



*History and Philosophy of Biology*

# **PHILOSOPHY OF POPULATION HEALTH**

**PHILOSOPHY FOR A NEW PUBLIC HEALTH ERA**

Sean A. Valles



# Philosophy of Population Health

Population health has recently grown from a series of loosely connected critiques of twentieth-century public health and medicine into a theoretical framework with a corresponding field of research—population health science. Its approach is to promote the public’s health through improving everyday human life: affordable nutritious food, clean air, safe places where children can play, living wages, etc. It recognizes that addressing contemporary health challenges such as the prevalence of type 2 diabetes will take much more than good hospitals and public health departments.

Blending philosophy of science/medicine, public health ethics and history, *Philosophy of Population Health* offers a framework that explains, analyses and largely endorses the features that define this relatively new field. Presenting a philosophical perspective, Valles helps to clarify what these features are and why they matter, including: searching for health’s “upstream” causes in social life, embracing a professional commitment to studying and ameliorating the staggering health inequities in and between populations; and reforming scientific practices to foster humility and respect among the many scientists and non-scientists who must work collaboratively to promote health.

Featuring illustrative case studies from around the globe at the end of all main chapters, this radical monograph is written to be accessible to all scholars and advanced students who have an interest in health—from public health students to professional philosophers.

**Sean A. Valles** is Associate Professor, jointly appointed to Michigan State University’s Lyman Briggs College and Department of Philosophy, USA.

## History and Philosophy of Biology

Series editor: Rasmus Grønfeldt Winther | [rgw@ucsc.edu](mailto:rgw@ucsc.edu) | [www.rgwinther.com](http://www.rgwinther.com)

This series explores significant developments in the life sciences from historical and philosophical perspectives. Historical episodes include Aristotelian biology, Greek and Islamic biology and medicine, Renaissance biology, natural history, Darwinian evolution, Nineteenth-century physiology and cell theory, Twentieth-century genetics, ecology, and systematics, and the biological theories and practices of non-Western perspectives. Philosophical topics include individuality, reductionism and holism, fitness, levels of selection, mechanism and teleology, and the nature–nurture debates, as well as explanation, confirmation, inference, experiment, scientific practice, and models and theories vis-à-vis the biological sciences.

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**Rasmus Grønfeldt Winther** is Associate Professor of Philosophy at the University of California, Santa Cruz (UCSC), and Visiting Scholar of Philosophy at Stanford University (2015–2016). He works in the philosophy of science and philosophy of biology and has strong interests in metaphysics, epistemology, and political philosophy, in addition to cartography and GIS, cosmology and particle physics, psychological and cognitive science, and science in general. Recent publications include “The Structure of Scientific Theories,” *The Stanford Encyclopaedia of Philosophy* and “Race and Biology,” *The Routledge Companion to the Philosophy of Race*. His book with University of Chicago Press, *When Maps Become the World*, is forthcoming.

# **Philosophy of Population Health**

Philosophy for a New Public Health Era

**Sean A. Valles**

First published 2018  
by Routledge  
2 Park Square, Milton Park, Abingdon, Oxon OX14 4RN

and by Routledge  
711 Third Avenue, New York, NY 10017

*Routledge is an imprint of the Taylor & Francis Group, an informa business*

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*British Library Cataloguing in Publication Data*

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

*Library of Congress Cataloging in Publication Data*

Names: Valles, Sean A. (Sean Alejandro) author.

Title: Philosophy of population health science : philosophy for a new public health era / Sean A. Valles.

Description: Milton Park, Abingdon, Oxon ; New York, NY : Routledge, 2018. | Includes bibliographical references and index.

Identifiers: LCCN 2017060479 | ISBN 9781138059900 (hbk) |

ISBN 9781315163307 (ebk)

Subjects: LCSH: Social medicine--Philosophy. | Medicine--Philosophy.

Classification: LCC RA418 .V357 2018 | DDC 362.1--dc23

LC record available at <https://lcn.loc.gov/2017060479>

ISBN: 978-1-138-05990-0 (hbk)

ISBN: 978-1-315-16330-7 (ebk)

Typeset in Times New Roman  
by Wearset Ltd, Boldon, Tyne and Wear

**A tu salud, Maya.**



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# Acknowledgments

Thanks go first and foremost to Margot Valles, for the constant and patient support throughout the writing of this book.

I owe great thanks to Elizabeth Simmons, Matt McKeon, and Chris Long for making my sabbatical possible and hence making the writing of this book possible.

I have been greatly assisted at various writing stages with text feedback from: Robyn Bluhm, Anke Bueter, Teresa Blankmeyer Burke, Laura Cabrera, Kristie Dotson, Kevin Elliott, Sandro Galea, Kerry Keyes, Shelbi Meissner, Nancy McHugh, David Nash, Billy Oglesby, Alexandria Skoufalos, Dan Steel, and Kyle Whyte.

For their questions and comments, I thank the attendees of: the Nov. 2016 Philosophy of Science Association; the Dec. 2016 Michigan State University Department of Philosophy colloquium; the Mar. 2017 Wittenberg University colloquium; the Apr. 2017 American Philosophical Association—Pacific Division; the Jun. 2017 International Philosophy of Medicine Roundtable; the Aug. 2017 Massey University Diversity in Philosophy Conference, the incarcerated and non-incarcerated students in the spring 2017 Wittenberg University course “Global Health Justice”; and the students of the fall 2017 Michigan State University course, “Introduction to Science, Technology, the Environment and Public Policy.”

