

Cambridge University Press & Assessment

978-1-108-94967-5 — Systems Thinking Analyses for Health Policy and Systems Development

Edited by Jo. M. Martins , Indra Pathmanathan , David T. Tan ,

Shiang Cheng Lim , Pascale Allotey

Frontmatter

[More Information](#)

Systems Thinking Analyses for Health Policy and Systems Development

Health systems are fluid and their components are interdependent in complex ways. Policymakers, academics and students continually endeavour to understand how to manage health systems to improve the health of populations. However, previous scholarship has often failed to engage with the intersections and interactions of health with a multitude of other systems and determinants. This book ambitiously takes on the challenge of presenting health systems as a coherent whole, by applying a systems-thinking lens. It focuses on Malaysia as a case study to demonstrate the evolution of a health system from a low-income developing status to one of the most resilient health systems today. A rich collaboration of multidisciplinary academics working with policymakers who were at the coalface of decision-making and practitioners with decades of experience, provides a candid analysis of what worked and what did not. The result is an engaging, informative and thought-provoking intervention in the debate. This title is Open Access.

JO. M. MARTINS is Adjunct Professor at the International Medical University, Kuala Lumpur, Malaysia.

INDRA PATHMANATHAN is Principal Visiting Fellow in the International Institute of Global Health, United Nations University, Kuala Lumpur, Malaysia.

DAVID T. TAN is Head of Experimentation in the United Nations Development Programme.

SHIANG CHENG LIM is Country Technical Lead for Better Health Programme Malaysia at RTI International (Malaysia Office).

PASCALE ALLOTEY is Director of the International Institute for Global Health at United Nations University.

Systems Thinking Analyses for Health Policy and Systems Development

A Malaysian Case Study

Edited by

J O. M. MARTINS

International Medical University

INDRA PATHMANATHAN

United Nations University International Institute for Global Health

DAVID T. TAN

United Nations University International Institute for Global Health

SHIANG CHENG LIM

United Nations University International Institute for Global Health

PASCALE ALLOTEY

United Nations University International Institute for Global Health



CAMBRIDGE
UNIVERSITY PRESS

Cambridge University Press & Assessment
 978-1-108-94967-5 — Systems Thinking Analyses for Health Policy and Systems Development
 Edited by Jo. M. Martins, Indra Pathmanathan, David T. Tan,
 Shiang Cheng Lim, Pascale Allotey
 Frontmatter
[More Information](#)



Shaftesbury Road, Cambridge CB2 8EA, United Kingdom
 One Liberty Plaza, 20th Floor, New York, NY 10006, USA
 477 Williamstown Road, Port Melbourne, VIC 3207, Australia
 314–321, 3rd Floor, Plot 3, Splendor Forum, Jasola District Centre, New Delhi – 110025, India
 103 Penang Road, #05–06/07, Visioncrest Commercial, Singapore 238467

Cambridge University Press is part of Cambridge University Press & Assessment, a department of the University of Cambridge.

We share the University's mission to contribute to society through the pursuit of education, learning and research at the highest international levels of excellence.

www.cambridge.org

Information on this title: www.cambridge.org/9781108949675

DOI: 10.1017/9781108954846

© United Nations University International Institute for Global Health 2021

This work is in copyright. It is subject to statutory exceptions and to the provisions of relevant licensing agreements; with the exception of the Creative Commons version the link for which is provided below, no reproduction of any part of this work may take place without the written permission of Cambridge University Press & Assessment

An online version of this work is published at doi.org/10.1017/9781108954846 under a Creative Commons Open Access license CC-BY-NC-SA 4.0 which permits re-use, distribution and reproduction in any medium for non-commercial purposes providing appropriate credit to the original work is given, any changes made are indicated, and the new work is published under the same license terms. To view a copy of this license, visit <https://creativecommons.org/licenses/by-nc-sa/4.0>

All versions of this work may contain content reproduced under license from third parties. Permission to reproduce this third-party content must be obtained from these third-parties directly. When citing this work, please include a reference to the DOI 10.1017/9781108954846

First published 2021

First paperback edition 2023

A catalogue record for this publication is available from the British Library

Library of Congress Cataloging-in-Publication data

Names: Martins, Jo. M., 1936– editor.

Title: Systems thinking analyses for health policy and systems development : a Malaysian case study / edited by Jo. M. Martins, Indra Pathmanathan, David T. Tan, Shiang Cheng Lim, Pascale Allotey.

Description: Cambridge, United Kingdom ; New York, N.Y. : Cambridge University Press, 2021. |

Includes bibliographical references and index.

Identifiers: LCCN 2020053664 | ISBN 9781108845205 (hardback) | ISBN 9781108949675

(paperback) | ISBN 9781108954846 (ebook)

Subjects: LCSH: Medical policy – Malaysia. | Integrated delivery of health care – Malaysia. | Medical care – Malaysia.

