also work on primary data collection projects where we travel to people's homes to collect measurements. I'm particularly interested in understanding the health and air pollution impacts of real-world environmental policies. For example, in Beijing, the government is banning coal and putting electric or gas-powered heat pumps into millions of homes. We were interested in evaluating the effect of this program on air pollution and health. What we've found is that, for the most part, villages want to make this transition from coal to electric heat pumps, but some of the poorest households may have trouble paying for the additional electricity costs.

Climate change has been a hot topic in the world recently. How is it affecting our health?

We do have increasingly strong evidence showing the impacts of climate change on health, both directly and indirectly. I am not a climate change researcher myself, but I do work closely with climate modelers who are looking at how air pollution from different sources, including household solid fuel burning and agricultural burning in rural areas, contribute to climate change. My role is to provide some of the input data for models generated by atmospheric scientists that look at the potential climate impacts of air pollution and the potential climate benefits associated with reducing these sources of pollution.

If you could offer a piece of advice to an emerging environmental health researcher, what would it be?

My advice to an emerging researcher in environmental health is the same advice I'd give to any researcher: always start with a really good question. Once you have a good question, then you can start thinking about the tools you want to use to answer that question, including a creative study design, new data, and fancy statistical methods.

"My advice to an emerging researcher in environmental health is the same advice I'd give to any researcher: ***always start with a really good question.***"

How do you envision the future of research as it pertains to environmental health?

Environmental health is a broad field and there are a lot of interesting directions that intersect with toxicology, exposure science, epidemiology, and policy. The intersection of environmental and urban health is an important area. In many cities, urban residents have, on average, better health than their rural counterparts, but the urban poor often have much worse health. In developing countries, the health of the urban poor is often impacted by environmental risks, including lack of access to safe water, poor sanitation, low-quality housing, polluting energy, and crowding. Understanding what health looks like for the urban poor and how environmental factors contribute to health inequalities is an important research area, particularly since cities are growing and inequalities are also growing.

INFECTIOUS DISEASE

From working with animals to humans

Q&A with Nicholas Ogden, an expert on vector-borne diseases and the Director of the Public Health Risk Sciences Division.

BY SUPRIYA HOTA

Dr. Nicholas Ogden is a senior research scientist and the Director of the Public Health Risk Sciences Division for the Public Health Agency of Canada (PHAC). His work focuses on assessing the risk and impact of climate change on vector-borne diseases – including Lyme disease, West Nile, and other zoonoses – and develops tools for community adaptation to these disease risks. His team undertakes ecological and epidemiological studies, conducts systematic reviews and meta-analyses, and uses genome sequencing to understand pathogens and their ecology. Building on this knowledge, they then try to understand and predict when and where the disease risks might appear due to climate change.

Ogden received his veterinary degree from the University of Liver-

Dr. Nicholas Ogden

pool. After 10 years of clinical practice, he completed a PhD in the ecology of tick-borne disease from the University of Oxford. He was then appointed as a professor at the Faculty of Veterinary Science at University of Liverpool where he continued his research in the ecology and epidemiology of tick-borne diseases in Europe and Africa. Ogden's postdoctoral work at the Université de Montréal – in collaboration with PHAC – focused on the potential emergence of Lyme disease in Canada associated with climate change.

What is the most and least favourite part of your position? What are some personal attributes that make you successful at your job?

The favourite parts of my job are my research, the people that I work with, and the organization that I work for. One of the hardest parts is when we must put that research aside and help out during an outbreak – such as right now with the coronavirus. Some personal attributes that may make me better at my job include helping and encouraging others, as well as my knowledge and experience with research development. Because I am working with infectious diseases, my training in biological and veterinary sciences, my understanding of the ecology and epidemiology of emerging infectious diseases, and how to control them all help me at my job. Basically, my multiple skills and experiences help me become a more effective health practitioner.

Can you tell us about some project(s) that you are currently working on? How does your work help the community and/or the country?

We integrate climate change, field and laboratory studies, and environmental determinants to predict where and when infectious diseases may emerge in Canada. We also explore how the ecosystem could change if an outbreak were to happen. Furthermore, we assess how infectious diseases could cause risks to Canadian communities so they can be informed about the possible emergence of infectious diseases due to climate change and how they can be better prepared for them.

Why did you choose to work at the PHAC?