For starting me down this path, I thank the Edinburgh Migration, Ethnicity, and Health Research Group, the University of Edinburgh Centre for Population Health Sciences, and especially Raj Bhopal and Vittal Katikireddi.

I thank my parents, Marilyn Valles and Larry Valles, for their even earlier efforts at setting me on a life course trajectory of well-being—I owe my life course thinking to their life course efforts.

All remaining mistakes in the book are my own.

# 1 **Blueprint of a philosophy of—and for—population health**

## A brief overview

This book offers a detailed philosophical analysis of the features and consequences of the emerging “population health science” and associated population health “approach”/“framework”/“thinking.” Population health is a bold intellectual and practical expansion of “public health.” The corresponding population health science synthesizes expertise from an array of scientists and non-scientists to understand the full range of causes of health and illness in a population (from gun violence to food affordability), seeking to improve health through collaborations between multiple sectors of society (from insurance companies to community activists). It is now widely accepted that effective and equitable health promotion requires broad-scoped interdisciplinary and intersectoral efforts. Accordingly, use of the term “population health” is growing exponentially in publications, and the term is getting incorporated into the names and/or missions of colleges, departments, centers, and academic journals worldwide. Yet, no previous philosophy book has offered a concerted analysis of the rise of the population health science. This book fills the gap, seeking to contribute to both the philosophy community (which too often critiques an outdated notion of public health) and the population health community, which has grown so quickly that it is inevitably still sorting through its assumptions, theories, values: what they are, what they could be, and what they should be.

The book begins by articulating the history of population health science, rooted in the gradual recognition of health as a social phenomenon. Next, the book argues for a pluralistic understanding of health as something inherently tied to the nuances of diverse social contexts and necessarily understood as something extended over the entire life course; this is offered as a meta-concept of health that leaves room for a plurality of locally contingent healths. The following chapter argues that population health science offers a way to expand public health’s scope of interests and interventions, while still respecting philosophers’ concerns about public health becoming hegemonic. Broad models of public/population health such as “health in all policies,” seek to promote population health via action on social and environmental determinants of health (e.g., tax reforms to address economic inequities), but overtly reject the notion that physicians or public health officials should dictate social policy from on high. The next chapter argues that attending to philosophy of causation in population

## 2 *Population health: A brief overview*

health indicates the need for special attention to health's "upstream causes" (including so-called "fundamental causes") and their downstream effects, with an eye toward explaining the causes of massive health disparities between populations. The next chapter identifies some key enduring methodological challenges, including how population health science research and interventions struggle with questions about how to proceed in the absence of abundant evidence from randomized controlled trials, and how to divide up populations in order to examine and intervene upon the needs of various subpopulations. The following chapter argues that health equity concerns are inseparable from the practice of population health science, but that the philosophical and conceptual obstacles to promoting health equity need to be reappraised. Lack of consensus about the meaning and moral justification of health equity are manageable inevitabilities, while relatively more attention is owed to advancing health equity by first creating inclusive and participatory decision-making processes. The final chapter reiterates the cross-cutting importance of epistemic humility: we each need to recognize our limitations as knowers, and moving forward in population health science requires humble and non-hierarchical collaborative relationships—intersectoral and interdisciplinary. Moreover, the relatively small group of scholars who are familiar with population health science have an obligation to communicate with the public about what population health science is and does.

### **Introduction**

Public health isn't what it used to be; sometimes it's not even "public health"—it's "population health." This book is a philosophical take on the rise of "population health," which has become ubiquitous over the last two decades, yet remains unknown to all but a small group of health scholars and practitioners. Since the 1990s, a growing number of public health scholars, practitioners, and policymakers have begun using the term "population health." This curious term signals growing support for a new set of theories and methods—those of population health as opposed to a narrowly conceived public health. The population health literature is heterogeneous, but at its core is a set of radical and admirable new ideas about how to reform the way we promote healthy populations. These ideas have been described and debated, largely in fragmentary articles, accompanied by a handful of science books attempting to synthesize together what it means to adopt a population health approach/thinking/model/paradigm and what it means to do applied science under the aegis of "population health." Meanwhile, philosophers specializing in the public health sciences have done little to aid in the project of analyzing, synthesizing, and communicating what is philosophically novel or notable about the shift that is signified by the phrase "population health." This book seeks to help remedy that gap in the literature by constructing a philosophical scaffold to intellectually support population health science. This book shows how population health science's fragmentary theoretical and methodological pieces do indeed fit together, and that the complete

interdisciplinary whole they assemble is well positioned to change for the better the theory and practice of health promotion.

A clear understanding of philosophical questions in population health—from how to define health and conceptualize causes, to how health equity values fit into the practice of population health—can contribute to future debates over what it does mean and what it should mean to work in the service of “population health.” Overall, this is a book that hopes to make some small contribution to the population health project—it is philosophy *of* population health in the form of philosophy *for* population health—with the long-term goal of advancing population health science and expanding the dialogue between philosophy and population health science. To do this, the book will integrate philosophy of science, philosophy of medicine, bioethics, and public health ethics.