Classification: LCC RA395.M35 S97 2021 | DDC 362.109595–dc23

LC record available at <https://lcn.loc.gov/2020053664>

ISBN 978-1-108-84520-5 Hardback

ISBN 978-1-108-94967-5 Paperback

Cambridge University Press & Assessment has no responsibility for the persistence or accuracy of URLs for external or third-party internet websites referred to in this publication and does not guarantee that any content on such websites is, or will remain, accurate or appropriate. LM



UNITED NATIONS
UNIVERSITY

UNU-IIGH

International Institute
for Global Health

Contents

<i>List of Figures</i>	page viii
<i>List of Tables</i>	xiv
<i>List of Boxes</i>	xviii
<i>Biographies of Editors and Contributors</i>	xxi
<i>Foreword by Dr Abdul Ghaffar</i>	xxxix
<i>Foreword by Dr Noor Hisham Abdullah</i>	xxxv
<i>Preface</i>	xxxvii
<i>Acknowledgements</i>	xxxix
<i>List of Abbreviations</i>	xli

Section I

1 An Introduction to Health Systems	3
DAVID MCCOY AND PASCALE ALLOTEY	
2 Systems Thinking for Health System Improvement	17
BARRY NEWELL, DAVID T. TAN AND KATRINA PROUST	

Section II

3 Malaysia's Health and Socio-economic Transformation	33
JO. M. MARTINS	
4 Health Service Delivery: Primary Health Care	65
SHIANG CHENG LIM, INDRA PATHMANATHAN AND SAFURAH JAAFAR	
Case Study 4.1 REAP-WISE: Malaysia's Experience in Integrated Primary Health Care Services	98
SHIANG CHENG LIM, SAFURAH JAAFAR AND DAVID T. TAN	

Case Study 4.2 Managed Care Organisations as Intermediaries in the Provision of Healthcare by GPs to Private Sector Employees	107
KUAN JOO LIM, MILTON LUM, INDRA PATHMANATHAN AND DAVID T. TAN	
5 Health Service Delivery: Secondary and Tertiary Care	116
INDRA PATHMANATHAN, MILTON LUM AND ANUAR ZAINI	
Case Study 5.1 Expanded Access to Dialysis Services through Public Funding of Private Delivery	164
INDRA PATHMANATHAN, MILTON LUM, ANUAR ZAINI AND DAVID T. TAN	
6 Health Service Delivery: Disease Prevention and Control	172
SHIANG CHENG LIM	
Case Study 6.1 Adoption of Harm Reduction Strategies for Preventing HIV among Injecting Drug Users	209
SHIANG CHENG LIM AND DAVID T. TAN	
7 Health Service Delivery: Environmental Health Services	221
MUKUNDAN SUGUNAN PILLAY AND DEBBIE SIRU	
Case Study 7.1 Rural Water Supply and Sanitation	235
MUKUNDAN SUGUNAN PILLAY, DEBBIE SIRU AND DAVID T. TAN	
Case Study 7.2 Clinical Waste Management	241
DEBBIE SIRU, MUKUNDAN SUGUNAN PILLAY AND DAVID T. TAN	
8 Health Workforce	254
INDRA PATHMANATHAN	
Case Study 8.1 Unexpected Influx of New Medical Graduates Threatens to Overwhelm the Health System	293
INDRA PATHMANATHAN AND DAVID T. TAN	
9 Financing Health Care	306
CHIU-WAN NG	

<i>Contents</i>	vii
Case Study 9.1 Development of a Case-Mix System for Improving Efficiency in Ministry of Health Hospitals CHIU-WAN NG, THARANI LOGANATHAN, KUAN- JOO LIM AND DAVID T. TAN	331
10 Health Information NURAIDAH M. MARZUKI, FAZILAH S. ALLAUDIN, SUPATHIRATHEAVY RASIAH AND JO. M. MARTINS	337
Case Study 10.1 Challenges in Introducing Telehealth NURAIDAH M. MARZUKI AND DAVID T. TAN	361
11 Medical Products THOMAS PARADATHATHU AND CHEE HAN LIM	367
Case Study 11.1 Challenges in Regulating Traditional Medical Products THOMAS PARADATHATHU, CHEE HAN LIM AND DAVID T. TAN	395
12 Leadership and Governance JO. M. MARTINS AND INDRA PATHMANATHAN	402
Case Study 12.1 Leadership Enabled Affordable Treatment of Hepatitis C in Malaysia CHEE HAN LIM, FAIZUL NIZAM BIN ABU SALIM AND DAVID T. TAN	431
Section III	
13 Lessons from a Health System in Evolution DAVID MCCOY, INDRA PATHMANATHAN, DAVID T. TAN, JO. M. MARTINS AND SHIANG CHENG LIM	449
14 Toward a Systems Thinking Theory for Health Systems DAVID T. TAN	473
<i>Appendix I Systems Thinking Analysis of STC</i> DAVID T. TAN AND INDRA PATHMANATHAN	151
<i>Appendix II Supplementary Tables</i>	155
<i>Appendix III Supplementary Tables</i>	202
<i>Appendix IV Detailed Acknowledgements</i>	494
<i>Index</i>	499

