

One Health

The Theory and Practice of Integrated Health Approaches

Edited by

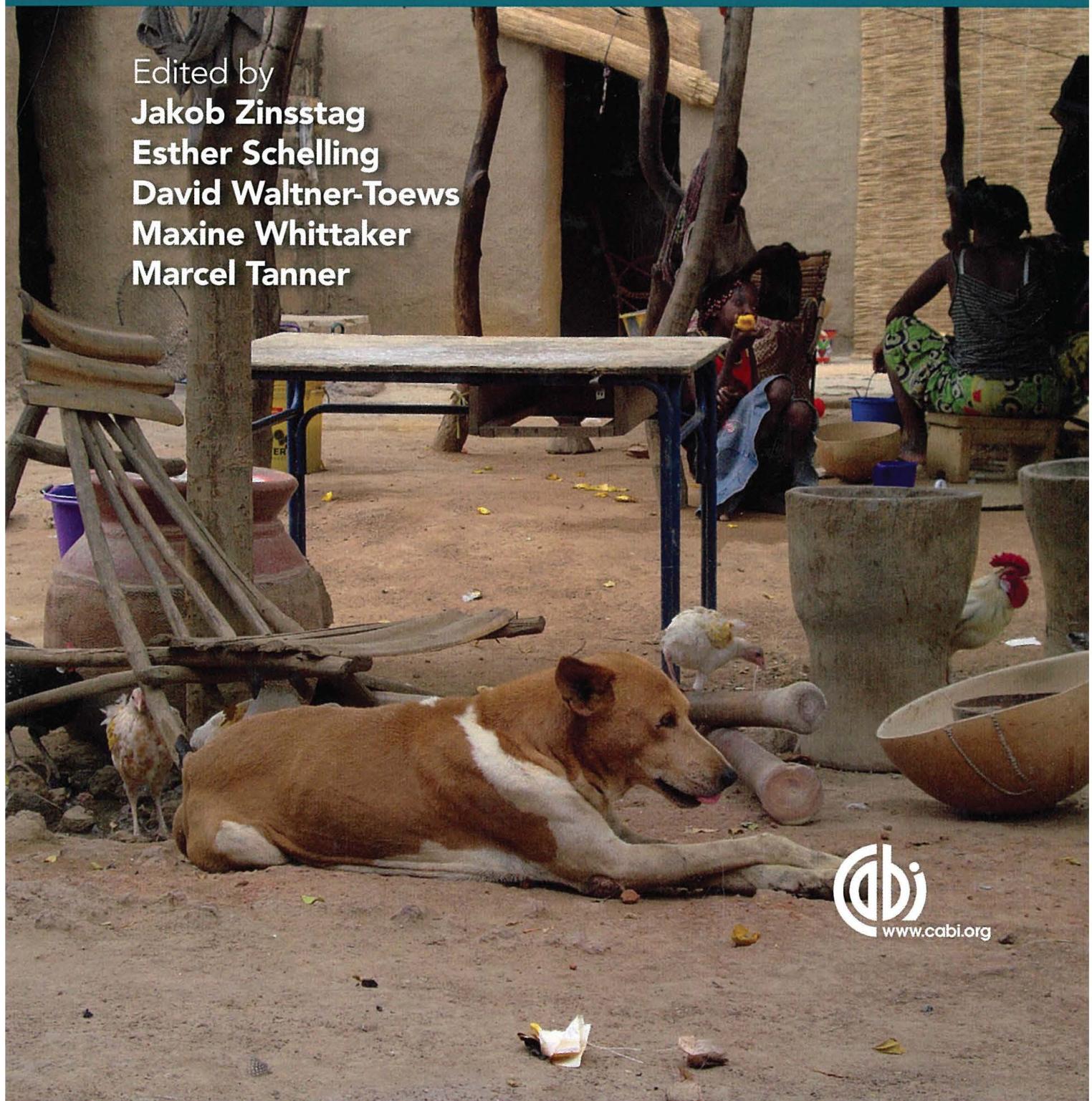
Jakob Zinsstag

Esther Schelling

David Waltner-Toews

Maxine Whittaker

Marcel Tanner



www.cabi.org

One Health

The Theory and Practice of Integrated Health Approaches



One Health

The Theory and Practice of Integrated Health Approaches

Edited by

Jakob Zinsstag

*Swiss Tropical and Public Health Institute, Basel, Switzerland
University of Basel, Basel, Switzerland*

Esther Schelling

*Swiss Tropical and Public Health Institute, Basel, Switzerland
University of Basel, Basel, Switzerland*

David Waltner-Toews

University of Guelph, Canada

Maxine Whittaker

University of Queensland, Australia

and

Marcel Tanner

*Swiss Tropical and Public Health Institute, Basel, Switzerland
University of Basel, Basel, Switzerland*



CABI is a trading name of CAB International

CABI
Nosworthy Way
Wallingford
Oxfordshire OX10 8DE
UK

Tel: +44 (0)1491 832111
Fax: +44 (0)1491 833508
E-mail: info@cabi.org
Website: www.cabi.org

CABI
38 Chauncy Street
Suite 1002
Boston, MA 02111
USA

Tel: +1 800 552 3083 (toll free)
Tel: +1 (0)617 395 4051
E-mail: cabi-nao@cabi.org

© CAB International 2015. All rights reserved. No part of this publication may be reproduced in any form or by any means, electronically, mechanically, by photocopying, recording or otherwise, without the prior permission of the copyright owners.