Philosophers of science and medicine, like me, spend a great deal of time examining the philosophical foundations of sprawling disciplines/theories/enterprises, small projects/hypotheses/texts, and everything between. Much like building inspectors or health inspectors, we typically find a combination of individually avoidable errors, dubious shortcuts, and ill-designed methods. All the while, philosophers of science and medicine still tend to have an abiding respect and appreciation for science/medicine, critiquing in the hopes of making things better. When scrutinizing the philosophical underpinnings of a new interdisciplinary program (such as in my previous work on evolutionary medicine and personalized genomic medicine), I have come to expect extensive, if not fatal, problems (Valles 2012a; Valles 2012b). Imagine my surprise at encountering population health science and finding nothing really fundamentally broken. What I found instead was a field that has many debates and unsettled theoretical and practical questions that remain to be sorted out, and many open questions about the future of the field. So, I come to this project on philosophy of population health science as a philosopher of science and medicine seeing little broken in the field, but still seeing many questions—about what population health science is, was, should be, and could be—that I think my skill set can help answer or at least clarify. I see population health science as a thoughtful reaction by public health scientists and other health scientists, a reaction against practices that had proliferated in twentieth-century biomedical science and influenced much of public health science: the paternalism, the overreliance on narrow biomedical understandings of health and well-being, the cultural and ethical imperialism, the failures to connect with underlying social problems such as food insecurity, the arrogance of expert judgments delivered by experts from on high.

Philosopher of biology Michael Ruse has pondered whether philosophy of science should take up the role of “handmaiden to the sciences” (Ruse 2008). I prefer the framing offered by Kristie Dotson, who has advocated for philosophy done from a “position of service” (Dotson 2015). So, I offer this book from a position of service to scholars and graduate/professional students interested in population health—philosophers and non-philosophers alike.



## **What is population health science?**

Population health science is a loosely organized field of research and practice, united by a commitment to understanding patterns of health distribution within and between human populations, and to achieving desirable equitable patterns of health distribution via interdisciplinary and intersectoral efforts. It is also committed to the view that health's causes and effects are embedded in nuanced ways within human populations' diverse cultures, social structures, and environments. Population health science is pluralistic in the sense that it seeks those interdisciplinary and intersectoral collaborations because they are theoretically irreplaceable, not just expedient. Population health science is sprawling in scope to match its contention that health is similarly massive. Neither sociology nor epidemiology can have a suitably complete grasp of health; neither patient advocacy charities nor for-profit healthcare companies can fully succeed in promoting health without the cooperation of the other. There are entrenched antagonisms impeding these sorts of interdisciplinary and intersectoral collaborations, but this does nothing to dissuade population health science advocates from the belief that we nonetheless need such collaborations.

Population health science is in the early formative stages of a new discipline. Right now, population health science “represents a way of thinking, rather than a particular set of questions or methods and, as such, draws from a number of long-standing disciplines” (Keyes and Galea 2016b: 633). Population health science scholars have offered varying, but complementary, definitions for what “population health” signifies as a practical scientific enterprise:

a conceptual approach to understanding the drivers of health and consequently the strategies most useful to improve health. As I see it, this conceptual approach has two key principles: (1) the need to consider factors defined at multiple levels of organization ... and (2) an explicit concern with health equity.

(Diez Roux 2016)

the field of population health includes health outcomes, patterns of health determinants, and policies and interventions that link these two.

(Kindig and Stoddart 2003: 380)

a research program that confronts the structural forces that place individuals at risk, creates distributions of health and disease unequally across socially defined groups, and focuses on embedding biological pathways within social interactions that develop across the life course and across generations.

(Keyes and Galea 2016b: 634)

population health connects prevention, wellness, and behavioral health science with healthcare quality and safety, disease prevention, and management and economic issues of value and risk—all in the service of the specific population.

(Nash et al. 2016: xviii)

population health has a focus on health disparities, particularly disparities related to socioeconomic status, and many of its proponents have a pessimistic view of the degree to which health care can reduce these disparities.

(Anderson et al. 2005: 757)

This book will proceed under my reading of what falls under the broad population health science framework, which I interpret as: (1) rooted in theoretical and empirical developments in the mid-late twentieth century (Marmot et al. 1984; Rose 1992); (2) shaped by World Health Organization priority-setting (World Health Organization 1986; Commission on Social Determinants of Health 2008; Kickbusch 2003; Murray et al. 2002; World Health Organization 2014); (3) spurred by the 1994 volume *Why Are Some People Healthy and Others Not?* (Evans et al. 1994); (4) popularized by Kindig and Stoddart (Kindig and Stoddart 2003; Kindig 2007); (5) heralded by the growth of departments/colleges/centers of “population health” (Bachrach et al. 2015); (6) pursued under various names and models in contemporary work, often using the term “population health” (Tricco et al. 2008; Stoto 2013); and (7) summarized in a handful of general texts (Young 1998; Keyes and Galea 2016a; Nash et al. 2016). The lingering fogginess of what does and doesn’t fall within this interdisciplinary endeavor (Tricco et al. 2008; Jacobson and Teutsch 2012) is one of the chief motivations for my writing this book.

In this book I will use the term “population health science” to refer to the scientific dimension of the larger “population health framework.” Advocates of population health science tend to agree that it “represents a way of thinking (Keyes and Galea 2016b: 633),” one that is not restricted to scientists or even scientific reasoning—there is more to a population health *framework* than population health *science*. For example, the population health framework is concerned with instilling new population health thinking in people such as employers, so that they can appreciate and address the ways that employees’ wellness is good for all parties (Isaac and Gorhan 2016). I prefer “population health framework” as the descriptor for the umbrella way of thinking, including population health science. This is in keeping with a key article in the development of population health—“Why Population Health?” by John Frank (Frank 1995) and some subsequent literature, including work on population health terminology by David Kindig, one of the leading contemporary scholars on the topic (Kindig 2007). However, others refer to it as the “population health model,” which is a misnomer due to the diffuse theoretical and practical commitments of population health scholars (Carpiano and Daley 2006), and because the “Population Health Model” (“POHEM”) is a particular microsimulation computer model developed by early population health science scholars in Canada, a model which only a small subset in population health work uses (Hennessy et al. 2015).