Figures

2.1	The susceptible–infected–recovered (SIR) system	<i>page</i> 21
2.2	A causal loop diagram (CLD)	22
2.3	Two types of feedback structure	23
2.4	An influence diagram (ID)	24
4.1	Pap smear slides taken and coverage in Malaysia, 1994–2003	79
4.2	Trends in the utilisation pattern of OPDs	81
4.3	Estimated outpatient visits to clinics per capita per annum, Malaysia, 1930s–2000s	87
4-A	Expansion of scope in PHC services	98
4-B	Approaches to healthcare require supportive practices and systems, which in turn create an ecosystem that is aligned to and facilitates that approach	100
4-C	Four changes to the PHC clinics' setting were critical to the ecosystem change: locus of financing and decision-making, scope and alignment of healthcare staff responsibilities, professional development pathways, and facilities and operations	101
4-D	Reviewed approach of primary healthcare (REAP-WISE)	102
4-a	Employee expectations and unionisation determine the effectiveness of their demands of employers for healthcare benefits	108
4-b	MCO-imposed caps on per-visit reimbursement generates hidden costs through multiple visits (R1) or inadequate provision of care (B2)	110
4-c	Impact of MCOs on employer–employee–union dynamics changing the prior system (Figure 4-a) in ways that result in lower health benefits for the workforce	112

<i>List of Figures</i>	ix
4-d Pathways toward government regulation of practices related to healthcare benefits are ineffectual due to limited ability of the public and medical professionals to organise (B4 loop) and lack of information on how these practices affect the burden on the public healthcare system (B5 loop)	113
5.1 Evolving profile of types of hospitals, number of TB and leprosy beds, and childbirth in hospitals	120
5.2 Utilisation of Ministry of Health hospitals in Peninsular Malaysia, 1970 and 1996	122
5.3 Dynamics of providing more sophisticated clinical services	126
5.4 Rising demand for medical care outpaced public hospital resources, creating a gap in public sector capacity	129
5.5 Dynamics of improving clinical outcomes and establishing a quality culture at every level	132
5.6 Dynamics of improving resource utilisation and client satisfaction	133
5.7 Bed occupancy rates in MoH hospitals	137
5.8 Harnessing technology to improve access to seamless, integrated care	141
5.9 Composition of inpatient care utilisation in public and private sector by socio-economic status	142
5.10 Interactions between the larger ecosystem and the healthcare provider sub-system with its enabling or constraining sub-systems	147
5-a The rising demand for more sophisticated STC stressed the capacity of the public sector, thereby requiring greater investment	151
5-b In the 1970s and 1980s, rising societal affluence further increased the demand for sophisticated healthcare, resulting in the growth of the private sector STC, drained specialists from the public sector to the private sector and counteracted efforts to increase public sector capacity	152
5-c Increased investment resulted in increased availability of specialist services but was associated with the unanticipated effect of increased compartmentalisation of care	153

5-d	Investment in public sector organisational structure improved the capacity to deal with compartmentalisation	154
5-A	The gap between demand and supply	165
5-B	A view of the wider system affecting dialysis demand and supply	166
5-C	Changing the behaviour of the system through new policy	167
5-D	Effect of the rapid expansion of services on the workforce	170
6.1	Incidence rate of communicable diseases per 100,000 population, Malaysia, 1975–1997	173
6-A	A criminalisation approach emphasising criminal enforcement, education and rehabilitative efforts failed to reduce the number of new HIV cases from injecting drugs use	209
6-B	Stigmatisation and the paradigm of regarding the MoH as the main provider of outreach and services were barriers to a harm reduction programme	212
6-C	Commitment to MDG goals and local advocacy were critical enabling factors that overcame barriers to the adoption of the harm reduction approach	213
6-D	Success of the pilots created favourable conditions for institutional changes that persisted even after key enabling factors for the adoption of the harm reduction approach (MDGs and local advocacy) receded	215
6-E	While harm reduction strategies have reduced HIV in IDUs, the gains are being threatened by the increasing incidence of sexual transmission of HIV	217
7-A	The PWD strategy for expanding the water and sanitation network was unable to respond to rural disease burdens in a timely manner	236
7-B	Inadequate rural infrastructure investment in sanitation undermined community trust in government actors, hindering educational efforts that attempted to address the sanitation issues	237
7-C	The paradigm that the MoH mission is limited to healthcare delivery created internal and external barriers to its involvement in rural water and sanitation	240

