

# fighting global disease

It's back to Africa for Bill Stauffer '88,  
who will help Tanzania design its  
avian influenza surveillance and control  
program in an effort to stave off  
what many scientists regard as an  
inevitable "bird flu" pandemic.

BY MARC HEQUET

PHOTOGRAPHS BY BILL KELLEY





# When has science mattered more? The world is bracing for an influenza pandemic that could dwarf the ravages of the 1918 flu that killed 20 million people.

The highly pathogenic H5N1 virus, better known as avian influenza, or “bird flu,” is a viral disease that normally infects only birds, primarily domestic poultry and wild birds.

According to the World Health Organization, the virus has infected 321 men, women and children since 1997; 194 patients have died. The virus causes flu-like symptoms compounded by severe respiratory distress, pneumonia and ultimately organ failure. Its victims tend to be previously healthy children and young adults. Although the virus apparently has not been transmitted person to person — most cases appear to result from direct contact with infected chickens, ducks and turkeys — scientists worry that H5N1 will mutate, triggering a global pandemic.

William “Bill” Stauffer ’88, an M.D. and expert in tropical disease, is in the front ranks of the battle against the bird flu menace. His emphasis is pediatrics. Stauffer has studied avian influenza since 2004, but his interests go well beyond it. Early emergency-room experience taught him quick, cost-effective clinical techniques that he now can apply in developing countries to combat malaria, tuberculosis and other life-threatening diseases.

Beginning this fall, Stauffer will help the East African nation of Tanzania design its bird flu surveillance and control program. Tanzania already has other big health problems. An estimated 6.5 percent of that nation’s population of 36 million have AIDS or are HIV positive. Weakened immune systems leave sufferers particularly vulnerable to the H5N1 virus.

Stauffer’s persistence in practicing and training in tropical disease currently has him serving as the main medical technical expert for the U.S. Centers for Disease Control and Prevention (CDC) Division of Global Migration and Quarantine (DGMQ) where he is the lead on developing medical screening and presumptive therapy guidelines for refugees resettling to the United States. He coordinates his efforts with partners at the federal Department of Health and Human Services’ Office of Refugee Resettlement and Office of Global Affairs, as well as with the individual states. Stauffer has a sterling international reputation as an infectious disease expert.

“Bill is a dynamic, remarkably intelligent person who is able to handle incredibly complex projects, make them look easy and always keeps his sense of humor intact,” says Stauffer’s colleague Annelise Casano, a CDC/DGMQ

epidemiologist. “His knowledge of refugee health is impressive and we always learn something new each time we work with him.”

Stauffer initiated one of 13 worldwide tropical and travel medicine summer certificate courses at the University of Minnesota in collaboration with the CDC. “The course is unique in its focus on immigrant and refugee health, preparing both U.S. and international healthcare providers to recognize the unique needs and care of these populations,” says Stauffer.

The CDC relies on Stauffer to provide training for physicians and other healthcare workers in the United States to help prepare them for more cases of long-unfamiliar diseases among immigrants, from malaria and tuberculosis to intestinal parasites. Stauffer believes close to one billion people cross an international boundary every year.

“The world has shrunk very quickly,” says Stauffer, who also is the medical director for the only Midwest site of GeoSentinel, a worldwide infectious disease surveillance network affiliated with the CDC and the International Society of Travel Medicine that monitors for emerging infections. “Someone can board a plane in Manaus, Brazil, in the heart of the Amazon, safari in Tanzania in the morning, and by evening be standing in a crowded airport in Europe or North America,” he says. “That individual will have been exposed to hundreds of people within the first 24 hours of travel.”

Stauffer notes that the total number of migrants in the world represents the fifth largest populated country in the world. “These people have no formal or centralized international representation and resources, like a government,” he says. “The challenges we face in migration medicine are immense.”

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St. Olaf College is developing a plan that it will implement in the event of a pandemic. The college recently hosted members of Rice County health services, business organizations, educational institutions and local poultry farmers to discuss crisis management and communication.