A catalogue record for this book is available from the British Library, London, UK.

Library of Congress Cataloging-in-Publication Data

One health (Zinsstag)

One health : the theory and practice of integrated health approaches / edited by Jakob Zinsstag, Esther Schelling, David Waltner-Toews, Maxine Whittaker, Marcel Tanner.

p. ; cm.

Includes bibliographical references and index.

ISBN 978-1-78064-341-0 (alk. paper)

I. Zinsstag, Jakob, editor. II. Schelling, Esther, editor. III. Waltner-Toews, David, 1948- , editor. IV. Whittaker, Maxine, Professor, editor. V. Tanner, Marcel, editor. VI. C.A.B. International, issuing body. VII. Title.

[DNLM: 1. Communicable Diseases, Emerging--prevention & control. 2. Public Health Practice. 3. Zoonoses--prevention & control. WA 110]

RA643

616.9--dc23

2014033215

ISBN-13: 978 1 78064 341 0

Commissioning editors: Sarah Hulbert and Claire Parfitt

Editorial assistant: Alexandra Lainsbury

Production editor: Shankari Wilford

Typeset by SPi, Pondicherry, India

Printed and bound in the UK by CPI Group (UK) Ltd, Croydon, CR0 4YY

Contents

Contributors	ix
Editors' Preface	xv
FAO Foreword	xvii
OIE Foreword	xix
WHO Foreword	xxi
 PART 1: THEORETICAL FOUNDATIONS	
1 One Health in History	1
<i>Michael Bresalier, Angela Cassidy and Abigail Woods</i>	
2 Theoretical Issues of One Health	16
<i>Jakob Zinsstag, David Waltner-Toews and Marcel Tanner</i>	
3 The Human–Animal Relationship in the Law	26
<i>Lenke Wettlaufer, Felix Hafner and Jakob Zinsstag</i>	
4 One Health: an Ecological and Conservation Perspective	38
<i>David H.M. Cumming and Graeme S. Cumming</i>	
 PART 2: METHODS FOR THE ASSESSMENT OF THE ANIMAL–HUMAN LINKAGES	
5 Measuring Added Value from Integrated Methods	53
<i>Jakob Zinsstag, Mahamat Béchir Mahamat and Esther Schelling</i>	
6 The Role of Social Sciences in One Health – Reciprocal Benefits	60
<i>Maxine Whittaker</i>	
7 The Role of Human–Animal Interactions in Education	73
<i>Karin Hediger and Andrea Beetz</i>	

8	Integrated Risk Assessment – Foodborne Diseases	85
	<i>Vanessa Racloz, David Waltner-Toews and Katharina D.C. Stärk</i>	
9	A One Health Perspective for Integrated Human and Animal Sanitation and Nutrient Recycling	96
	<i>Hung Nguyen-Viet, Phuc Pham-Duc, Vi Nguyen, Marcel Tanner, Peter Odermatt, Tu Vu-Van, Hoang Van Minh, Christian Zurbriigg, Esther Schelling and Jakob Zinsstag</i>	
10	One Health Study Designs	107
	<i>Esther Schelling and Jan Hattendorf</i>	
11	Animal–Human Transmission Models	122
	<i>Jakob Zinsstag, Samuel Fuhrmann, Jan Hattendorf and Nakul Chitnis</i>	
12	One Health Economics	134
	<i>Jakob Zinsstag, Adnan Choudhury, Felix Roth and Alexandra Shaw</i>	
13	Integrated Human and Animal Demographic Surveillance	146
	<i>Vreni Jean-Richard and Lisa Crump</i>	

PART 3: CASE STUDIES FROM RESEARCH TO POLICY AND PRACTICE

14	Brucellosis Surveillance and Control: a Case for One Health	153
	<i>Jakob Zinsstag, Anna Dean, Zolzaya Baljinnyam, Felix Roth, Joldoshbek Kasymbekov and Esther Schelling</i>	
15	Bovine Tuberculosis at the Human–Livestock–Wildlife Interface in Sub-Saharan Africa	163
	<i>Rea Tschopp</i>	
16	Integrated Rabies Control	176
	<i>Monique Léchenne, Mary Elizabeth Miranda and Jakob Zinsstag</i>	
17	Leptospirosis: Development of a National One Health Control Programme in Fiji	190
	<i>Simon Reid and Mike Kama</i>	
18	Human and Animal African Trypanosomiasis	201
	<i>Susan C. Welburn and Paul Coleman</i>	
19	Non-communicable Diseases: How Can Companion Animals Help in Connection with Coronary Heart Disease, Obesity, Diabetes and Depression?	222
	<i>Dennis C. Turner</i>	
20	Integrated One Health Services	230
	<i>Esther Schelling, Mahamat Béchir Mahamat, Jakob Zinsstag and Marcel Tanner</i>	
21	Beyond Fences: Wildlife, Livestock and Land Use in Southern Africa	243
	<i>David H.M. Cumming, Steven A. Osofsky, Shirley J. Atkinson and Mark W. Atkinson</i>	
22	Better Together: Identifying the Benefits of a Closer Integration Between Plant Health, Agriculture and One Health	258
	<i>Eric Boa, Solveig Danielsen and Sophie Haesen</i>	