<i>List of Figures</i>	xi
7-a Factors that led to poor clinical waste management	242
7-b Inability of the government to allocate sufficient resources for clinical waste management undercut both the enforcement of standards that did exist and the development of further standards necessary for ‘cradle-to-grave’ management	243
7-c Outsourcing of clinical waste services enabled necessary capital investment for clinical waste management, enabling the B1, B2 and B3 loops to function properly	244
8.1 Malaysian doctors in the public and private sectors, 1955–2013	265
8.2 Regional disparities in availability of doctors, 1970–2010	266
8.3 Utilisation of outpatient services in Malaysia	270
8.4 Distribution of selected specialist doctors in Malaysia, 2013	282
8.5 Reported satisfaction with public and private clinics, 2015	284
8.6 Reported satisfaction with public and private hospitals, 2015	284
8-A New graduates entering the workforce as HOs	293
8-B Doctors’ average career path in Malaysia	295
8-C Meeting the demand	296
8-D Lack of capacity planning	297
8-E Impact of the bottleneck on the HO experience	298
8-F The specialist bottleneck	300
8-G Systems responses to the crisis	302
9.1 Public and private health financing sources, Malaysia, 1997–2017	310
9-A Concerns over sustainable health care financing and quality of care are creating an impetus to improve hospital performance	332
9-B Institutional pressures keep generic accounting approaches in place over the adoption of the case-mix approach	334

10.1	Reinforcing loop showing how compliance with data collection improves the quality of data, enabling positive impacts on health outcomes	350
10-A	For telehealth functions that cut across health facilities, the more health facilities adopt and operate within a particular interoperable telehealth standard, the greater the benefit for other facilities to adopt that standard, creating a reinforcing cycle (R1 loop)	362
10-B	The push for the adoption of telehealth could increase the number of facilities adopting an interoperable telehealth standard or lead to the proliferation of incompatible standards	363
10-C	The proliferation of incompatible telehealth standards actually increases the cost of adopting interoperable standards (R3 loop) due to health facility operations and structures coming to rely on incompatible telehealth software	364
10-D	The lack of a critical mass of health facilities operating on the same telehealth standard reduces benefits for certain functions, such as health information exchange	365
11.1	Number of received reports of ADR	378
11.2	Number and ratio of pharmacists per 10,000 population	381
11.3	Number and ratio of assistant pharmacists per 10,000 population	382
11.4	MoH medicine expenditure, 2008–2017	384
11.5	Number of outpatient prescriptions received, 2011–2017	385
11.6	Export and import value of pharmaceutical products to Malaysia, 2013 and 2017	390
11-A	The registration and regulation of traditional medicines was in response to the adverse health impacts from the improper manufacture and use of traditional medicines and has successfully reduced poor practice and consequent outcomes	397
11-B	Regulation of traditional medicines creates costs to traditional medicine businesses, which some actors attempt to bypass (R1), creating a race to close	

<i>List of Figures</i>		xiii
	regulation loopholes (B1) and enforce existing regulations (B2)	398
11-C	Creating benefits for traditional medicine businesses for compliance with regulation can reward good actors and reduce attempts to bypass regulation	400
12-A	The paradigm that affordable medical treatment should be a right has led to the creation of tools meant to limit the price of treatment (B1 loop). These tools have provided governments with important leverage to negotiate treatment prices with suppliers (B2 loop).	434
12-B	Reliance on the private sector for developing treatment solutions creates a competing paradigm that distrusts interference with market mechanisms (R1 loop). This paradigm undermines the availability of price control tools (B3 loop).	435
12-C	Advocates for market-driven development of medical products have pushed for trade agreements, IPR protection and the use of political pressure and sanctions that increase the risk of using price control tools to limit government actions to control treatment prices (B4 loop). For governments to successfully utilise these tools, they must take a variety of actions to mitigate against these risks.	435
13.1	The WHO health system framework	450
13.2	Proposed revised layout of the WHO building blocks depicted in Figure 13.1	466
14.1	The health systems in society model contains eight linkages that form the macro-level feedback loops that shape the health system and its component building blocks	482

Tables

2.1	The bathtub metaphor	<i>page</i> 21
3.1	Human development, Malaysia, 1970–2015	34
3.2	Changes in poverty, urbanisation, safe deliveries and infant mortality, Malaysia, 1960–1980	39
3.3	Epidemiological transition and causes of death, peninsular Malaysia, 1982–1990	42
3.4	Changes in poverty, urbanisation, safe deliveries and infant mortality, Malaysia, 1980–2000	44
3.5	Infant mortality, poverty and rural living, Malaysia, 2000	45
3.6	Changes in poverty, urbanisation, safe deliveries and infant mortality, Malaysia, 2000–2016	49
3.7	Life expectancy by sex and years of age, Malaysia, 1999 and 2017	51
3.8	Burden of disease and injury, Malaysia, 2014	52
3.A	Gross domestic product growth, Malaysia, 1960–2017	58
3.B	Gross domestic product by industry, Malaysia, 1961–2017	58
3.C	Employment by industry, Malaysia, 1970–2017	59
3.D	Poverty in Malaysia, 1970–2016	59
3.E	Population growth, Malaysia, 1960–2017	60
3.F	Population by ethnic group, Malaysia, 1957–2010	60
3.G	Fertility and life expectancy, Malaysia, 1960–2017	61
3.H	Age distribution of the population of Malaysia, 1957–2017	61
3.I	Dependency rates, Malaysia, 1957–2017	62
3.J	Urban population, Malaysia, 1960–2017	62
3.K	Number of people per doctor, Malaysia, 1964–2016	63
3.L	Number of people per nursing personnel, Malaysia, 1964–2016	63