The upcoming chapters will strive for clarity in their use of key and often related terms, such as “population health” and “public health.” The trickiness of these terminological questions is largely a reflection of the field itself. Even the

## 6 *Population health: A brief overview*

term “population health” is a known source of confusion since it is used in the literature to refer to both the phenomenon itself and the corresponding field of study (Nash et al. 2016: 3; Kindig and Stoddart 2003). Confusion over the meaning of “population health” has also affected the (small) philosophical literature on it. Rothstein has attacked the creeping of “population health” theories and practices into the domain of “public health,” while Goldberg has sometimes defended “population health” under the label “broad model of public health” (Rothstein 2002, 2009; Goldberg 2012). Exasperated at the terminological confusions, Diez Roux insists that Goldberg’s use of the term “public health” is identical to how advocates use the term “population health” (Diez Roux 2016); DeSalvo splits the difference by proposing the term “Public Health 3.0” (DeSalvo et al. 2016). And so on.

Terminological disputes are typical in young and developing fields. In spite of the field’s youth, population health science’s tenets have already had enormous success in mainstream public health. This is in keeping with an ambition to reform, expand, and reorient public health science, rather than to reject and compete with public health. It has found a particularly warm reception in the American Public Health Association, which hosts the world’s largest annual public health conference. It is telling (and rhetorically convenient) that APHA’s recent conference themes, when combined, serve as a thumbnail sketch of key components of a sound philosophical foundation for population health science:

- Health is a social entity, and health promotion must also be social (Chapter 2)
  - “Healthy Communities Promote Healthy Minds and Bodies” (2011 American Public Health Association conference theme)
- Health is a life course phenomenon, and best approached as such (Chapter 3)
  - “Prevention and Wellness Across The Life Span” (2012 American Public Health Association conference theme)
- Health promotion efforts must be willing to contend with the massive breadth of health’s socially embedded causes and effects (Chapters 4 and 5)
  - “Think Global, Act Local” (2013 American Public Health Association conference theme)
  - “Healthography: How Where You Live Affects Your Health and Well-Being” (2014 American Public Health Association conference theme)
  - “Health in all Policies” (2015 American Public Health Association conference theme)
- Social justice and social reform are necessary components of population health promotion, even if achieving this will be difficult and contentious (Chapters 6 and 7)

- “Social Justice: A Public Health Imperative” (2010 American Public Health Association conference theme)
- “Creating the Healthiest Nation: Ensuring the Right to Health” (2016 American Public Health Association conference theme)

Meanwhile, the 2016 accrediting standards for US public health higher education programs make frequent reference to “population health” (a change from the 2011 standards, which did not), including the requirement that Masters-level and Doctoral-level education must, “substantively address scientific and analytic approaches to discovery and translation of public health knowledge in the context of a population health framework” (Council on Education for Public Health 2016: 29). Population health science is a distinct entity at this point, but some readers will recognize similarities with kindred disciplines and movements. Social medicine and the People’s Health Movement are two such endeavors. Interestingly, despite many similarities between population health science and these other two entities, the practical relationships between them are far weaker than one might expect. They share the commonality of having developed as reactions against undesirable features of the biomedical model of health, which dominated the twentieth century (see Chapter 2). Chapter 6 will go on to show how evidence-based medicine is yet another field/movement that shares this dissatisfaction with the biomedical model, though evidence-based medicine’s focus on healthcare interventions, and relative neglect of health promotion efforts outside the healthcare sector (in part because such interventions can be harder to assess), has led to peculiar tensions between it and population health science.

Perhaps the best illustration of the gap between the population health science and Social Medicine is that the term “Social Medicine” does not even appear in Nash et al.’s 2016 second edition to their population health textbook (Nash et al. 2016). The term appears exactly once in Keyes and Galea’s book articulating population health science theory—in the MESH standardized medical keywords, “Social Medicine—methods” classifying the book’s subjects; it appears nowhere in the text. Why the divergence of “population health” and “social medicine”? There are innumerable structural and disciplinary contingencies that surely played a role, but there is more essential philosophical reason at the heart of the disagreement. As Young argues in his population health text, “social medicine” and “preventive medicine” necessarily fall within the medical profession, and “social medicine” remains a liability for three reasons: (1) philosophically, it is tied to a “‘biomedical’ orientation” that is fundamentally objectionable to the many skeptics of the biomedical model of population health promotion (even if social medicine pushes back against biomedicalization); (2) “social medicine” can be confused with the politically contentious “socialized” medicine (though Chapter 2 will argue that the connections to socialism are more than an accident of terminology); and (3) “proponents of population health” have situated themselves as offering “something more than traditional public health” (Young 2005: 5).