My wife and I moved to Canada because she had an opportunity to work here and be close to her family. Back in the UK, I was working in academia as a professor in the Faculty of Veterinary Science at the University of Liverpool. There, my research focused on the ecology and epidemiology of tick-borne diseases. At the time, tick-borne diseases were not a public health issue in Canada. But a colleague, who worked for a part of Health Canada – which became PHAC – raised the possibility that Lyme disease may move north from the US to Canada due to climate change. From this, a project developed and I got a post-doctoral position at the Université de Montréal to model potential effects of climate change on the emergence of Lyme disease in Canada. Following this work, I was fortunate enough to be offered a post at PHAC.

"It is important to have knowledge of the scientific literature but also the spirit of critical inquiry."

What is your career goal? Do you see your position evolving overtime at the PHAC?

My career goal is to contribute to the knowledge in a way that helps the communities and/or the world to become better protected from infectious diseases. I don't see my position evolving except in terms of taking on more management duties. But I really like what I do!

If you were to start all over again, would you make any changes to your career path? What changes would you make and why?

No, I wouldn't make any changes to my career path. There were times in my life when I changed jobs and felt that maybe I made a mistake in changing paths. But now when I look back, I think all of my past work experiences have given me something. There is not a part of my past career that I regret.

What inspired you to pursue a PhD after 10 years of clinical practice? Do you ever use the knowledge/ experience from your Doctor of Veterinary Medicine (DVM) degree in your current position?

I pursued a PhD for two reasons. Firstly, it was time to move on and secondly, I was looking for new intellectual challenges. The challenges that I experienced in my clinical practice had become increasingly routine. I also started to realize that more research in the area of emerging infectious diseases was needed, and I thought that understanding how diseases work in wildlife could be fundamental to understanding how diseases work in humans. A funding opportunity came up and I ended up working in the field of Lyme disease.

Yes, the basic training I received (including examining biological samples under a microscope and learning how diseases make animals sick) and the skills I have learned (such as examining healthy and diseased animals, diagnosing illnesses, and seeing first hand how epidemics occur in animal populations) gives me insights into my current work. I am working on emerging infectious diseases that originate as diseases that are transmitted from animal to human populations, for which understanding the biology and ecology of the diseases and how they affect animals are very important. My past training and experience stand me in good stead.

What is the current demand for individuals with an M.Sc. or PhD in your field? Do you see the demand for this position increasing in the future? If you could offer advice to new M.Sc. or PhD graduates and emerging researchers in your field, what would it be?

I think there is an increase in the demand for individuals with M.Sc. or PhDs, especially during infectious disease outbreaks. There is no better example than the time we are living in right now – the COVID-19 outbreak. We need individuals who have graduate degrees in ecology and epidemiology, who can understand the animal, human, and ecosystem aspects of the story, to help better control and prevent the emergence of infectious diseases. These qualified and skilled individuals can be found working for international organizations such as the World Health Organization, to national organizations such as PHAC, to educational institutions. There is always a need for people who have deep expertise in the specific fields of microbiology, bacteriology, virology, epidemiology, and genomics. But we need both specialized and generalist individuals to put the pieces together. A piece of advice that I would offer is to read widely and deeply. It is important to have knowledge of the scientific literature but also the spirit of critical inquiry. With that knowledge, you attain the position to develop hypotheses, leading to research ideas that you can explore with rigorous studies.

MENTAL HEALTH

At the intersection of mental health and drug addiction

Q&A with Jibran Khokhar, biomedical science researcher and assistant professor at the University of Guelph

BY MADISON PEREIRA

Jibran Khokhar completed his B.Sc. from Queen's University, and subsequently earned his PhD in pharmacology and toxicology under the supervision of Rachel Tyndale at the University of Toronto and the Centre for Addiction and Mental Health. After completing his degree, he pursued a post-doctoral fellowship with Dr. Alan Green in the department of psychiatry at Dartmouth College. During this time, he worked to develop new and safer therapies for co-occurring schizophrenia and alcohol use disorder. Today, Khokhar is an assistant professor in the department of biomedical sciences at the University of Guelph. His research continues to focus on the development of new medications for co-occurring schizophrenia and substance use disorder, and the effects of adolescent drug use on mental illness and addiction.

Jibran Khokhar

How has graduate school prepared you for your faculty role at the University of Guelph?

My mentor, Rachel Tyndale, allowed me to focus on the research aspect which helped me learn specific techniques, but she also helped me work on other skills including critical thinking, scientific writing and oral presentation skills. During my graduate studies, a lot of my experiments went wrong or didn't work and it's similar to being faculty and a principle investigator. Often times my grant applications are rejected and not funded. From my graduate studies, I've learned that it's important to be able to keep your chin up while taking hits and it's helped me persevere with whatever obstacles are thrown my way in terms of my career.