23	Food Security, Nutrition and the One Health Nexus <i>Mahamat Béchir Mahamat, Lisa Crump, Abdessalam Tidjani, Fabienne Jaeger, Abderahim Ibrahim and Bassirou Bonfoh</i>	272
24	One Health into Action: Integrating Global Health Governance with National Priorities in a Globalized World <i>Anna Okello, Alain Vandersmissen and Susan C. Welburn</i>	283
25	One Health in Policy Development: an Integrated Approach to Translating Science into Policy <i>Susan C. Cork, Dorothy W. Geale and David C. Hall</i>	304
PART 4: CAPACITY BUILDING, PUBLIC ENGAGEMENT AND CONCEPTUAL OUTLOOK		
26	Evolution of the One Health Movement in the USA <i>Carol S. Rubin, Rebekah Kunkel, Cheri Grigg and Lonnie King</i>	318
27	Institutional Research Capacity Development for Integrated Approaches in Developing Countries: an Example from Vietnam <i>Hung Nguyen-Viet, Vi Nguyen, Phuc Pham-Duc, Le Vu Anh, Phung Dac Cam, Marcel Tanner, Delia Grace, Christian Zurbrügg, Tran Thi Tuyet Hanh, Tu Vu-Van, Luu Quoc Toan, Dang Xuan Sinh, Pham Thi Huong Giang and Jakob Zinsstag</i>	332
28	Enabling Academic One Health Environments <i>Bonnie Buntain, Lisa Allen-Scott, Michelle North, Melanie Rock and Jennifer Hatfield</i>	341
29	Individual and Institutional Capacity Building in Global Health Research in Africa <i>Bassirou Bonfoh, Mahamat Béchir Mahamat, Esther Schelling, Karim Ouattara, Aurélie Cailleau, Daniel Haydon, Sarah Cleaveland, Jakob Zinsstag and Marcel Tanner</i>	357
30	Transdisciplinary Research and One Health <i>Esther Schelling and Jakob Zinsstag</i>	366
31	Operationalizing One Health for Local Governance <i>Andrea Meisser and Anne Lévy Goldblum</i>	374
32	Non-governmental Organizations in One Health <i>Craig Stephen and David Waltner-Toews</i>	385
33	Toward a Healthy Concept of Health <i>Karen L.F. Houle, with contributions by Karin Tschanz Cooke</i>	397
34	Grappling with Complexity: the Context for One Health and the Ecohealth Approach <i>Martin J. Bunch and David Waltner-Toews</i>	415
35	Summary and Outlook of Practical Use of One Health <i>Jakob Zinsstag and Marcel Tanner</i>	427
Index		435

Contributors

Lisa Allen-Scott, Department of Community Health Sciences, Faculty of Medicine, University of Calgary 7th Floor, TRW Building, 3330 Hospital Drive NW, Calgary, Alberta, Canada T2N 4N1. E-mail: lallen@ucalgary.ca

Mark W. Atkinson, Wildlife Health & Health Policy Program, Wildlife Conservation Society, 2300 Southern Boulevard, Bronx, NY 10460, USA. E-mail: atkinsonm@me.com

Shirley J. Atkinson, Wildlife Health & Health Policy Program, Wildlife Conservation Society, 2300 Southern Boulevard, Bronx, NY 10460, USA. E-mail: satkinson@wcs.org

Zolzaya Baljinnyam, Animal Health Project, Swiss Agency for Development and Cooperation, Mongolia Swiss Agency for Development and Cooperation-Mongolia, Government Building 11, Room 601, Chingeltei District 4, J.Sambuu Street-11, Ulaanbaatar 15141, Mongolia. E-mail: zola.baljinnyam@yahoo.com

Mahamat Béchir Mahamat, Centre National de Nutrition et de Technologie Alimentaire du Ministère de la Santé Publique au Tchad, N'Djaména, Chad, Ministère de la Santé Publique, N'Djaména, Chad and Centre de Support en Santé Internationale, N'Djaména, Chad. E-mail: mahamatbechir@yahoo.fr

Andrea Beetz, Department of Special Education, University of Rostock, Germany, Department of Behavioural Biology, University of Vienna, Austria, Institut für Sonderpädagogische Entwicklungsförderung und Rehabilitation, August-Bebel-Str. 28, 18055 Rostock, Germany. E-mail: andrea.m.beetz@gmail.com

Eric Boa, Independent Consultant, 17 Overdale Avenue, New Malden, Surrey KT3 3UE, UK. E-mail: eric_boa@hotmail.com

Bassirou Bonfoh, Centre Suisse de Recherches Scientifiques en Côte d'Ivoire, Abidjan, Côte d'Ivoire. E-mail: bassirou.bonfoh@csrs.ci

Michael Bresalier, Department of History, King's College London, Strand, London WC2R 2LS. E-mail: michael.bresalier@kcl.ac.uk

Martin Bunch, Faculty of Environmental Studies, York University, 4700 Keele Street, Toronto, Ontario, Canada M3J 1P3. E-mail: bunchmj@yorku.ca

Bonnie Buntain, Department of Ecosystem and Public Health, Faculty of Veterinary Medicine, Department of Community Health Sciences, Faculty of Medicine, University of Calgary TRW 2D19, 3280 Hospital Dr NW, Calgary, Alberta, Canada T2N 4Z6. E-mail: bonnie.buntain@ucalgary.ca

