from engaging with cultures and contexts far removed from their own.

Dr. Ahluwalia's activities in East Africa are but one piece of a much broader effort by CDM to reimagine how it engages the world at large.

CDM has a proud history of global engagement. Faculty regularly collaborate with colleagues around the world on research projects, and nearly half of all CDM students participate in work abroad in locations ranging from Central America to South Asia.

CDM Students Join Their Generation of Global Citizens to Reach Across Borders



Recently, however, the college has turned its attention to considering how it can achieve a more lasting impact abroad—contributing to oral health over the long term by focusing on prevention, building capacity by working collaboratively with local health professionals, and addressing the real needs of specific communities.

Much of the impetus, explains CDM Dean Christian S. Stohler, DMD, DrMedDent, has come from students, who are eager to learn more about the world beyond Washington Heights and their place in it.

By the same token, the college wants to train leaders who are capable of developing oral health-related systems that can be used not only here at home, but around the globe. And exposing students to the unique challenges found in other parts of the world can drive innovation here, as well.

Accomplishing all of that, however, is no small task.

Lois Cohen, PhD, a consultant specializing in global oral health at the National Institute of Dental and Craniofacial Research who has been advising the college, says the key to successful global engagement lies in developing a coherent strategy—one that encompasses research, the curriculum, and service and emphasizes sustainability, the empowerment of local communities, and mutual benefit.

More than a year ago, Dr. Stohler asked the college's Board of Advisors to form a global engagement task force to determine how best to achieve the college's goals. He

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also invited the faculty to form a global initiatives group to review CDM's extant global efforts with an eye toward enhancing existing programs, exploring new ones, and expanding the college's globally oriented collaborations with other members of the Columbia community, including colleagues throughout the medical center.

Those efforts are ongoing. But new global opportunities for CDM students and faculty are already taking shape, with many more on the horizon. And all promise to bring lasting benefits to the communities that CDM will engage abroad—and to CDM itself.

Dr. Ahluwalia's work exemplifies many of the values and goals of CDM's evolving global agenda. Kenya has a population of 40 million, yet its Ministry of Health budgets only \$4,500 for oral health, and the country has, at most, 900 registered dentists, most of

them concentrated in urban areas. As a result, most Kenyans have limited access to dental care, a situation that has consequences that reach beyond oral health.

Poor periodontal health has long been associated with common chronic diseases, such as diabetes and cardiovascular disease. But in a country that continues to grapple with a severe AIDS epidemic, the negative consequences become even broader. By suppressing the immune system, AIDS may contribute to serious oral health problems. Those, in turn, only make it harder for already weakened individuals to take in the nourishment they require to maintain their overall health.

Common conditions like fluorosis, which is associated with stained teeth, can also make it difficult for individuals, such as the AIDS orphans at Nyumbani Village, to find marital partners, increasing their social isolation and further undermining their quality of life.

All of these factors make oral health care and education a priority. And Dr. Ahluwalia sees a way forward that would take advantage of the country's existing health care infrastructure and leverage the power of community-based organizations.

With support from the World Health Organization, countries across East Africa have developed cadres of community-based health care providers. In Kenya, community health volunteers are dispatched to rural villages to provide outreach and education, and organizations such as Nyumbani employ health workers in clinics in the slums of Nairobi. By and large, however, those workers are not trained to provide oral health services.

Dr. Ahluwalia plans to work with policymakers, academics, organized dentistry, corporate partners, and NGOs such as Nyumbani to offer oral health services more equitably by, for example, retraining community health workers to support oral health and empowering community-based organizations to do the same.

After performing a needs assessment at Nyumbani Village last summer, Dr. Ahluwalia's students realized that the community had no system in place for distributing donated toothbrushes and toothpaste or for ensuring that they would be used properly. So they developed a system and offered basic oral health education to teachers and children alike, training the kids themselves to act as role models for one another. Nyumbani residents stood to gain over the long term from the exercise, but so did the Columbia contingent.

"It was eye-opening for our students," says Dr. Ahluwalia. "They really learned how to do community-based work and how to think about integrating oral health into existing systems."