**WORLD WATCH**

**T**HE U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT (USAID) and its government partners, the Departments of State, Health and Human Services, and Agriculture, have been working to coordinate national and international preparedness and response measures to the looming bird flu pandemic. When USAID needed someone to help Tanzanians build clinical and laboratory infrastructure in which to monitor avian flu outbreaks, they turned to Bill Stauffer.

Tanzania fronts the Indian Ocean south of Kenya and north of Mozambique. On its beautiful northern border lies Lake Victoria. The country's geographical treasures include Serengeti National Park, Olduvai Gorge — where anthropologists found remains of early humans — and Mount Kilimanjaro, the highest peak in Africa. Stauffer's ongoing research in acute respiratory disease, influenza, malaria and other

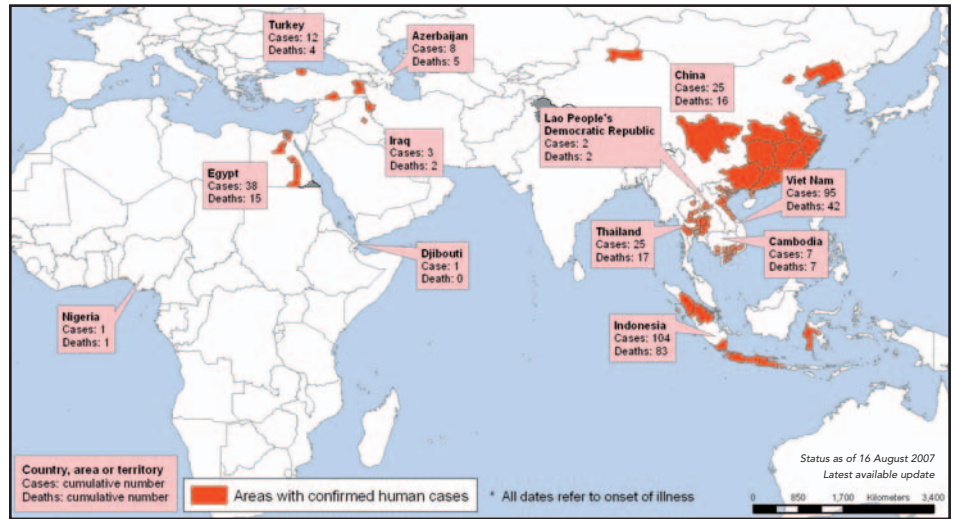
illnesses first took him to Tanzania in the summer of 2004. His wife, Carol, and their two boys went along.

Domestic chickens and ducks run free in Tanzania villages. On their last stay, the Stauffer children played in a neighbor's chicken coop. This time? Likely not. The country lies beneath the migration route of a significant share of the world's wild bird population, which carries the H5N1 virus. International flyways remain a prime area of interest to scientists who early on noted cases of avian influenza at opposite ends of this migration route.