## **Why write a book on philosophy of population health science?**

Population health science has made enormous strides, and philosophers have much work to do to catch up. While this book will make clear that I largely endorse the trajectory of population health science, the lack of public awareness that there even is such a thing, let alone its previous and potential accomplishments, is deeply problematic. This book is offering a small contribution to meeting that need by working to build a critical dialogue around the many philosophical aspects of population health science. Critical dialogue is very much in the spirit of population health science since, historically, the field is the result of public health scientists coming to terms with internal and external criticism. Chapter 2 chronicles that process in detail, but the point for the moment is that population health scientists have echoed scholars' critiques about how public health needed a course correction—population health science is a field of science devoted to doing this. In the 1994 edited volume that arguably marks the birth of population health science, Renaud metaphorically described the fundamental tension as a power struggle between Panakeia, the goddess of medicine (individualistic biomedical thinking) and Hygeia, the goddess of public health (population thinking):

On the eve of the twenty-first century, a power struggle emerges between the god of medical art, Panakeia, who is increasingly ambitious and skillful in her attempts to resurrect the dead, and Hygeia, the goddess of public health and great priestess of social reforms.

(Renaud 1994: 324)

In the realm of health, the issue at stake for the future is the reestablishment of a balance between Hygeia and Panakeia, which has been tilted in favour of the latter over the course of three decades of biomedical development.

(Renaud 1994: 333)

Renaud was correct in his era about the problem of patient-level care displacing population-level health, and hindsight makes it look all the more prophetic of him to contribute to a whole new field of science to address the problem.

Public health science has come under frequent attack by a number of philosophers, anthropologists, and other humanists and social scientists studying it. The tension between individualistic biomedicine and population-level health matters is responsible for many of the critiques of public health coming from scholars and laypeople alike. To name a few focal problems:

- A slew of behavioral guidelines relentlessly add new behavioral expectations for individuals, adding up to an absurdly untenable and inappropriate burden for each person.
  - “Lose weight!” “Avoid fat!” “Stop smoking!” “Reduce alcohol intake!” “Get fit!” “Practice safe sex!” “Play safe!” ... Individuals are expected

to take responsibility for the care of their bodies and to limit their potential to harm others through taking up various preventive actions.

(Petersen and Lupton 1996: ix)

- Public health science is all too often wielded bluntly, without due attention to the fact that evidentiary/epistemic and ethical/values standards for public health experts are often very different from those of the populations they try to serve.
  - While parents and public health officials may hold many values in common, their value hierarchies are sometimes at odds, and the rules by which they wage arguments often differ considerably. The result is a chaotic environment in which, parents ... ultimately decide whether or not to vaccinate children.

(Largent 2012: 29)

- Even seemingly benign concepts and theoretical innovations in public health science have combined to elevate individual lifestyle and risk factors, at the expense of other understandings of what population-level health is and how its causes are approached.
  - New methods and approaches for studying health, a shift from earlier mechanistic approaches to probabilistic lifestyle factors, and the rise of “chronic disease,” evolved synergistically to converge in an emphasis on lifestyle as a core—really, *the* core—problem confronting public health.

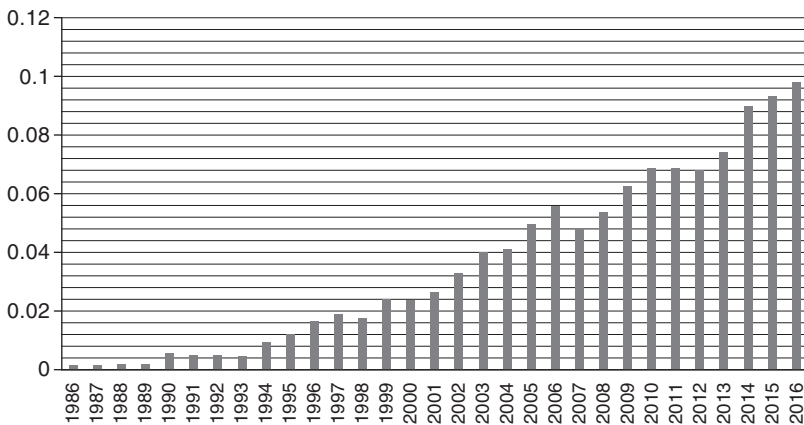
(Bell 2017: 26)

I agree that these are genuine and serious problems. And the problems go much further. The dominant biomedical model of health—elaborated in Chapter 2—with its focus on disease, diagnosis and bio-technological patient-level solutions to population-level problems, has been a massive disappointment despite massive social investments in it. Bell’s text *Health and Other Unassailable Values* (Bell 2017) and Metzl and Kirkland’s volume *Against Health* (Metzl and Kirkland 2010) together offer detailed and insightful analysis of the often moralistic follies that can and do creep into public health science literature and the associated public/media discourse. I support population health science in part *because* I take these criticisms of public health science very seriously. More importantly, I believe that the problems are already being addressed.

Medical science done under an implicit or explicit biomedical model has left a legacy of over-prescription (Welch et al. 2011), disease mongering (González-Moreno et al. 2015), profiteering (Goldacre 2012), and more. A burgeoning body of evidence indicates that the biomedical model is not just yielding the aforementioned side effects—it is arguably failing outright. The signs of this are appearing most conspicuously in my home country, the United States, where the biomedical model has long found fertile ground thanks to its research infrastructure, remarkable willingness to spend disproportionate amounts of its vast wealth

on healthcare, and its reliance on novel medical treatments to address its health ills. Perhaps the most striking example of the model's failures are the data on the failures of the annual checkup—the exemplar of the biomedical model's contributions to routine population health monitoring and wellness, a hazily defined practice of scrutinizing a patient's vital signs and diagnostic tests in search of pathologies in patients' tissues. A meta-analysis of longitudinal studies that included a total of 182,800 subjects finds that annual checkups reduce neither morbidity nor mortality (Krogsbøll et al. 2012). Checkups' chief accomplishment is that they do in fact increase the number of diagnoses for patients (Krogsbøll et al. 2012)—the biomedical model is certainly good at making business for itself. In total, the sprawling US biomedical system is exorbitantly expensive and yet, by most measures, it yields abysmal results (Woolf and Aron 2013).