In a similar vein, Dr. Ahluwalia will be working with partners in Tanzania to integrate oral and general health



Kavita Ahluwalia

services by retraining nurses and other health providers. And she traveled to Kampala, Uganda, in March with dental public health resident Abisola Jegede to give a talk on integrating oral health and health in adolescents at a conference targeting adolescent health providers, jointly sponsored by Columbia and Makerere University, a leading African research institution. A student devoted the summer to assessing pediatricians' oral health knowledge, opinions, and practices at Makerere University.

Dr. Ahluwalia's colleague, Yiping Han, PhD, professor of microbial sciences in dental medicine and microbiology & immunology, has been to Kampala recently herself. Her goal, however, is to collaborate with Ugandan colleagues at Makerere to study the relationship between oral bacteria and serious pregnancy complications.

Dr. Han studies the oral microbiome, the assortment of microorganisms that shelter inside the mouth and not infrequently find their way to other parts of the body, sometimes to ill effect. Much of her work has focused on the bacterium *Fusobacterium nucleatum*, a building block of plaque that has long been tied to periodontal disease. Over the past decade, Dr. Han has linked this common oral bug to colorectal cancer and to adverse pregnancy outcomes such as preterm birth, stillbirth, and neonatal sepsis.

Working with pregnant mice, Dr. Han has determined that *F. nucleatum* is capable of causing potentially devastating intrauterine infections by entering the bloodstream and invading the placenta. This appears to be what happened to a woman who approached Dr.

Han several years ago. Before suffering a stillbirth at term, the woman experienced both a brief respiratory illness and a case of pregnancy-related gingivitis, a common condition that usually attracts little attention.

"It's often overlooked because it's a mild and reversible condition that typically subsides after childbirth," says Dr. Han.

Using cutting-edge genomic techniques, Dr. Han identified identical strains of *F. nucleatum* in the woman's mouth and in the lungs and stomach of her fetus. She concluded that the woman's underlying medical condition, coupled with the immune suppression that naturally occurs during pregnancy, permitted *F. nucleatum* to successfully colonize the placenta, infecting and killing the fetus.

That hypothesis accords well with Dr. Han's animal model. But corroborating it further in human subjects, and determining just how many pregnancy complications are caused by oral bacteria, will require further research. So Dr. Han is now undertaking a human study in partnership with the departments of dentistry and of obstetrics and gynecology at Makerere and its affiliated Mulago Teaching and National Referral Hospital.

Attending physicians at Mulago will enroll approximately 100 women, sampling their oral and vaginal microbiomes after they give birth. The women's pregnancy outcomes will be correlated with the catalog of microorganisms that Dr. Han and her colleagues identify through genomic analysis.

The study will refine Dr. Han's understanding of the mechanisms that enable oral bacteria like *F. nucleatum*

to wreak havoc beyond the oral cavity. And it promises to help Ugandan health care providers understand the factors that drive adverse pregnancy outcomes among local populations, enabling better prevention.

Dr. Han also has been involved with CDM's efforts to expand its footprint in China, a country that has seen rapid advances in oral health care over the past decade. CDM has signed memoranda of understanding with several leading Chinese institutions, including the School of Stomatology at Zhejiang University and the College of Stomatology at Guangxi Medical University. The agreements have much to offer both sides, opening the door to everything from student exchange visits to joint research projects.

Dr. Stohler says colleagues in China are particularly interested in adopting elements of the college's predoctoral curriculum and in pursuing postdoctoral training

and research opportunities at CDM; CDM stands to learn much from the rapid pace of innovation in China, especially with regard to the use of smartphones and wearable devices as potential tools for advancing oral health. Because Chinese hospitals and schools of stomatology serve large populations with a high degree of genetic homogeneity, the collaborations might offer opportunities to develop personalized oral health solutions tailored to the genomic characteristics of specific patients.

Dr. Han, who helped broker agreements with Hunan Maternal and Child Health Care Hospital and LBX Pharmacy, China's leading pharmacy chain, says that LBX has already agreed to fund a visit to the hospital by a group of CDM students; when hospital and pharmacy representatives visited Columbia last year, she discussed potential research opportunities. Recreating her Ugandan study in China, for example, would not only buttress Dr. Han's model of how the oral microbiome affects systemic health, but also help the Chinese understand how oral health affects pregnancy outcomes among their own population.