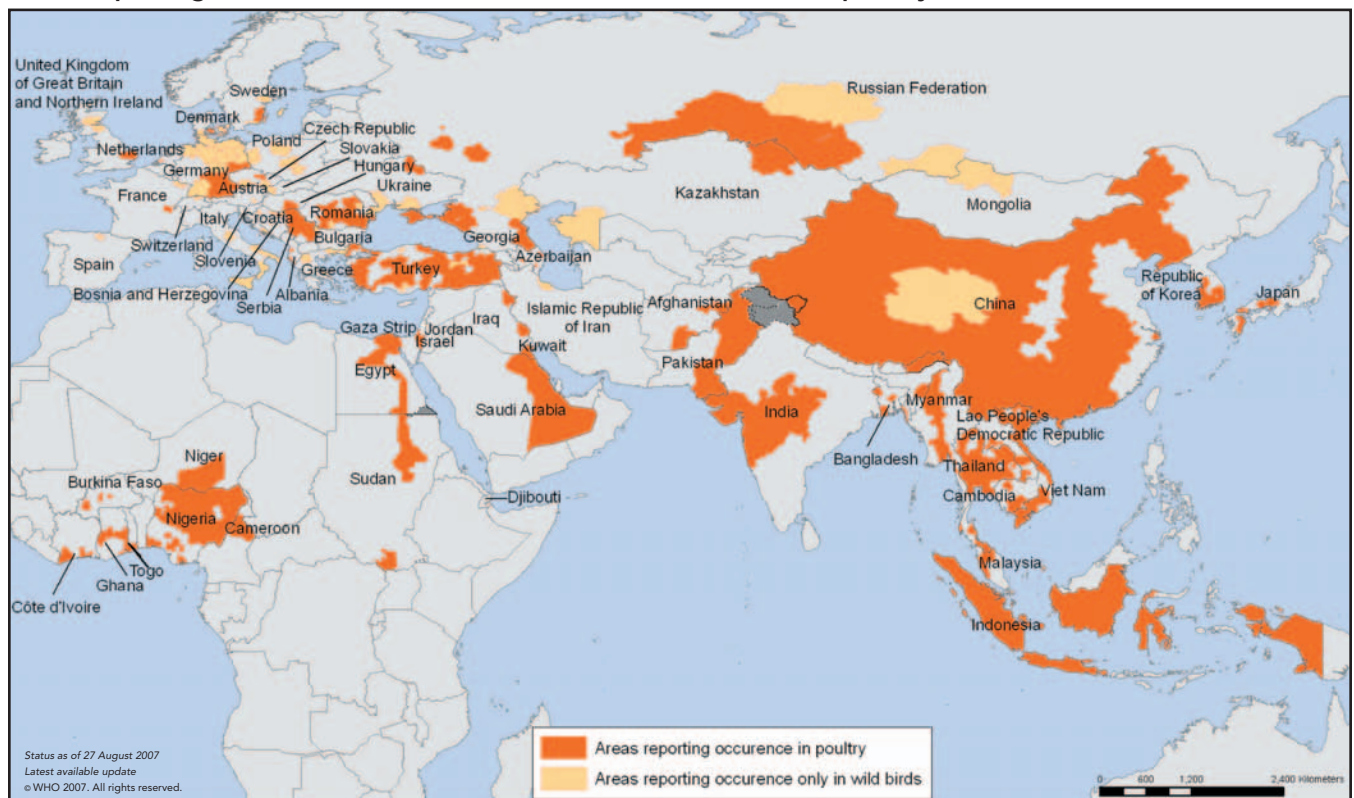
Indonesia leads the world with 104 human cases of bird

World Health Organization maps of areas with cases of avian influenza in humans and birds. Most cases have occurred in rural or peri-urban areas where many households keep small flocks of poultry that roam freely. The virus cannot be transmitted through properly cooked poultry or eggs. Learn more about bird flu on the World Health Organization's website: [www.who.int/csr/disease/avian\\_influenza](http://www.who.int/csr/disease/avian_influenza)

Areas with confirmed human cases of H5N1 avian influenza since 2003\*



Areas reporting confirmed occurrences of H5N1 avian influenza in poultry and wild birds since 2003



The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the limitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not be full agreement.

Data Source: World Organisation for Animal Health (OIE) and national governments. Map Production: Public Health Mapping and GIS Communicable Diseases (CDS) World Health Organization

flu confirmed to date; 83 of these have been fatal. Cambodia, China, Egypt, Iraq, Thailand, Turkey, Vietnam and Azerbaijan (a nation straddling southwestern Asia and Eastern Europe) have had human deaths as well. Croatia, Bulgaria, Greece, Italy, Germany, England, France and Austria have found cases of H5N1 mostly in migrating swans but also in domestic poultry. Although no human cases of avian flu have been discovered in Tanzania, the virus has been found in poultry elsewhere in Africa.