The good news is that the reform effort—population health science—already has a firm foothold and is making more headway all the time. Figure 1.1 is a variation on a diagram Sandro Galea previously published, in which he shows that 2013 marked a sudden change in the ratio of English-language PubMed database entries mentioning “population health science” divided by those mentioning “epidemiology”; 2013 was when ratio suddenly began exponentially climbing (Galea 2017). Figure 1.1 takes a similar approach and shows how in a little over 20 years, “population health” went from being a virtual non-entity to being used about 1/10 as often as “public health.” A 1:10 ratio remains small, but three factors must be kept in mind. First, the “public health” phrase has been part of the health lexicon for over a century, appearing in academic journal names, institutions, professional titles (MPH, Master of Public Health), and everyday usage (the standard term for the health of a group of people is “public health”). Second, the increasing ratio means that “population health” is making gains *relative to* “public health”—“public health” and “population health” are



*Figure 1.1* Ratio of the number of results from a PubMed search using “population health” as a search term divided by the number of results using “public health” as a search term, 1986–2016.



both used very often in health publications, but the growth of “population health” is outpacing “public health.” Third, as noted above, population health science’s impact is not just evidenced by invocations of the term; it has also made an enormous impact on public health science, such that some scholars see it as just good public health science (Diez Roux 2016), and others describe the contributions as a distinct new phase of public health science (DeSalvo et al. 2016).

There is clearly something happening in the public/population health sciences, something that merits attention. The rise of population health thinking is better tracked in the US and Canada than elsewhere—a sampling problem afflicting most areas of health research—but the data from the US are telling, and important insofar as the US and Canada together produce a large proportion of health science (the majority of it, according to a 2008 bibliometric analysis; Tricco et al. 2008). A 2015 report commissioned by the Institute of Medicine Roundtable on Population Health Improvement found 25 Masters- and/or PhD-level programs in the US including “population health” in their names (Bachrach et al. 2015). A survey of US hospitals by the American Hospital Association found, “over 90% of hospitals agreed or strongly agreed that population health was aligned with their mission” (Health Research & Educational Trust 2015: 4). With that degree of institutional entrenchment, it will not be going away anytime soon. The incredible power of institutional inertia and the impossibility of ‘unringing the bell’ after exposing students, administrators, etc. to population health thinking, means that this mindset will linger and echo for a long time, even if population health science were to start falling into decline for some reason.

Katherine Keyes and Sandro Galea’s 2016 book, *Population Health Science*, lays out the theoretical scientific foundations of the contemporary population health sciences, and in doing so ends up engaging with some of the same questions addressed in this book (Keyes and Galea 2016a). Though, as an exposition of the general theoretical background of population health sciences, it is only able to engage in a limited way with most philosophical issues. For example, the book posits the “principle”: “Efforts to improve overall population health may be a disadvantage to some groups; whether equity or efficiency is preferable is a matter of values” (Keyes and Galea 2016a). The book’s need to get through a wide survey of the technical details of the science means that it cannot devote as much time to directly covering philosophical angles. Ultimately, I see my book as complementary to theirs; *Population Health Science* lays out the scientific foundations of population health science with some related discussion of philosophical matters, while this book lays out the philosophical matters with some related discussion of population health science.

Other works have also explored the gray areas between population health science theory and philosophy of population health science. For a textbook-type overview, the clear leader is Nash et al.’s updated textbook, which also includes thoughtful discussion of philosophical issues such as equity, overarching evidentiary/epistemic challenges, and political theoretical aspects of health promotion and governance (Nash et al. 2016). In 2002, the World Health Organization



(WHO) published an edited volume that served to foster conversation among the diffuse considerations and disciplines involved in population health measurement, including the ethical issues therein (Murray et al. 2002); though, edited volumes lack the sort of univocal cohesion of works such as T. Kue Young's monograph *Population Health: Concepts and Methods*, which had appeared four years earlier and includes discussion of philosophical issues such as the nature and measurement of health (Young 1998).

### **What will this book accomplish?**

Chapter 2 historically traces population health science to a series of twentieth-century insights about the social nature of health:

the recent “bio-medicalized” view, ascendant since the Flexner reform of North American medical schools ... focuses our attention, for example in coronary disease prevention, on the control of intermediary physiological variables, such as blood pressure, rather than the living and working conditions that may underlie their perturbation.

(Frank 1995: 163)

The chapter traces out the twentieth-century history of how population health science emerged a new interdisciplinary approach. I argue that the history of population health science theory is best understood as the synthesis of four different insights that took hold in public health theory in the twentieth century: (1) health is metaphysically social, (2) health is empirically social, (3) health is ethically inseparable from social empowerment, and (4) methodologies of health research and health promotion must engage with health as a social phenomenon. The WHO, boldly and controversially, declared that health is the presence of complete well-being, including social well-being (World Health Organization 1946). It was not until the 1970s and 1980s that new data emerged to solidify the case that individuals' and populations' health are causally determined by social forces to an enormous degree. I trace the progression from this empirical data to the World Health Organization's dual embrace of health empowerment: empowering individuals and their communities is pragmatically essential according to emerging data on the social science of health, and also health empowerment is ethically essential as a means of promoting population health without committing paternalistic abuses. This commitment to empowerment spurred the development of new methodologies of research and intervention when interacting with populations during health promotion efforts.