Aurelie Cailleau, Centre Suisse de Recherches Scientifiques en Côte d'Ivoire, Abidjan, Côte d'Ivoire. E-mail: aurelie.cailleau@gmail.com

Angela Cassidy, Department of History, King's College London, Strand, London WC2R 2LS. E-mail: angela.cassidy@kcl.ac.uk; angela.cassidy@gmail.com

Nakul Chitnis, Swiss Tropical and Public Health Institute, Socinstrasse 57, PO Box CH-4002, Basel. University of Basel, Basel, Switzerland. E-mail: nakul.chitnis@unibas.ch

Adnan Choudhury, The University of Queensland School of Population Health, Herston, Queensland 4006, Australia. E-mail: a.choudhury@sph.uq.edu.au

Sarah Cleaveland, Institute of Biodiversity, Animal Health and Comparative Medicine, University of Glasgow College of Medical, Veterinary & Life Sciences, Graham Kerr Building, University of Glasgow, Glasgow G12 8QQ, Scotland. E-mail: Sarah.Cleaveland@glasgow.ac.uk

Paul Coleman, Department of Disease Control, Faculty of Infectious and Tropical Diseases, London School of Hygiene & Tropical Medicine, Keppel Street, Bloomsbury, London WC1E 7HT. E-mail: paul.coleman@h2ovp.com

Susan Cork, Department of Ecosystem & Public Health, Faculty of Veterinary Medicine, University of Calgary, 3280 Hospital Drive, Calgary NW, T2N 4Z6. E-mail: sccork@ucalgary.ca

Lisa Crump, Swiss Tropical and Public Health Institute, Socinstrasse 57, PO Box CH-4002, Basel. University of Basel, Basel, Switzerland. E-mail: lisa.crump@unibas.ch

David H.M. Cumming, Percy FitzPatrick Institute, DST/NRF Centre of Excellence, University of Cape Town, South Africa; Tropical Resource Ecology Programme, Department of Biological Sciences, University of Zimbabwe, PO Box MP 167, Mount Pleasant, Harare, Zimbabwe. E-mail: cummingdhm@gmail.com

Graeme S. Cumming, Percy FitzPatrick Institute of African Ornithology, DST/NRF Centre of Excellence, University of Cape Town, Rondebosch 7701, South Africa. E-mail: gscumming@gmail.com

Phung Dac Cam, National Institute of Hygiene and Epidemiology, 1 Yersin Street, Hai Ba Trung, Hanoi, Vietnam. E-mail: cam@fpt.vn

Solveig Danielsen, CABI, Kastanjelaan 5, 3833 AN Leusden, the Netherlands. E-mail: s.danielsen@cabi.org

Anna Dean, Swiss Tropical and Public Health Institute, Socinstrasse 57, PO Box CH-4002, Basel. University of Basel, Basel, Switzerland. E-mail: deanan@who.int

Samuel Fuhrmann, Swiss Tropical and Public Health Institute, Socinstrasse 57, PO Box CH-4002, Basel. University of Basel, Basel, Switzerland. E-mail: samuel.fuhrmann@unibas.ch

Dorothy Geale, Canadian Food Inspection Agency, 7494 Vimy Ridge Road, Port Hope, Ontario, L1A 3V6, Canada. E-mail: dwgeale@gmail.com

Delia Grace, International Livestock Research Institute, Box 30709, Nairobi, Kenya. E-mail: d.grace@cgiar.org

Cheri T. Grigg, One Health Office, National Center for Emerging and Zoonotic Infectious Diseases, Centers for Disease Control and Prevention, 1600 Clifton Road NE, MS A-30, Atlanta, GA 30333, USA. E-mail: cgrigg@cdc.gov

Sophie Haesen, Swiss Tropical and Public Health Institute, Socinstrasse 57, PO Box CH-4002, Basel. University of Basel, Basel, Switzerland. E-mail: sophie.haesen@unibas.ch

Felix Hafner, Faculty of Law, University of Basel, Peter Merian-Weg 8, PO Box CH-4002, Basel. E-mail: Felix.hafner@unibas.ch

David Hall, Department of Ecosystem & Public Health, Faculty of Veterinary Medicine, University of Calgary, 3280 Hospital Drive, Calgary NW, Canada T2N 4Z6. E-mail: dchall@ucalgary.ca

Jennifer Hatfield, Global Health and International Partnerships, Faculty of Medicine, University of Calgary 7th Floor, TRW Building, 3330 Hospital Drive NW, Calgary, Alberta, Canada T2N 4N1. E-mail: jennifer.hatfield@ucalgary.ca

Jan Hattendorf, Swiss Tropical and Public Health Institute, Socinstrasse 57, PO Box CH-4002, Basel. University of Basel, Basel, Switzerland. E-mail: jan.hattendorf@unibas.ch

Daniel Haydon, Institute of Biodiversity, Animal Health and Comparative Medicine, University of Glasgow College of Medical, Veterinary & Life Sciences, Graham Kerr Building, University of Glasgow, Glasgow G12 8QQ, Scotland. E-mail: Daniel.Haydon@glasgow.ac.uk

Karin Hediger, Swiss Tropical and Public Health Institute, University of Basel; Institute for Interdisciplinary Research on the Human–Animal Relationship (IEMT) Zurich, Socinstrasse 57, PO Box CH-4002, Basel. University of Basel, Basel, Switzerland. E-mail: karin.hediger@unibas.ch