<i>List of Tables</i>	xv
4.1 Health indicators in Malaysia, 1957–1990	67
4.2 Rural Health Services and notional staffing pattern	69
4.3 Number of rural health facilities in Peninsular Malaysia	70
4.4 Percentage of institutional deliveries and immunisation coverage, 1970–1990	73
4.5 Gaps and challenges and action taken in integrating preventive and curative services	83
4.6 Quality monitoring and improvement: examples of experiences in primary care	86
4.7 Top three reasons for encounters in public and private clinics	88
4.8 Access to and satisfaction with primary care	90
4.9 Doctors reporting involvement in health promotion during routine patient encounters	90
4.10 Referral experiences reported by doctors	91
4.11 Clinical outcomes for the management of diabetes and hypertension	91
4-a Problems encountered by GPs who had contracts with MCOs	111
5.1 Regional disparity in secondary care in different regions of Malaysia, 1972	122
5.2 Increased availability of specialist care in MoH hospitals, 1970–1997	125
5.3 Laboratory services increased in sophistication in tandem with the availability of specialist clinicians	125
5.4 Rapid growth of private hospitals, 1980–1996	127
5.5 Distribution of high-cost imaging technology in MoH and private hospitals, 1997	128
5.6 Referral experiences reported by doctors in public sector health centres	138
5.7 Cataract surgery profiles, 2002 and 2015	140
5.8 Expenditure on and utilisation of public and private hospitals, 2012 and 2017	143
5.9 Client satisfaction with hospital services	144
5.10 Selected medical technology in hospitals, 2011	144
5.11 Sources of funds in the private sector, Malaysia, 2012 and 2017	145

5-a	Interaction of forces that shaped the evolution of STC during the 1960s and 1970s	155
5-b	STC services: interaction of forces that shaped the evolution during the 1980s and 1990s	160
5-A	Haemodialysis in Malaysia: prevalence, 1990–2015	166
5-B	Dialysis: price pre-treatment	169
5-C	Dialysis: financing by sector	169
6.1	Examples illustrating key features in the spectrum of Malaysian vertical disease control approaches that subsequently merged with mainstream health services	177
6.2	Percentage coverage of immunisation in Malaysia, 1970–2017	184
6.3	Infant and child mortality rates, 1957–2017	184
6.4	Prevalence of selected NCD risk factors in Malaysia for adults aged ≥ 18 years, 1996–2015	186
6.5	Incidence rate of emerging and re-emerging communicable diseases (per 100,000 population)	187
6.6	Illustrative examples of the rapid emergence of and varied challenges posed by emerging diseases in Malaysia	188
6.a	Ten principal causes of admissions and deaths, 1960, 1974 and 1996	202
6.b	Infant and child mortality rates, 1957–2017	203
6.c	National disease control programmes	204
7-A	Comparison of scope of services before and after privatization	248
8.1	Summary of interacting influences on the evolution of the health workforce, 1960s and 1970s	255
8.2	Production of allied health personnel (selected categories), 1956–1995	257
8.3	Evolution of the composition of the health workforce (selected categories) 1955–2015	258
8.4	Selected health staff, utilisation rates and health outcomes	260
8.5	Summary of interacting influences on the evolution of the health workforce, 1980s and 1990s	262
8.6	Profile of health worker training programmes	264
8.7	Number of people per doctor and per nursing staff, 1970–2000	267

<i>List of Tables</i>	xvii
8.8 Access to health facility (with doctor, medical assistant or community nurse)	269
8.9 Summary of interacting influences and the evolution of the health workforce, 2000s and 2010s	272
8.10 Examples of specialisation and the relevant governance mechanisms	281
8-A Rapid increase in medical schools and new medical graduates	296
9.1 Total and per capita expenditure on health, Malaysia, 1997–2016	311
9.2 Public and private health expenditure, Malaysia, 1997–2017	314
9.3 Licensed private health care facilities, Malaysia, 2007–2017	320
11.1 Price comparisons in private sector outlets	386
11.2 Export and import value of pharmaceutical products to Malaysia by product category, 2013–2017	391
12.1 Differing imperatives influenced the system behaviour in formulating health legislation	412
12.2 Illustrative features of leadership during Malaysia’s experience in introducing HPV immunisation	418
12-A Stakeholder concerns and contributions	437
12-B Leadership characteristics and outcomes	441
14.1 Key linkages between building blocks in the case studies	477
14.2 Examples of health-related components of sub-systems in the cultural adaptation template	480
14.3 Feedback loop types in the case studies	486
14.4 Feedback loop type frequencies in the case studies	488

