Preface

Infectious diseases have plagued humankind since the beginning of their existence, shaped their history and evolution, cause significant burden and claimed numerous lives and continue to do so today. Our understanding of infectious diseases is continuously evolving and several key steps helped this progress including the discovery of the microscope, antibiotics, vaccines, genetic manipulation, gene sequencing and bioinformatics (to mention just a few). At various stages of human history, it was thought that humans won the battle and were able to control and even eradicate some very serious and devastating infectious diseases. Unfortunately, while some pathogens have indeed been efficiently controlled, new threats to public health are constantly appearing, commonly known as emerging pathogens.

An emerging or re-emerging infectious disease is defined as a disease that just appeared or whose incidence has increased considerably in the last two decades or likely to increase in the near future according to the Centers for Disease Control and Prevention (CDC). While according to the World Health Organisation (WHO), an emerging disease is defined as appearing for the first time in a population or if it is already present, is rapidly increasing in incidence or geographical distribution. Therefore, the main feature of emerging pathogens is sudden appearance, which tends to take the world in general and public health officials in particular by surprise. This happened far too many times for health agencies and governments to feel infallible and resort to complacency. Throughout history, numerous infectious diseases emerged and some caused pandemics (epidemic infectious diseases that spread through the human population across a large region), typically associated with devastating and unforgettable losses such as plague, poliomyelitis, HIV/ AIDS, Spanish influenza, SARS, MERS and Ebola. However, this arms race between humans and pathogens is everlasting and both are evolving to ensure survival of the fittest as supported by the Red Queen Hypothesis “to survive in an evolving system, one must co-evolve with the best traits to survive”. Therefore, these interactions are highly complex and under the influence of a multitude of intrinsic and extrinsic factors, making the infectious diseases field a fascinating domain. A lot of drivers intervene in the relationship between infectious diseases and human hosts and though we made sig-
significant headway in understanding the drivers and outcomes of these interactions, particularly in terms of disease occurrence, we are still poorly equipped to control and especially prevent new disease emergence. Whilst, the world started to forget about the devastating Ebola outbreak in West Africa, international health agencies praised for the efficient control of the outbreak, survivors attempting to go back to normal life and countries celebrating Ebola free status, a new virus steals the spotlight and media headlines. The new “kid on the block” is the Zika Virus, so far a mild arbovirus limited to endemic locations in Africa, Asia and South Pacific but currently responsible for a fast spreading outbreak in South and Central America (22 countries so far) and because of possible links to microcephaly in newborn babies, it has been declared a “Public Health Emergency of International Concern” by the World Health Organisation on 1 February 2016. The reasons for this wildfire like spread and the surge of neurological disease are still unknown but further resource allocation and research would allow to decipher the drivers of this new epidemic. It took time and resources to solve the Ebola emergence conundrum and several factors have contributed to the outbreak in West Africa including bushmeat consumption, burial practices, civil unrest, human mobility and behavioural and cultural practices, though urban settings and socioeconomic conditions are believed to be the main factors. In time, the drivers and mechanisms of the Zika virus emergence are likely to be unravelled. In the meantime, it is a valuable reminder to health officials, NGOs and governing bodies that, despite major advances, we cannot drop our guard and we need to keep investing in new vaccines and therapies and more efficient and novel mosquito control strategies.

The link between environment and health was noticed by humans earlier on. It has been reported that Roman aristocrats spent their summers in hill resorts to avoid malaria and that in south Asia, strongly curried food was likely to be protective of diarrhoea especially in hot summers. Another example of the effect of the environment on infectious diseases is the earlier belief that bad air (miasma) caused diseases such as the Black Death, cholera and malaria. Since then, advances in microbiology and medicine established that the causes of these diseases are infectious agents (germ theory of disease), particularly the work of Louis Pasteur and Robert Koch in the mid- late 1800s. Nevertheless, the influence of the environment on human health is paramount as everything around us (air, water, soil) can contribute to our good health and conversely potentially transmit disease causing particles (whether infectious or not). Therefore, changes in the living environment are bound to affect human health. The climate change field, though some opponents still exist, is firmly established and the main cause is related to anthropogenic activity. Climate change is projected to increase temperature, droughts, floods and extreme weather events and is associated with significant adverse impacts on human health through various mechanisms. While the burden of climate change could be mediated through
non-infectious causes such as heat and cold related morbidity and mortality, risk of injury, death and mental illness following extreme weather events as well as impacts of air pollution; infectious diseases contribute to significant increased burden. The environment is a key player in disease emergence phenomenon. This book aims to examine the impact of environmental change on emerging infectious diseases and pandemics, in particular, lessons learnt from previous epidemics and pandemics, comprehensive investigation of significant drivers of disease emergence, climate sensitive diseases (vector-borne and waterborne), climate vulnerability in cities and the health sector, governance and adaptation strategies, and perspective of public health officials.

The target audience for this book is wide, encompassing people with prior biological, medical and environmental knowledge as well as the general public. This book would be of interest to environmental scientists, academics, students, researchers, microbiologists, stakeholders, policy makers, public and environmental health officials, advocates, practitioners, NGOs, health charity workers and interested laypersons.

This comprehensive and timely publication aims to be an essential reference, a valuable addition to the field and a useful resource for the interested reader. It will serve as a succinct yet comprehensive overview of the topic allowing the readers to capture the main facts and confer them the knowledge needed for meaningful discussion of the topic.

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