Karen L.F. Houle, University of Guelph, 337 MacKinnon Building, Guelph, Ontario, Canada N1G 2W1. E-mail: khoule@uoguelph.ca

Abderahim Ibrahim, Université de N'Djaména, Faculté des Sciences et de la Santé, N'Djaména, Chad. E-mail: abderahimibrahim@yahoo.fr

Fabienne N. Jaeger, Swiss Tropical and Public Health Institute, Socinstrasse 57, PO Box CH-4002, Basel. University of Basel, Basel, Switzerland. E-mail: fabienne.jaeger@unibas.ch

Vreni Jean-Richard, Swiss Tropical and Public Health Institute, Socinstrasse 57, PO Box CH-4002, Basel. University of Basel, Basel, Switzerland. E-mail: vreni@jean-richard.ch

Mike Kama, Fiji Centre for Communicable Disease Control, Fiji Ministry of Health, Mataika House, Tamavua, The Republic of Fiji. E-mail: mnkama02@gmail.com

Joldoshbek Kasymbekov Swiss Tropical and Public Health Institute, Institute of Biotechnology of the National Academy of Sciences of the Kyrgyz Republic, 243 Chui Avenue, Bishkek 720071, Kyrgyzstan. E-mail: joldoshbek.kasymbekov@gmail.com

Lonnie J. King, College of Veterinary Medicine, Ohio State University, 1900 Coffey Road, Columbus, Ohio 43210, USA. E-mail: King.1518@osu.edu

Rebekah M. Kunkel, One Health Office, National Center for Emerging and Zoonotic Infectious Diseases, Centers for Disease Control and Prevention, 600 Clifton Road NE, MS A-30, Atlanta, GA 30333, USA. E-mail: rkunkel@cdc.gov

Monique Léchenne, Swiss Tropical and Public Health Institute, University of Basel, Socinstrasse 57, PO Box CH-4002, Basel. E-mail: monique.lechenne@unibas.ch

Anne Lévy Goldblum, Gesundheitsdepartement Basel-Stadt, Gerbergasse 13, PO Box CH-4001, Basel. E-mail: anne.levy@bs.ch

Andrea Meisser, Swiss Tropical and Public Health Institute, University of Basel, Socinstrasse 57, PO Box CH-4002, Basel. E-mail: andrea.meisser@unibas.ch

Mary Elizabeth Miranda, Research Institute for Tropical Medicine, Department of Health, the Philippines, 10 Aralia St, Ayala Westgrove Heights, Silang, Cavite, the Philippines 4118. E-mail: betsygmiranda2@gmail.com

Vi Nguyen, Centre for Public Health and Ecosystem Research, Hanoi School of Public Health, 138 Giang Vo, Hanoi, Vietnam. E-mail: vivivinguyen@gmail.com

Hung Nguyen-Viet, Hanoi School of Public Health, 17A, Nguyen Khang Street, Trung Hoa Ward, Cau Giay District, Hanoi, Vietnam. E-mail: h.nguyen@cgiar.org

Michelle North, Department of Ecosystem and Public Health, University of Calgary TRW 2D26, 3280 Hospital Dr NW, Calgary, Alberta, Canada T2N 4Z6. E-mail: manorth@ucalgary.ca

Peter Odermatt, Swiss Tropical and Public Health Institute, Socinstrasse 57, PO Box CH-4002, Basel. E-mail: peter.odermatt@unibas.ch

Anna Okello, Division of Pathway Medicine & Centre for Infectious Diseases, School of Biomedical Sciences, College of Medicine & Veterinary Medicine, The University of Edinburgh, Chancellor's Building, 49 Little France Crescent, Edinburgh, EH16 4SB, Scotland. E-mail: Anna.Okello@ed.ac.uk

Steven A. Osofsky, Wildlife Health & Health Policy Program, Wildlife Conservation Society, 2300 Southern Boulevard, Bronx, NY 10460, USA. E-mail: sosofsky@wcs.org

Karim Ouattara, Centre Suisse de Recherches Scientifiques en Côte d'Ivoire, Abidjan, Côte d'Ivoire. E-mail: karim.ouattara@csrs.ci

Phuc Pham-Duc, Centre for Public Health and Ecosystem Research, Hanoi School of Public Health, 138 Giang Vo, Hanoi, Vietnam. E-mail: pdp@hsph.edu.vn

Luu Quoc Toan, Centre for Public Health and Ecosystem Research, Hanoi School of Public Health, 138 Giang Vo, Hanoi, Vietnam. E-mail: lqt@hsph.edu.vn

Vanessa Racloz, Roll Back Malaria, World Health Organization, Avenue Appia 20, CH-1211, Geneva. E-mail: raclozv@who.int

Simon Reid, The University of Queensland School of Population Health, Herston, QLD 4006, Australia. E-mail: simon.reid@uq.edu.au

Melanie Rock, Department of Community Health Sciences, Faculty of Medicine, Department of Ecosystem and Public Health, University of Calgary TRW 3E13, 3280 Hospital Dr NW, Calgary, Alberta, Canada T2N 4Z6. E-mail: mrock@ucalgary.ca

Felix Roth, Swiss Tropical and Public Health Institute, Socinstrasse 57, PO Box CH-4002, Basel. E-mail: felix.roth@unibas.ch