Boxes

2.1	The Boyden criteria	<i>page 19</i>
2.2	Systems thinking principles for health system improvement	25
4.1	Excerpts from the Declaration of the Alma Ata International Conference on Primary Health Care, September 1978	66
4.2	Key strategies that advanced PHC in Malaysia	70
4.3	The role of NGOs in a health system dominated by the public sector	75
4.4	Influence of other health system components on PHC: summary of illustrative examples	79
4.5	The journey towards integration	82
4.6	Dimensions of quality that were monitored and improved	85
4.7	What are GPs?	87
4.8	System observations: when systems outcomes diverge from stated goals	88
4.9	System observations: overcoming limits to growth	93
4-A	Reviewed approach of PHC: wellness, illness, support services and emergency information (REAP-WISE)	102
5.1	Why were hospitals concentrated in the West Coast states during colonial days?	117
5.2	Secondary care-supported PHC	120
5.3	Illustrative examples: STC-supported public health	121
5.4	System observations: shifting the healthcare burden to the private sector	129
5.5	Key features of the QAP for secondary and tertiary healthcare services in the public sector	131
5.6	Further initiatives strengthened STC support for PHC	134
5-A	Key features in the rapid expansion of dialysis	168
6.1	The major communicable diseases of concern in Malaysia (1960s to mid-1980s)	174

<i>List of Boxes</i>	xix
6.2 The role of the IMR in vaccine production and diagnostic services	183
6.3 System observations: understanding feedback loops through communicable diseases	185
6.4 National committee/task force/strategic plan/policy	192
6.5 Examples of integration of disease prevention and control activities (prevention, early detection, management and treatment) in PHC clinics	194
6.6 Key milestones in the evolution of responses to emerging communicable diseases	195
6.7 System observations: considering feedback loops in behavioural change	196
6-A Harm reduction principles and strategies	211
6-B Key involvement by the MAC in the government's adoption of harm reduction strategies	214
7.1 System observations: cross-boundary problems	224
7-A Details of the BAKAS approach	238
7-B Leadership and commitment of state public health engineers	239
8.1 Key features of the rapid production of allied health personnel	256
8.2 System observations: stocks and flows of personnel	261
8.3 Examples of key initiatives to upgrade health staff competencies during the 1980s and 1990s	268
8.4 Malaysian experiences on moving basic training of health personnel from the health to the education sector	274
8.5 System observations: stocks and flows of personnel	277
8.6 Rapid and effective implementation of programmes	277
8.7 Governance structures (legislation, boards, registration and annual licensing) to ensure quality and safety of practice of healthcare professionals	279
8-A The career pathway for doctors in Malaysia	294
9.1 Establishment of the MNHA	308
9.2 Sources of health care financing as captured in the MNHA	312
9.3 Pre-payment and fund pooling features in health financing sources	316
9.4 System observations: intuition and systems surprises	317

9.5	Systems observations: interactions between modes of health financing and delivery	325
10.1	Health systems research provided information for managerial decision-making	345
10.2	System observations: closing the feedback loop to improve data collection	350
10.3	System observations: use of health information for single- and double-loop learning	351
11.1	Legislation to safeguard the people vis-à-vis medical products	368
11.2	Management of the flow of medicines in the MoH system to ensure uninterrupted supply at the front line	370
11.3	Landmarks in developing institutional capacity for oversight of pharmacy and pharmaceutical trade	371
11.4	System observations: path dependency in dispensing practices	383
11.5	System observations: the need for an equitable international system for drug development and public good	389
11-A	Usage and popularity of traditional and complementary medicines (T&CM)	396
12.1	Reflection on leadership in Malaysia's health sector	415
12.2	System observations: attempts to bridge silos	423
12.3	System observations: systems perspectives on leadership development	424
12-A	Essential vocabulary regarding rules governing international trade of medicines	433
12-B	Relevant quotes	440

Biographies of Editors and Contributors

The twenty-member editorial-cum-authors team that designed and produced this innovative and insightful view of health systems have an interesting mix of talents. They have professional backgrounds in public health, economics, social science, engineering, mathematics, systems thinking, medical sciences, and pharmaceuticals. Together, they combine insights gained during decades of personal experience of working in and managing national programmes in the Malaysian health system with a breadth of vision acquired through international public health work and the scientific rigour of academic publications. In delightful contrast to most publications in this field, the editors of this book guided active and iterative interaction between the authors, and between the authors and a wide range of Malaysian stakeholders. This process enriched and deepened the understanding of the workings of health systems.