CDM has been building bridges to other parts of the world, as well. Last year, the college signed a wide-ranging agreement with the Faculty of Dentistry at the Universidad Francisco Marroquín—UFM—in Guatemala City.

Evanthia Lalla, DDS, professor of dental medicine and senior associate dean for faculty development who chairs the global initiatives faculty group and serves as faculty representative to the global engagement task force, explains that in addition to its own well-appointed facilities in the capital, UFM enjoys a close relationship with a community medical clinic, Centro de Salud Barbara, in a small town about a two-hour drive from the city. Medical students from UFM and from foreign institutions rotate through the clinic and visit the town's outlying communities, providing primary care to local underserved populations. But the program lacks an oral health component, and students from the UFM Faculty of Dentistry do not currently participate in rotations.

For Dr. Lalla, having CDM students and faculty visit UFM's Guatemala City campus and the Barbara clinic would represent an opportunity to do sustainable work on multiple levels. "Guatemala seems a perfect place to start a program where students can go and get these different experiences, both in the countryside and in the city," she says.

Dr. Lalla envisions CDM beginning with a needs assessment to determine the level of oral disease and the access to oral health education and care in these different settings and eventually establishing broad service, education, and research collaborations with both the Faculty of Dentistry and the Faculty of Medicine, which has shown interest in





CDM's work on the relationship between oral and general health. She is equally enthused by the prospect of CDM students returning to the United States with newfound insights into what it takes to address underserved and under-resourced populations wherever they exist.

"Bringing experiences like that to everyday interactions with patients here on the clinic floor can be very helpful," she says. "It's so important to understand where the people you are serving as a health care provider are coming from and to meet them where they are."

An agreement signed in January between the college and the School of Dental Medicine at the University of Puerto Rico, the leading educational institution for oral health professionals in Latin America and the only bilingual dental school recognized by the Commission on Dental Accreditation, promises to yield similar benefits.

UPR Dean Ana N. López Fuentes, DMD, MPH, says UPR students and faculty will gain much from CDM's innovative approaches to educating the public, training oral health care providers, and collaborating with colleagues in the biomedical sciences and engineering disciplines. "We can learn so much from Columbia," she says, adding that Columbia advised the Puerto Rican government on the establishment of the School of Dental Medicine 60 years ago.

Yet Columbia stands to learn much from UPR, which works with local dentists to care for underserved populations at a number of sites, and Dr. López Fuentes believes that by rotating into these community settings, Columbia students could learn how to structure and deliver services that are responsive to local needs. The fact that Columbia students live and work in a part of New York that has a large Latin-American population would make those experiences more relevant.

"It's a way of learning cultural details that will help them become better providers," says Dr. López Fuentes.

Opportunities for joint research projects also abound. Cleft lip and palate are far more common in Puerto Rico than in mainland United States, for example; UPR not only runs a craniofacial clinic in conjunction with the School of Medicine, but also recently inaugurated a new craniofacial genomics center to investigate the genetic basis of the disorder. UPR also plans to launch a pan-Caribbean saliva repository, which Dr. López Fuentes hopes will yield biomarkers for systemic diseases.

[As this issue went to press, UPR and its academic community were recovering from the unprecedented devastation caused by Hurricane Maria. The dental school suffered no major damage and, with the support of ADEA, the ADA, and others, is resuming classes. Columbia is in touch with Dean López Fuentes and looks forward to continuing our partnership.]



Evanthia Lalla

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The benefits of these multiple initiatives will accrue both to CDM and to its partners abroad, yielding opportunities for both sides to learn from one another; to improve the quality and depth of oral health care services, training, and disease prevention; and to drive research and innovation across a wide range of disciplines.

In the end, however, those who stand to gain the most are the very people Dr. Stohler credits with having spurred the college's renewed commitment to a deeper, more lasting, and more productive form of global engagement in the first place: CDM students themselves. "Twenty-first century students want to know about the world, and they want to understand how they fit into a global context," says Dr. Stohler. In that sense, he adds, "global engagement is just one of many things we are doing to create a curriculum that allows students to follow their passion and to find their niche in life."