Carol Rubin, One Health Office, National Center for Emerging and Zoonotic Infectious Diseases, Centers for Disease Control and Prevention, 1600 Clifton Road NE, MS A-30, Atlanta, GA 30333, USA. E-mail: crubin@cdc.gov

Esther Schelling, Swiss Tropical and Public Health Institute, Socinstrasse 57, PO Box CH-4002, Basel. E-mail: esther.schelling@unibas.ch

Alexandra Shaw, The University of Edinburgh, Edinburgh, UK; Upper Cottage, Abbotts Ann, Andover Hants SP11 7BA, UK. E-mail: alex@apconsultants.co.uk

Katharina Stärk, SAFOSO AG, Bern, Switzerland, and Royal Veterinary College, Department of Production and Population Health, Hawkshead Lane, North Mymms AL9 7TA, UK. E-mail: kstaerk@rvc.ac.uk

Craig Stephen, Executive Director, Canadian Cooperative Wildlife Health Centre and Professor, Western College of Veterinary Medicine, University of Saskatchewan, 52 Campus Drive, Saskatoon, Canada, S7N 5B4. E-mail: csthep@cwhc-rcsf.ca

Marcel Tanner, Swiss Tropical and Public Health Institute, Socinstrasse 57, PO Box CH-4002, Basel. E-mail: marcel.tanner@unibas.ch

Pham Thi Huong Giang, Centre for Public Health and Ecosystem Research, Hanoi School of Public Health, 138 Giang Vo, Hanoi, Vietnam. E-mail: pthg@hsph.edu.vn

Tran Thi Tuyet Hanh, Centre for Public Health and Ecosystem Research, Hanoi School of Public Health, 138 Giang Vo, Hanoi, Vietnam. E-mail: tth2@hsph.edu.vn

Abdessalam Tidjani, University of N'Djaména, Faculty of Science and Health, Université de N'Djaména, N'Djaména, Chad. E-mail: abdelti@yahoo.fr

Karin Tschanz Cooke, Director of Post-Graduate Mas in Systemic Pastoral Counseling and Pastoral Psychology, University of Bern, Switzerland. E-mail: karin.tschanz@yahoo.com

Rea Tschopp, Armauer Hansen Research Institute, PO Box 1005, Addis Ababa, Ethiopia. E-mail: rea.tschopp@unibas.ch

Dennis C. Turner, IEMT, IEAP/IET, Seestrasse 254, CH-8810 Horgen, Switzerland. E-mail: dennis@turner-iet.ch

Minh Van Hoang, Institute of Public Health and Preventive Medicine, Hanoi Medical University, 1 Ton That Tung Street, Dong Da, Hanoi, Vietnam. E-mail: hoangvanminh@hmu.edu.vn

Alain Vandersmissen, European Union, European External Action Service, B-1046 Brussels, Belgium. E-mail: alain.vandersmissen@ex.europa.eu

Le Vu Anh, Hanoi School of Public Health, 138 Giang Vo Street, Hanoi, Vietnam. E-mail: lva@hsph.edu.vn

Tu Vu-Van, Centre for Public Health and Ecosystem Research, Hanoi School of Public Health, 138 Giang Vo Street, Hanoi, Vietnam. E-mail: vuvantu@gmail.com

David Waltner-Toews, Professor Emeritus, Department of Population Medicine, University of Guelph, Founding President, Veterinarians without Borders/Vétérinaires sans Frontières – Canada, 33 Margaret Ave, Kitchener, Ontario, Canada N2H 4H1. E-mail: dwtoews@gmail.com

Susan C. Welburn, Division of Infection and Pathway Medicine, School of Biomedical Sciences, College of Medicine & Veterinary Medicine, The University of Edinburgh, Chancellor's Building, 49 Little France Crescent, Edinburgh EH16 4SB, UK. E-mail: sue.welburn@ed.ac.uk

Lenke Wettlaufer, Faculty of Law, University of Basel, Peter Merian-Weg 8, PO Box CH-4002, Basel. E-mail: lenke.wettlaufer@unibas.ch

Maxine Whittaker, School of Population Health, University of Queensland, Room 123, Public Health Building, Medical School, Herston Rd, Herston, Qld 4006, Australia. E-mail: m.whittaker@uq.edu.au

Abigail Woods, Department of History, King's College London, Strand, London WC2R 2LS.
E-mail: abigail.woods@kcl.ac.uk

Dang Xuan Sinh, Centre for Public Health and Ecosystem Research, Hanoi School of Public Health, 138 Giang Vo Street, Hanoi, Vietnam. E-mail: dxs@hsph.edu.vn

Jakob Zinsstag, Swiss Tropical and Public Health Institute, Socinstrasse 57, PO Box CH-4002, Basel. E-mail: jakob.zinsstag@unibas.ch

Chris Zurbrügg, Swiss Federal Institute of Aquatic Science and Technology, Department of Water and Sanitation in Developing Countries, PO Box CH-8600, Dübendorf, Switzerland.
E-mail: Christian.Zurbruegg@eawag.ch

Editors' Preface

Since the late 1990s, One Health has become a unifying concept for a wide variety of governmental and non-governmental organizations concerned with human and animal health, wildlife conservation and environmental sustainability. In the wake of the avian influenza pandemic threat, the World Health Organization (WHO), the Food and Agriculture Organization (FAO) and the World Organisation for Animal Health (OIE) joined forces in what is called the 'Tripartite' engagement at the human–animal–ecosystem interface. One Health has become the lead concept in research, capacity building and translational consortia such as the EU-funded Integrated Control of Neglected Zoonoses (ICONZ) and the Training of the One Health Next Generation (OH-NEXTGEN) as well as the Wellcome Trust-funded Afrique One consortium.