The team consists of four categories, namely:

- Editorial team. The editorial team designed the parameters of the book, guided the chapter authors, reviewed the chapters, and derived key messages for all chapters. Most members of the team also authored one or more chapters.
- Lead authors for chapters.
- Lead authors for case studies.
- Co-authors for chapters or case studies.

Editorial Team cum Lead Authors for One or More Chapters

Jo. M. Martins

Professor (adjunct), International Medical University, Malaysia

Jo. M. Martins was a senior finance officer in a large corporation before entering public service in Australia. His work has included the design and implementation of community health services and the rationalisation of hospital services in Australia. He has been an advisor and

consultant to the World Health Organization. He was a task manager for health projects for the World Bank, including the first World Bank-funded health project in Malaysia. He has held professorial positions and continues his association with university teaching and research in Australia and at the International Medical University in Malaysia. He is an assistant editor of the *Asia Pacific Journal of Health Management* and the author/editor of books, book chapters, peer reviewed articles, and official reports.

Indra Pathmanathan

Principal Visiting Fellow, International Institute of Global Health, United Nations University, Kuala Lumpur, Malaysia

ORCID ID: 0000-0003-4781-2199

Indra Pathmanathan has fifty years' experience as a public health specialist. Working initially in Malaysia in academia, research, education of health personnel, and managing health programmes, she witnessed at first hand many of the key milestones cited in this book and took a lead role in establishing national programmes for health systems research and quality assurance. Her international experience includes consulting in health systems research for the World Health Organization, Geneva, to support programmes in several countries; serving in the World Bank, Washington, as team leader for reproductive health in the South Asia region; and evaluating health policies and programmes in Bangladesh, Ethiopia, and Sri Lanka. She has authored several books and peer-reviewed papers.

David Tat Ui Tan

United Nations Development Programme, Head of Experimentation

ORCID ID: 0000-0003-4820-2878

David Tan uses systems thinking for transdisciplinary research, organisational learning and development, and co-creation of narratives. He is currently with United Nations Development Programme Accelerator Labs, bringing innovation, learning, and safe-to-fail experiments to the development process. Prior to this, he was a health policy researcher at the United Nations University International Institute for Global Health studying health systems and the health-urban development interface.

Shiang Cheng Lim

Strategic Programme Manager and Monitoring, Research and Evaluation Lead, RTI International (Malaysia Office)

Shiang Cheng Lim is an applied researcher with more than fifteen years of research and programme experience in solving practical

interdisciplinary problems in the field of global health, especially in areas related to sexual and reproductive health (SRH), abortion, HIV, gender-based violence (GBV), ageing, cognitive function and impairment, non-communicable diseases (NCDs), and health systems. Her research largely focuses on how complex contextual factors influence people's health-related behaviour and decisions and how it can be improved through a multidimensional approach through health system strengthening, strategic partnership management, and participatory engagement.

Pascale Adukwei Allotey

Director, United Nations University, International Institute for Global Health (UNU-IIGH)

ORCID ID: 0000-0002-6942-5774

Pascale Allotey, as Director of UNU-IIGH, is interested in furthering the knowledge base in topics such as the application of systems thinking to improve understanding of health systems and increase the effectiveness of health policies globally. Her research over the last twenty-five years has focused on health equity, health and human rights, gender and social determinants of health, forced migration and marginalisation, sexual and reproductive health, infectious diseases, and non-communicable diseases. The engagement of communities in research and policy has been central to defining her areas of research. She has authored and edited several books and authored over 150 peer-reviewed articles.

Lead Authors for Other Chapters**David Christopher Ariam McCoy**

Professor of Global Public Health and Director of the Centre for Global Public Health, Institute of Population Health Sciences, Queen Mary University of London

David McCoy is Professor of Global Public Health. He is Director of the Centre for Global Public Health in the Institute of Population Health Sciences at Queen Mary University of London. He qualified as a medical doctor from the University of Southampton and spent six years as a clinician in the UK and South Africa before entering a career in public health. Since returning to the UK, he has worked as a public health specialist in the NGO sector, academia, and the NHS.

Edward Barry Newell

Honorary Associate Professor, Fenner School of Environment and Society, the Australian National University, Canberra, Australia

Barry Newell is a physicist who focuses on the practical and theoretical aspects of policymaking in complex adaptive systems. He has a particular interest in the use of systems thinking to support effective cross-sector communication and adaptive policymaking in situations dominated by uncertainty. This work has led to the practical systems thinking and modelling approach called *Collaborative Conceptual Modelling* (CCM) that he has developed in collaboration with Katrina Proust. CCM is focused on putting systems thinking to work. He is co-author, with Robert Dyball, of the textbook *Understanding Human Ecology: A Systems Approach to Sustainability*.