**“The mandate is to make sure that avian flu does not come to America through refugees who are being resettled to the United States.”**

For the next year, the Stauffers will live in Arusha, a bustling city of 280,000 that serves as jumping-off point for safaris heading to nearby big-game parks. At an elevation of 5,000 feet, it is forested and cool in the dry season. Vervet monkeys scamper through the trees. Sons Max, age 6, and Jacob, 8, will attend an international school. Carol, a social worker for St. Paul Schools who also works with families and children in St. Paul homeless shelters, will volunteer her professional skills in public health and social work.

In addition to his work for USAID, Stauffer will be busy with several tasks related to the work he’s been doing at the University of Minnesota and the CDC. Most mornings he will be at Selian Lutheran Hospital in central Tanzania doing clinical work in internal medicine, pediatrics and infectious diseases. Selian Hospital began as a dispensary clinic in 1958 and was expanded into a full hospital 22 years ago by Dr. Mark Jacobson, chief physician and administrative head, and a St. Olaf parent (daughter Sarah is a sophomore). Selian serves Maasai and Waarusha tribes, and approximately 30 percent of its patient population is HIV positive. Stauffer calls it “probably the best hospital in Tanzania.”

“Bill brings so much to a hospital in a developing country like Tanzania — his own knowledge, experience and eagerness to teach and mentor, as well as his interest in exploring significant diseases and finding ways to better prevent and treat those illnesses,” says Jacobson.

Not only will Stauffer’s presence at Selian connect the hospital to the wider medical community, which is globally linked in the struggles against these diseases, “but he brings the tremendous resources of the western medical community to bear on the problems specific to Africa,” says Jacobson. Stauffer also will teach Tanzanian residents, visiting University of Minnesota medical students as well as other international trainees, and help Selian staff launch a research program to study travel-related illness, HIV and malaria.

Stauffer’s work on acute respiratory infections and refugee-screening will also take him to a camp in Kibondo, 400 miles west of Arusha and within about 20 miles of the Burundi border.

“It’s way out in the bush,” he says. To get there requires a flight to Mwanza on the south shore of Lake Victoria and then two puddle-jumper hops in United Nations aircraft to the

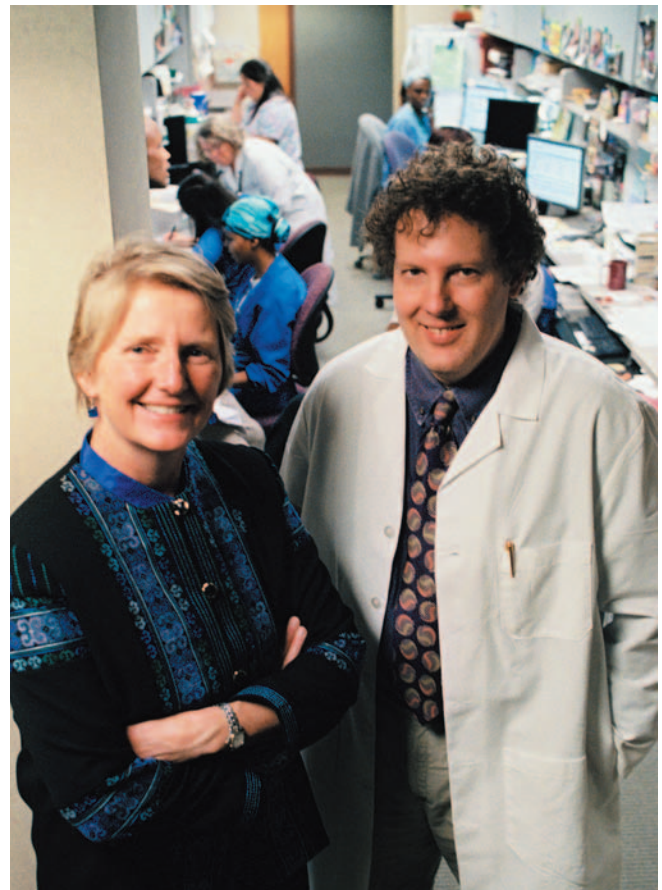
refugee camp’s dirt airstrip and cinder-block terminal.