We understand One Health foremost as any added value in terms of better health and well-being for humans and animals, financial savings and improved environmental services achieved from closer cooperation between practitioners and scholars concerned with human health, animal health and related outcomes, beyond what can be achieved by working alone. This operational statement shows the need for underlying theory, practical methods and case examples.

What is the added value of another book? Our experiences in Africa, Central Asia, North America, Asia, the Pacific and Australia/New Zealand show that human and animal health professionals remain in their specific silos despite encouraging improvements. We are always surprised how little the different disciplines know about each other and how little they communicate among and between each other.

Beyond merely research, One Health should translate into policy and practice for the betterment of health of communities, their animals and the integrity of their environment. The relationship between theory, policy and practice is a recursive one. Implementing One Health activities in different cultures can lead us to question some of our fundamental ideas about what constitutes good health, which then changes how we practise, which leads to further questioning. In order to learn from our experience in this process and to keep these ideas relevant in chaotic times and diverse settings, it is important to examine more explicitly both ourselves and the central ideas on which the programmes we promote are based. We hope this book both informs its readers and stretches us to reflect and learn from our personal experiences of One Health, as well as those of the people, animals and environments with which we work.

The present interdisciplinary textbook is based on more than a decade of experiences of research and translational teams and provides a comprehensive but minimal essential overview

on One Health theory and practice. It is intended for all those working for the health of communities in research and implementation, who see the need in their daily activities to liaise with other disciplines and sectors. This involves among others, human and animal health, social and cultural sciences, economics, environmental sciences and engineering and conservation. The book will benefit students in human and veterinary medicine, health and environmental sciences and biology to ground them in modern inter- and transdisciplinary methods. The book should also serve professionals in academia, technical authorities and government with its numerous practical examples and case studies on disease control, service provision, conservation and academic teaching.

The making of this book would not have been possible without the dedicated coordination of Dr Lisa Crump, whose tireless support is gratefully acknowledged. We would like to thank all lead authors and co-authors for their important contributions and hope that they will benefit from the book for their own work. Numerous external reviewers are thanked for their critical comments which greatly helped to improve the content of the book. We thank Bolor Bold, Sophie Haesen, Monique Léchenne, Rose Marie Subasic and Kurt Pfister for their support with copy-editing. Dr Borna Müller graciously contributed numerous graphical representations and figures. We would like to thank Rachel Cutts and Alexandra Lainsbury from CABI for their most helpful support.

Jakob Zinsstag
Esther Schelling
David Waltner-Toews
Maxine Whittaker
Marcel Tanner
May 2014

FAO Foreword

The One Health concept, or approach, is far from new, but its rediscovery is most welcome. Hippocrates (460–370 BCE) purportedly stated 'The soul is the same in all living creatures, although the body of each is different', recognizing that at the time, the soul had a more encompassing definition than we give today with regard to intellectual, emotional intensity or energy.

Such great thinkers as Rudolf Virchow, Robert Koch, Louis Pasteur, Aldo Leopold, Rachel Carlson, Pedro Acha and Calvin Schwabe contributed to our growing understanding of humans within their environment, the cause and effect and interrelationships between microbes, pathogens, contaminants, health and disease in a biotic and abiotic realm. While most human diseases that have emerged in the last half a century can be traced to an animal source, mostly coming from wildlife, and are often the focus for One Health discussions, non-zoonotic diseases cannot be excluded from the One Health dialogue. Animal diseases – in their entirety – limit efficiencies in production and erode biodiversity. They affect public health in terms of lower availability of quality nutritious products of animal origin and negatively influence the cognitive development of children, the responsiveness of the immune system and maternal health. In addition, these diseases negatively impact livelihoods, community trade and individual and national wealth.

Undoubtedly, addressing and attaining global health is a complex endeavour. It requires more than physicians and veterinarians collaborating to address individual or communal health. The disease drivers to emergence, maintenance and spread, dynamically revolve around factors and trends in population growth, demand for more dietary protein, widespread poverty, access to goods and services from the private and public sectors, growing trade and globalization. They further include environmental encroachment and natural resource degradation, immigration and peri-urban sprawl, political and social instability and economics. To address disease prevention at the root, classic non-health discipline specialists such as economists, sociologists, wildlife biologists, communication specialists, city and global planners and financiers have much to contribute.

The Food and Agriculture Organization (FAO) brings together top leaders in economic and social development, forestry and natural resources managers, environmental scientists, specialists in aquaculture and fisheries, nutritionists and geneticists, crop production specialists and pathologists, statisticians, veterinary public health and infectious disease experts from more than 194 countries for the purpose of eliminating hunger and poverty. The production of quality and nutritious food in a resilient environment is the cornerstone to health. Without health, we and our partners will not eliminate hunger or poverty. FAO, thus, is a One Health organization.