Mukundan Sugunan Pillay

Managing Director, TSI Healthcare Sdn Bhd, Malaysia

Datuk Dr Mukundan Pillay is a civil engineer with additional qualifications (masters and doctorate) in public health. He was a pioneer public health engineer in the Ministry of Health, Malaysia, and had a key role in providing technical leadership for upgrading both rural and urban sanitation and water supply in the country. He became director of engineering services of the Ministry of Health Malaysia and then deputy director general of the ministry in charge of research and technical support. He was also a pioneer in contracting private sector entities to undertake functions previously confined to the public sector. He shared his experience internationally, serving as Senior Health Adviser with the WHO in Beijing and as Senior Health Specialist with the World Bank in Bahrain.

Chiu-Wan Ng

Professor of Public Health, University of Malaya, Malaysia

ORCID: 0000-0002-7687-2310

Chiu-Wan Ng graduated in Medicine from the National University of Singapore and obtained her MPH in Health Systems Management and her PhD in Health Economics from the University of Malaya. Her main research interests include health systems, financing, and economics, in particular efforts to achieve universal health coverage in low- and middle-income countries in the Asia Pacific region. She is the Malaysian country investigator for the EQUITAP (Equity in Asia Pacific Health Systems) and GNHE (Global Network on Health Equity) research collaborations.

Thomas Paraidathathu

Executive Dean and Professor, Faculty of Health and Medical Sciences, Taylor's University, Malaysia

ORCID: 0000-0002-8834-9623

Thomas Paraidathathu is a pharmacist with an MS and a PhD in Pharmacology/Toxicology. Serving in the Ministry of Health, Malaysia, Thomas worked initially as a hospital pharmacist and later in drug regulatory affairs, where he gained first-hand experience in building national capacity to improve the safety of medical and traditional products marketed in the country. Subsequently as an academic, he built human resource capacity and is currently an emeritus professor. He has been a member of the Pharmacy Board of Malaysia, council member and vice president of the Malaysian Pharmaceutical Society, and a founding member of the Malaysian Academy of Pharmacy.

Nuraidah binti Mohd Marzuki

Public Health Physician, Health Informatics Section, Planning Division, Ministry of Health Malaysia, Putrajaya, Malaysia

Nuraidah Marzuki is a public health physician with the Health Informatics Centre, Ministry of Health, Malaysia. She has more than fifteen years of experience in government-led e-health initiatives. She previously served at the e-Health Section, Planning Division as Project Manager for the Malaysia Health Information Exchange (MyHIX). She received her MBBS and graduated with a Doctorate in Public Health from the University of Malaya.

Lead Authors for Case Studies

Kuan Joo Lim

Retired public health officer

Kuan Joo Lim is a medical officer with a post-graduate qualification in public health, MPH (health planning). He served in the Ministry of Health for twenty-nine years and has experience in hospital management (public and private sectors), health planning, hospital planning, healthcare financing, health information including IT, quality assurance, training, research and disease control, and medical ethics. He served as a short-time consultant to the World Health Organization and the Islamic Development Bank.

Debbie Siru

Consultant

Debbie Siru has extensive experience in the field of environmental health, primarily in the areas of drinking water quality and medical waste management. She has personal experience in building national capacity in medical waste management in the public and private sectors

in Malaysia. She has an MSc in Water and Environmental Management from the University of Warwick, UK, and was the first person outside the US to obtain a Certificate in Healthcare Environmental Management from ECRI, USA. She has also been engaged by the World Health Organization on four separate occasions to provide consultancy on various aspects of environmental health.

Chee Han Lim

Senior Researcher, Third World Network

Chee Han Lim is a founding member of the Agora Society Malaysia, a senior researcher at the Third World Network, and formerly a senior analyst at the Penang Institute. He holds a PhD in Infection Biology from Hannover Medical School, Germany, an MSc in Immunology, and a BSc in Biotechnology from Imperial College London. Health and socio-economic policies are his current concerns. He believes that a nation can advance significantly if policymaking and research are taken seriously.

Other Contributors**Katrina Margaret Proust**

Honorary Senior Lecturer, Fenner School of Environment and Society, the Australian National University

Katrina Proust has a background in environmental and applied history and complex social-ecological systems. Her work focuses on the historical factors and the feedback dynamics that shape relationships between humans and their environment. She is particularly interested in the interconnected systems that comprise urban communities. With Barry Newell she has developed *Collaborative Conceptual Modelling*, an approach to complex social-ecological issues that provides a conceptual framework to help a group undertake a systems project.

Safurah Jaafar

Professor of Community Medicine, International Medical University, Malaysia

ORCID ID: 0000-0001-6834-7885

Safurah Jaafar currently holds the position of Head of Division Family and Population Health and also Programme Director of the MBA in Healthcare Management at the International Medical University. She was instrumental in reforming PHC delivery in Malaysia, with an interest in safeguarding the equitable