Stauffer is setting up an acute respiratory surveillance program in Kibondo with CDC funding. “The mandate is to set up avian flu surveillance and to make sure that avian flu does not come to America through Burundi refugees who are currently being resettled to the United States,” he explains. The funds will also be used to integrate the Kibondo site with the rest of Tanzania’s avian flu surveillance as well as to build capacity in the region to describe the epidemiology of respiratory diseases and enhance diagnosis and treatment.

“I go there quite frequently to make sure the many components of the program are proceeding as planned although we have a new full time, Hopkins International Health PhD, who is taking the lead as our project coordinator and who lives there full-time,” he says.

#### LAYING THE GROUNDWORK

THE SALT LAKE CITY NATIVE WHO GREW UP in Edina, Minnesota, often accompanied his physician father — a bird-watching hobbyist — to tropical destinations. It was on these jaunts that he developed an interest in tropical disease. The younger Stauffer’s subsequent college career took him from India to Panama to northern Minnesota, a pair of restless legs carrying an equally restless mind.



Stauffer with his mentor, Dr. Patricia Walker, at the HealthPartners Center for International Health in St. Paul. Dr. Walker is the associate medical director for the Global Health Pathway at the University of Minnesota.

PHOTO COURTESY OF THE UNIVERSITY OF MINNESOTA DEPARTMENT OF MEDICINE.

Those who knew Stauffer at St. Olaf may remember his smile and shock of curly hair, and regard him as an unlikely candidate for the heroic fight against global disease. In college he was a cut-up and a practical joker, the guy who put a dead skunk under the back seat of a friend's car and stomped an envelope full of shaving cream under a residence hall door, then tipped a wastebasket full of water against the same door and ran — so when the victim came out to see who squirted the shaving cream, the tipping wastebasket flooded the room.

Academically, Stauffer claims he often just got by. His biology professor, Gene Bakko, remembers it differently.

“He was so filled with interesting ideas and pursuits and wanted to do it all,” says Bakko. “Bill had a great interest in the natural history of wild animals, plants and the environment in general. He conducted a neat study in a tamarack bog for my winter ecology course, something most students wouldn't think of doing.”

Stauffer was also interested in paleobotany — how early plants helped feed dinosaurs — and early living vertebrates, as well as sustainable agriculture, the welfare of people in lesser developed countries and how their lives could change for the better by improving their environment.

“Although I started as a pre-med student, I quickly decided it wasn't for me,” says Stauffer. “St. Olaf gives its students great experience and training for medical school, as evidenced by all the MDs who hail from there, but I didn't have that in the forefront of my brain while I was an undergrad. I was thinking about other things, like molecular biology. When I discovered public health, I saw it as an avenue to international work.”

St. Olaf was also where Stauffer met his future wife, Carol Lunderberg, who had transferred briefly to the Hill in 1986, though she graduated from Hope College in Michigan. They met on Global Semester and their first date, Bill likes to say, was the Taj Mahal. They married in 1993.

Pursuing a career in public health, Stauffer soon realized that “in order to be a decision-maker, I would have to get my MD. Hence, medical school.”

Stauffer began in internal medicine and pediatrics, moving on to Johns Hopkins where he focused on tropical medicine. In his present position at the University of Minnesota, Stauffer is an assistant professor in the Department of Internal Medicine, Division of Infectious Diseases and International Medicine.

Dr. Jonathan Ravdin, chair of the University of Minnesota's Department of Internal Medicine, served as a research mentor for Stauffer and credits him with developing a successful global health course for postgraduate trainees at the University. “Bill is a unique individual who can network and bring together individuals with common interests in global health,” says Ravdin.

