

The Contextual Determinants of Malaria

Elizabeth A. Casman
and
Hadi Dowlatabadi,
editors

The Contextual Determinants of Malaria

Edited by
**Elizabeth A. Casman and
Hadi Dowlatabadi**

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Though knowledge about malaria continues to advance, there remains disagreement about the most effective means to prevent and treat the disease. The Publisher and contributors to this volume have made every reasonable effort to ensure that information presented about studies of eradication methods, vaccines, and drug treatments is accurate. The Publisher cannot accept responsibility for loss and/or liability of any kind by any party from the use of information in this publication.

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Preface

Recent attempts to project the impacts of climate change on malaria often acknowledge the importance of social, economic, and other contextual variables but fail to explicitly incorporate them or consider how they may evolve along with demographic and environmental conditions. This problem is of critical interest to the climate policy community, which has been buffeted by claims and counter-claims concerning the impact of climate change on malaria.

While we hope that this book provides important advances to our understanding of the climate change–malaria linkage, we also intend it to address broader efforts to improve malaria control planning. There are many issues common to both assessing the impact of climate change on malaria prevalence and designing strategies for malaria control. In each line of investigation, it is important to consider why, as malaria has been eradicated in some parts of the world, the disease has persisted or reemerged in others. In each investigation, there is a need to identify the most successful interventions and to consider the factors that would allow the techniques to be transferred effectively from one setting to many others. And, in each domain, it is essential to consider the interaction of many dimensions of global change—and to consider the many stresses that will influence the course of malaria during the twenty-first century.

The origins of this book are in an international workshop that was held May 15–18, 2000, in Lausanne, Switzerland. The workshop was structured around developing a method for incorporating contextual factors into projections of the future incidence of malaria. Papers on the determinants of malaria prevalence around the world (including environmental, climatic, social, behavioral, demographic, land-use, economic, institutional, and technical factors) were presented and discussed, followed by papers on individual high-impact determinants and how they are expected to evolve over the next half-century, when the effects of climate change are expected to be more tangible. Workgroups were formed to synthesize this information into a conceptual framework that would assist those grappling with the problem of addressing the impact of climate change on the distribution of malaria. *The Contextual Determinants of Malaria* is the result of the refinement of the original papers in response to a two-year process of discussion and comment. Our objectives for the book are

- to provide a better understanding the role of global warming in malaria occurrence and to put climate effects in perspective with the other contextual variables, and
- to improve our understanding of the various factors controlling the incidence of malaria, their interactions and relative importance, and thereby to refocus attention on critical scientific and public health needs.

It is our hope that this book will be of value to those contemplating the effects of climate change on human health, to those devising malaria control programs and research initiatives, and to those trying to understand the global resurgence of malaria that has occurred in recent decades.

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The Workshop on the Contextual Determinants of Malaria was made possible by the generous support of the ExxonMobil Foundation. Additional support was provided by the National Science Foundation (USA), the Electric Power Research Institute, the National Oceanographic and Atmospheric Administration (USA), and the American Petroleum Institute. The conference was organized by the editors, who are members of the Center for the Integrated Study of the Human Dimensions of Global Change at Carnegie Mellon University.

We wish to thank the World Health Organization, Geneva Office, for logistical and intellectual support. Also, we wish to express our gratitude to Baruch Fischhoff, Lester Lave, and M. Granger Morgan of Carnegie Mellon University for their valued assistance in conducting the workshop and to Ms Terri Jones, of the same institution, for secretarial assistance.

The papers and discussions from the workshop form the basis for this book, but the book, having been reviewed, edited, updated, and supplemented, is now much more than a proceedings. For their attention to detail and careful scrutiny we gratefully acknowledge the staff and associates at RFF Press, including Don Reisman, Sandra Hackman, Rebecca Henderson, and Gina Armento.

We are profoundly indebted to the distinguished group of public health professionals and academics who participated in the workshop. Their generous intellectual involvement accounts for the strengths of this volume. We would especially like to acknowledge the thoughtful contributions of two workshop participants whose names do not appear in the list of authors, Menno J. Bouma of the London School of Hygiene and Tropical Medicine and Steven W. Lindsay of the University of Durham, United Kingdom.

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Introduction

Elizabeth A. Casman and Hadi Dowlatabadi

One of our manuscript reviewers suggested we consider renaming this book *The Contextual Influences of Malaria*, because “Determinants” was too “deterministic.” Yet, determinants are precisely what we are after. Various features of malaria epidemiology have long been given mathematical expression, and recent climate change impact studies have used such formulas as surrogates for future malaria risk. If we are to take such studies seriously, we must be convinced that their equations include the true controlling determinants.

To be able to predict future malaria risk, an understanding of the history of malaria and of its current contextual determinants is essential. Moreover, consideration of how the current determinants of malaria will evolve in the future, accompanied by a frank analysis of the uncertainty surrounding such predictions, is also necessary. We hope that the chapters in this volume will inform future malaria risk assessments by identifying the important contextual determinants and by making explicit the strengths, weaknesses, and conditionalities of the predictive relationships used in such assessments, especially those concerning the health impacts of global climate change.

Organization of the Volume

Because a desire to understand the effects and relative importance of future climate change on malaria largely motivated the development of the workshop, the book begins with a set of reports on the results of current malaria and climate change models and the role of the Intergovernmental Panel on Climate Change (IPCC; an investigative committee convened under the auspices of the World Meteorological Organization and the U.N. Environment Programme) in coming to grips with this issue (Part 1).

The discussions in Part 1 set the stage for the regional assessments presented in Part 2, which describe the factors that have controlled the retreat and spread of malaria in different parts of the world. Part 3 focuses on selected high-impact determinants and how we currently predict them to change over the next 50 years. Originally, we had thought that we would be able to distill a set of criteria from these reports that could be used together with the MIASMA malaria distribution model to better predict the risk of the spread of malaria in the twenty-first century. By the end of the workshop, however,