This chapter links to the following chapter on the definition of health, by illustrating how the four senses of health-as-social combine to yield a strong rebuttal to the influential biomedical understanding of health and disease. The biomedical model of health sees health as the absence of some distinct malfunction in the body's machinery. It is a view that is widely embraced inside and outside medical research communities, and Christopher Boorse has, most

prominently, expounded it as a philosophical position. This understanding of health does not entirely preclude pursuit of population health science efforts. For example, Norman Daniels endorses Boorse's view and yet also shares population health sciences' interest in intervening on the social determinants of health (Daniels 2008: 37). Yet, the history provided in this chapter shows that a biomedical understanding of health led health sciences astray in the twentieth century, and population health science arose from within the community of health scientists to try to reform the theory and practice of health science at the population level. The biomedical model's dominance in the twentieth century fostered the development of new blood tests, imaging technologies, surgical techniques, drugs, and devices. Yet, perhaps most emblematically, the United States is a global leader in medical technology innovations and medical education, but the existence of such technologies and experts has failed to prevent the national life expectancy from stagnating and recently even declining (Xu et al. 2016). The chapter illustrates the value of understanding health in the four senses of social through a case study on the health of the Standing Rock Sioux population in the United States. The case study examines the tribe's opposition to the Dakota Access Pipeline that traverses land that is vital to the well-being of the tribe. I show that the social understanding of health that I endorse allows a more thorough account of the health harms at stake.

Chapter 3 offers an (pluralistic) overarching concept of health: health as a life course trajectory of complete well-being in social context:

binary views [of "individual versus population health"] ... fail to use the rich information and interpretations that stem from a more comprehensive approach to health over the life course (i) of the individual within the collective and (ii) of the collective of interacting individuals.

(Arah 2009: 242)

The metaphysical and epistemic significance of "health" and "disease" are vigorously debated in the philosophy of medicine literature (Carel and Cooper 2014). In this chapter, I offer a new definition of health that synthesizes together some of Onyebuchi Arah's insights into philosophy of population health science and the World Health Organization's enduring endorsement of health as the positive presence of well-being. Arah's conception of individual and population-level health partly built on earlier work by McDowell et al. (Arah 2009; McDowell et al. 2004). Arah characterizes health as a dynamical life course phenomenon, a developing thing that is extended over time and shaped by a complex set of factors from genetics to social conditions; such a thing must be understood and addressed in light of its complete trajectory and not snapshots in time (e.g., one's vital signs at the time of a single visit to the doctor). I also argue for the adoption of the oft-maligned WHO concept of health as the presence of holistic well-being, a definition that has been criticized as vague or mistaken by many scholars (including some population health science scholars). I argue that it is an outline of a definition, capable of being further specified in individual

applications, not a fully developed definition that is ready to operationalize as is. It is more toolbox than tool. I argue for one particular specification of the WHO definition, combining it with the life course concept to yield health as a *lifelong* complete physical, mental and social well-being.

After offering my new health concept as a slight variation on the WHO concept, I argue that the concept, *health as a life course trajectory of complete well-being in social context*, strikes the right balance between empirically informed specificity and pluralism. As illustrated in the preceding chapter, health is social and hence socially contingent. This concept of health insists that health cannot be adequately understood as a phenomenon that exists at a single moment in time, but it necessarily refrains from dictating to any population what it means to have complete well-being. This final point is demonstrated in more detail in the chapter's case study, on efforts to promote the health of Aboriginal Australians and efforts within the context of colonial settler–indigenous power dynamics.

Chapter 4 defuses the public health “boundary problem”—the fear that public health could exceed its proper disciplinary and sociopolitical boundaries and thereby cause negative repercussions:

We understand that health equity is a shared responsibility and requires the engagement of all sectors of government, of all segments of society, and of all members of the international community, in an “all for equity” and “health for all” global action.

(World Health Organization 2011)

There is a troubling tension between the philosophical commitments of public/population health scientists and philosophers of public health. On one hand, many philosophers vehemently insist that we must mind the “boundary problem” of carefully delineating and policing the boundary line that constrains what can be properly treated as a public/population health problem (see, for example, Powers and Faden 2006; Broadbent 2013). On the other hand, public/population health scientists have now widely endorsed the idea that we must promote “Health in All Policies” (McQueen et al. 2012; Rudolph et al. 2013). Philosophers have adopted their position out of fears of potential negative repercussions of allowing scholars to public health-ify social problems such as crime and poor housing (Rothstein 2009). I argue that population health science is philosophically on the right track by searching the entire structure of society, not just healthcare and other obvious places, for the causes, effects, and solutions of health and disease. Empirically, it has long been clear that all manner of social dynamics are intimately causally connected to health, and healthcare only contributes to some (Lalonde 1974; Black et al. 1980). Health matters and healthcare matters are not coextensive, nor are physicians the automatic rightful leaders in addressing health matters.

I argue that attempts to limit the scope of public health investigation or action rest on three related missteps. First, much philosophy of public health works

under the unnecessarily restrictive political philosophy conception of public health action as the expression of government power over the polity. This is already a narrow framing of what public health is or can be, but such a view is wholly inadequate for understanding the growth of population health science, since population health is founded on a commitment to the idea that promoting the health of populations requires collaborations between different sectors of society—governments, charities, informal community activist groups, etc.—and government is just one sector among co-equals. Second, I argue that concerns about public health growing hegemonic and overtaking all discourse about population health are mistaken. Some make the conceptual mistake of assuming that treating a problem (e.g., gun violence) as a health problem then implies it is *only* a health problem (e.g., gun violence is also a legal problem). Others make the mistake of speculating about the potential harms of a broad conception of public health (one that addresses problems such as firearm policy) instead of looking at the decades-long history of clearly positive effects of implementing such a conception collaboratively and intersectorally.

