
Water-Associated Infectious Diseases

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Editor

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 Springer

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Dedicated
*to my **Parents and Family***
who believed in academics
as the way forward for an intelligent mind
and
*to my **Teachers***
who introduced me the subject
and nurtured my interest in it.

Foreword

Water is vital for the survival of all living things, including people. However, industrial waste, poor hygiene, and ineffective sanitation expose a large part of humanity to the water-related risks of contaminants, toxins, and infectious agents. The impact of water-associated infectious diseases, which are the subject of this book, is strongly dependent on the nature of the pathogens involved and also on broader ecological and climatic factors. Suitable sanitation methods for managing excreta form the crux of prevention, but contaminated water remains the major cause of global public health concern. Certainly, the fact that more than three million people die every year from these infections is shocking and requires sustained attention.

This book introduces the main agents responsible, reviews their epidemiology and evolution, considers the impact of global warming, and sets out the mitigating strategies employed at national and international levels. In addition, it deals with the molecular approaches used to detect the pathogens responsible, various ways in which water can be treated to prevent disease emergence, and the means of managing outbreaks when they occur. The chapters provide insights into the strategies of leading international organizations such as the United Nations (UN), the World Health Organization (WHO), the Centers for Disease Control and Prevention (CDC), and the International Water Association (IWA), as well as highlighting vital national initiatives such as the Swachh Bharat Mission (Clean India Mission), which operates throughout the country under the auspices of the Department of Drinking Water and Sanitation of the Ministry of Jal Shakti, Government of India.

The majority of people affected cannot afford conventional medicines and preventive measures such as vaccines. As a result, this book focuses also on the implementation of sustainable hygienic conditions and discusses robust and reliable policies for providing under privileged people with access to basic sanitation, hygiene, and water. It will be of interest to clinicians, microbiologists, climatologists, pharmaceutical industry representatives and policy-makers, and a timely contribution towards the global elimination of water-associated infectious diseases.

University of Glasgow, Glasgow, UK

Andrew J. Davison
President of the International Committee
on Taxonomy of Viruses

Preface

The escalating number of cases and the emergence of antiquated pathogens have created an immense worldwide burden on humanity. Emerging pathogens can be distributed according to the microbial classification, where viruses and bacteria represent 44% and 30% of overall etiological agents, respectively. The rationale of the emergence of infectious disease can be explained by several factors such as new environment, newer technologies, scientific advancement, changes in human behavior, and vulnerability. Pathogens-associated water-borne diseases are the major cause of mortality and morbidity in the developing and underdeveloped countries. The growing population density is the culprit behind the rising number of outbreaks of water-associated infectious diseases. The changing source of water bodies changes the pathogens related to water-associated infectious diseases.

Newer techniques are required which combines the strategy of accuracy assigned with traditional microbiology and sensitivity related with molecular biology. The plentiful number of conventional- and CAM-based medicines for the treatment of water-associated infectious diseases will supersede the gap of limited number of conventional drugs. This book focuses on the various aspects of implementation of sustainable hygienic conditions and discusses the robust and reliable policies and strategies on a global aspect to provide unprivileged people access with the basic sanitation, hygiene, and water.

All these aspects of the book are imperative for safeguarding human race from more loss of resources and economies due to water-associated infectious diseases. To overcome these issues and fill the gap, we propose to introduce *Water-Associated Infectious Diseases* to provide a readily available resource in this area.

The editor of this book hopes that this work might increase the interest in this field of research and that the readers will find it useful for their investigations, management, and clinical usage. The editor and contributors report no conflict of interest.

Lucknow, India

Shailendra K. Saxena

About This Book

Although we are in the era of the twenty-first century having most of the advanced technologies in hand, water-associated infectious diseases are the reason for the worldwide morbidity and mortality. This book provides a comprehensive overview of water-associated infectious diseases and their linked pathogens with plausible strategies and schemes for their mitigation at national and international level. This book focuses on various aspects of implementation of sustainable hygienic conditions and discusses the robust and reliable policies and strategies on a global aspect to provide unprivileged people access with the basic sanitation, hygiene, and water. All these aspects are imperative for safeguarding human race from more loss of resources and economies due to water-associated infectious diseases. To overcome these issues and fill the gap, we hope *Water-Associated Infectious Diseases* shall provide a readily available resource in this area.

Acknowledgements

This book was conceptualized to focus on water-associated infectious diseases and its management including various aspects of implementation of sustainable hygienic conditions and discusses the robust and reliable policies and strategies on a global aspect to provide unprivileged people access with the basic sanitation, hygiene, and water.

All these aspects are imperative for safeguarding human race from more loss of resources and economies due to water-associated infectious diseases. To overcome these issues and fill the gap, we hope *Water-Associated Infectious Diseases* shall provide a readily available resource in this area. The aim of this book is to acknowledge the potential of water-associated infectious diseases and their remedies.

I am overwhelmed in all humbleness and gratefulness to acknowledge from the bottom of my heart to all the contributors who trusted me and supported this work. I hope they are as proud of this book as I am. I would also like to thank Springer Nature Publisher to consider this book for publication. All the reports cited in this book are taken with proper citation. However, any missed information is just unintentional and explicable.

My research fellows and students are central to all my research and academic work. They are motivating force behind anything constructive we do. They are truly brilliant and have a bright future. I would like to express my special thanks of gratitude to my mentors, teachers, and students who gave me the strength to accomplish this. Also, I would like to thank the colleagues, family, and friends who gave a lot of encouragement and support during the work on this book.

A happy environment at home is essential for any kind of growth, and I thank my family, especially my talented wife and children for the same.

Lucknow, India

Shailendra K. Saxena

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About the Editor



Shailendra K. Saxena is Vice Dean and Professor & Head CFAR at King George's Medical University, Lucknow. His primary research interest is to understand molecular mechanisms of host defense during human viral infections and to develop new predictive, preventive, and therapeutic strategies for them. His work has been published in reputed international journals with high-impact factor. His work has been highly cited by numerous investigators globally and honored by several prestigious national and international awards, fellowships, and scholarships in India and abroad, including various Young Scientist Awards and BBSRC India Partnering Award. In addition, he was named as the Global Leader in Science by *The Scientist* magazine (USA) and International Opinion Leader/Expert involved in the vaccination for JE by IPIC (UK). He has been elected Fellow of The Royal Society of Biology (FRSB) and the Royal Society of Chemistry (FRSC) both from the United Kingdom; The Academy of Environmental Biology, India (FAEB); Indian Virological Society (FIVS); The Biotech Research Society, India (FBRS); and the (European) Academy of Translational Medicine Professionals (FacadTM), Austria. Furthermore, he has been awarded Dr. JC Bose National Award of the Department of Biotechnology (DBT, Ministry of Science and Technology, Government of India) in Biotechnology and has active collaboration with US universities.