Stauffer also is an adjunct professor in the Department of Pediatrics, Infectious Disease Division and in the School of Public Health, Epidemiology and Community Health. At Regions

Hospital Center for International Health and International Travel Clinic in St. Paul, he is a staff physician in internal medicine and pediatrics.

In 1999, with increasing refugee and immigrant arrivals in Minnesota's Twin Cities, Stauffer perceived a growing demand among healthcare professionals for information on international medicine as the immigrant population became predominantly Somalian, Ethiopian and Liberian. As chief resident, Stauffer organized monthly evening seminars on the subject at the Shriners Hospital in Minneapolis for students and practicing healthcare professionals. At the first session, he expected a dozen or so attendees. About 60 came. For the past eight years, Stauffer's seminar has continued to draw high numbers.

## GROWING CONCERNS

THE UNITED STATES IS NOT IMMUNE FROM world health worries. American doctors have some catching up to do, for example, on *Plasmodium falciparum*, a particularly virulent strain of malaria now prevalent in sub-Saharan Africa. It can kill within hours of the onset of symptoms,

says Stauffer. Immigrants bound for America may be carrying the strain and unknowingly transmit the disease to their new neighbors.

Malaria is treatable. But Stauffer still worries. American physicians who rarely see malaria might take a long time to diagnose it; and, if the immigrant's new neighbors suspect where the malaria came from, anti-immigrant sentiment might surge. Stauffer is trying to implement medical screenings that will identify and treat infectious diseases before immigrants and refugees arrive in the United States.

Now with his new assignment in Tanzania he sees an opportunity to piggyback an assault on other deadly diseases. The World Health Organization says that 20 percent of all deaths in children younger than age 5 result from acute lower respiratory infections. Stauffer sees preparation for an avian flu pandemic as a chance to figure out what causes the respiratory infections.

To monitor for bird flu in a given population, doctors must know the rates of acute respiratory infection for those populations. With that foundation, doctors can watch for unusual events — clusters of severe cases — and try to contain them. Meanwhile, those base numbers will provide clues about causes, or etiologies, of the acute respiratory infections that ravage children in the developing world.

Using bird flu funding in Tanzania to track what diseases are already killing children is a legitimate end-run for Stauffer.

“There are children dying in Africa, but when it has no perceived impact on our daily lives, the money isn't there even to do things as simple as define the actual etiologies of the leading cause of death,” he says. “Without that, we can't get funding or even advocate for prevention and intervention.”

Stauffer says bird flu funding in the pipeline will provide jobs





Bill and Carol Stauffer, with sons Jacob (center) and Max, on their 2004 trip to Tanzania. They are standing on the rift overlooking Lake Manyara.

for Burundian refugees, driven across the border into Tanzania during civil war and genocide in Burundi in the 1990s. One such initiative trains single women — who otherwise might not be able to make a living — as village veterinary officers. Their job will be to vaccinate poultry against Newcastle disease, which kills millions of chickens each year in Africa. Newcastle isn't known to infect humans, but outbreaks in poultry present symptoms like avian flu. Minimizing Newcastle means health officials poised for bird flu will have fewer false alarms to investigate.

With HIV and AIDS considered a national emergency, bird flu may further devastate Tanzania if the virus spreads to humans. And yet Stauffer the scientist isn't convinced that would happen. Puzzles persist about the great influenza outbreak of 1918 and the high mortality rate among otherwise healthy young adults, while older people and children with

less vigorous immune systems died at lesser rates.

Today's scientists think what actually killed them was a "cytokine storm," an over-response of normal, vigorous immune systems. A cytokine storm releases more than 150 inflammatory "mediators," including hormones called cytokines, oxygen-free radicals and coagulation factors. These mediators overwhelmed victims of the 20th-century epidemic.

With his St. Olaf grounding, Stauffer is a model for the type of big thinkers the world needs today. As he prepares to take his family to Africa, he wonders if the old, the young and others with suppressed immune systems might actually survive a bird flu pandemic better than the strong and healthy. He — and the global community — await more research. 🦋

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