Throughout this book numerous cases studies show that the operationalization of One Health is possible and indicators of its positive impact in health terms crystalize at the local level. International institutions such as the FAO, the World Organisation for Animal Health and the World Health Organization recognize their joint responsibility and have established common platforms to address critical issues such as antimicrobial resistance or pandemic threats. Elements for furthering the impact of the One Health approach remain elusive and will need to develop national and regional bodies to embrace the required collaborative, multisectoral and transdisciplinary approach. This book provides a valuable resource for the theoretical background, novel methods and practical examples on One Health and will be a valuable reference for all.

Juan Lubroth
Food and Agriculture Organization of the United Nations

OIE Foreword

One Health seeks incremental benefits from closer cooperation of public and animal health. Such approaches have gained significant momentum in the past decades at the level of the international organizations, national governments, technical authorities and academia. From the perspective of the World Organisation of Animal Health (OIE), I particularly welcome this textbook providing a theoretical foundation, genuine One Health methods, numerous practical examples on disease control and experiences from local and national policy and academic curricula.

As a common theme the book seeks to demonstrate added value of collaborative approaches in human and animal health, social and environmental sciences and economics. After a historical overview, theoretical foundations of One Health provide a framework for the development of interconnected methods measuring quantitative and qualitative benefits using many different disciplines ranging from mathematics to molecular biology and the social sciences. One Health challenges the legal aspects of the human–animal relationship, eliciting new thinking on an intrinsic value of animals. The book documents the important role of wildlife conservation on the development of One Health by the formulation of the Manhattan principles. It suggests that sustainable conservation of wildlife requires healthy humans and animals surrounding protection areas. The social and educational sciences contribute and benefit from One Health shedding light on the human–animal bond and its ramifications far beyond infectious diseases.

One Health becomes a key approach for risk assessment and food safety. Population growth and the livestock revolution warrant novel ideas for environmental sanitation, which are addressed with examples from South-east Asia. The book shows further how health and demographic surveillance of human populations can be extended to livestock, which makes a lot of sense for pastoralist populations worldwide.

Joint animal and human health approaches for the control of zoonotic diseases like brucellosis, bovine tuberculosis, rabies, leptospirosis and trypanosomiasis provide key examples for One Health. They are complemented by a particularly compelling story on joint human and animal vaccination services to mobile pastoralists in Chad. It is based on the observation that in the pastoralist area of Lake Chad there were more cattle vaccinated than children. Several chapters show that One Health is not only applicable in developing countries but has a high potential for industrial and transition countries to address non-communicable diseases or antimicrobial resistance surveillance.

One Health academic studies provide the basis for policy and practice with examples from New Zealand, the Fiji Islands, the USA and Canada. The last part of the book outlines efforts and enabling environment for capacity building, such as joint appointments between veterinary and medical faculties and the development of new One Health research groups in Asia and Africa.

In the past decade, OIE adopted a leadership role early on and has been instrumental in putting the One Health vision into practice. This has been facilitated by a formal alliance on this topic with the World Health Organization (WHO) and the Food and Agriculture Organization of the United Nations (FAO). The three organizations have published a joint Concept Note clarifying their reciprocal responsibilities and their objectives in this field.

The OIE publishes international standards on the good governance of both the public and private sector components of veterinary services, including the initial training and continuing education of the various actors involved. Furthermore, if an OIE member country so wishes, the OIE can carry out an independent assessment of their veterinary services' compliance with OIE quality standards using the Performance of Veterinary Services (PVS) Evaluation Tool. It can also carry out further assessments that enable member countries to calculate the investments and legislative and technical reforms needed to bring their veterinary services into line with these quality standards.

These assessments, which are known collectively as the OIE 'PVS Pathway', have already benefited nearly 120 member countries. As part of the Pathway, the OIE is piloting an assessment tool that evaluates the One Health component of veterinary services; this tool has already been successfully tested in three countries. It is designed to help countries to establish closer collaboration between veterinary services and public health services, in compliance both with the quality standards of the OIE and with the International Health Regulations (IHR) of the WHO. The recent decision of the WHO to develop a tool similar to the PVS Evaluation Tool to assist its member countries to assess their compliance with the IHR (and estimate the costs of improving it) is another example of the benefits of the collaborative One Health approach. Recently, WHO and OIE developed together an operational guide for member countries explaining how PVS principles and IHR obligations can be implemented together in a parallel way in full cooperation between veterinary services and public health services.

I commend the editors for putting together this textbook, which will further strengthen the efforts of OIE and provide a comprehensive overview for all those who want to put One Health to action for the betterment of the health of humans, livestock, companion animals and wildlife.

Bernard Vallat
World Organisation for Animal Health (OIE)

WHO Foreword

This book is a tribute to the advances being made in changing the paradigm to address effectively the health and well-being of people and animals within the environment that they share.

It is a significant resource not only for health and veterinary practitioners, but for the larger community that increasingly recognizes the benefits of interlinking different disciplines and sectors to solve problems at the interface of people, animals and their environment. It makes the case of complementarity and that pooling of expertise, data, knowledge, functional networks, operational systems and stakeholders translates into improved health outcomes, better livelihoods and increased effectiveness. The authors present case studies based on first experiences of how One Health policies can successfully be put into practice in a variety of settings, with a strong focus on the benefits, including the economic benefits, which can be achieved through integrated health approaches through One Health.

Bernadette Abela-Ridder
World Health Organization