I conclude that we do not know the full range of potential risks and benefits of adopting a broad model of population health, attention to the full range of risks at stake (“inductive risks” and other “epistemic risks”), and a broad model is preferable partly in light of our limited knowledge. The chapter’s case study illustrates the importance of a broad model of population health by exploring the work done, and work not yet done, on the population health aspects of global climate change.

Chapter 5 argues for how and why population health science should carry out its agenda to research and respond to the “upstream” social causes of health:

social factors such as socioeconomic status and social support are likely “fundamental causes” of disease that, because they embody access to important resources, affect multiple disease outcomes through multiple mechanisms, and consequently maintain an association with disease even when intervening mechanisms change.

(Link and Phelan 1995: 80)

Health, as argued in Chapter 3, is a dynamic process that develops over the course of one’s lifetime, not just a switch that flips off and on when one falls ill with a diagnosable disease and then recovers from it (Commission on Social Determinants of Health 2008; Hertzman et al. 1994). Similarly, a network of “social determinants” serve as extraordinarily powerful causal factors in shaping our health (Marmot 2004). Contending with these and other lessons of twentieth-century public health spurred the growth of new models for understanding and intervening upon the “upstream” causes of ill health—factors such as poverty and racism that lead to many ill effects downstream. I argue that one particularly philosophically and practically important contribution to this effort is Link and Phelan’s theory of “fundamental causes,” described in the above quote (Link and

Phelan 1995). Unfortunately, the term “fundamental cause” gives a misleading characterization of what is causally unique—and uniquely valuable—about fundamental causes. Drawing upon work on the philosophy of causation, I show how fundamental causes are special because they manifest a unique sort of stability. Fundamental causes are stable in the direction of their effect on health (e.g., social stigma harms health) but the proximate mechanisms and the specific health effects vary enormously, depending on context. This creates a situation where we can promote health via addressing stigma even without fully knowing the mechanisms of how certain upstream causes operate or even all the ways that they harm health.

I proceed to contrast population health science’s laudable attention to social determinants of health and upstream causes of health with Broadbent’s less prominent coverage of these topics in his influential text *Philosophy of Epidemiology* (Broadbent 2013). I use Geoffrey Rose’s distinction between causes of individual cases of disease vs. causes of between-population disease disparities to show that Broadbent’s philosophy prioritizes the former types of cause while population health science prioritizes the latter type of cause (Rose 1992). I conclude by advocating for orienting philosophy of public/population health to the topic of salutogenesis rather than pathogenesis; the philosophical study of disease can easily crowd out attention to the philosophical study of health. I illustrate these recommended changes in how to approach health causation by examining Brazil’s evolving HIV/AIDS policies.

Chapter 6 identifies four key philosophically rooted practical challenges faced by population health science:

ideally, we want population health interventions that are both efficient and equitable. In many ways, however, these two goals—equity and efficiency—are often at odds with each other; that is, there is a tradeoff when maximizing one potentially results in a cost for the other.

(Keyes and Galea 2016a: 130)

Applied population health science requires contending with difficult methodological choices along the way to achieving “health for all” (Fielding et al. 2013). In this chapter I make a case for why four philosophical methodological choices are particularly crucial. These include specific tactical choices about matters of research practice, and overarching challenges about how population health science charts a course within the existing scientific and sociopolitical landscape.

The four challenges featured in the chapter are: (1) how to equitably choose boundaries for the population one researches given populations’ heterogeneity; (2) how to balance programs aimed at high-risk populations with programs aimed at the wider population; (3) how to reconcile tensions between programs that treat population health improvement as the ultimate goal vs. programs that treat a broad model of population health concern as a means of fixing the inefficient healthcare system; (4) how to reconcile the desire for “evidence-based”

controlled experiments with the difficulty of gathering such evidence about the social determinants of health. I propose guidelines for equitably managing the challenges arising in (1) and (2). I also show that (3) and (4) are rooted in the complex relationship between the various movements and frameworks that have sprung up in recent years as reactions against the failures of the biomedical model of healthcare theory and practice. For example, some population health science scholars agree with evidence-based medicine scholars that randomized controlled trials are the soundest evidence of a treatment's efficacy, but such trials typically test traditional biomedical interventions (drugs, devices, and procedures) but have done far less to assess interventions operating at the level of upstream/fundamental causes or social determinants (economic inequality, inadequate public transportation infrastructure, etc.). The chapter's case study illustrates the issues featured in the chapter by examining ongoing research into the health of global migrants and policy responses to this research.

Chapter 7 argues that health equity concepts are built into population health science and urges a reorienting of the debates over what health equity is and should be:

we cannot substantially improve the health of the population as a whole without addressing health inequities and ... the drivers of health inequities are often the drivers of the health of the population generally.

(Diez Roux 2016: 619)

Population health science is, as a matter of fact, inseparable from concerns with health equity. The interdisciplinary science of population health itself formed around the goal of revising and expanding public health, with improving health equity as one goal of the reform (Kindig 2007). The relationship between science ethics/normativity has long been a topic of debate for philosophers of science in the "science and values" literature (Elliott and Steel 2017), as well the public health ethics literature disputing whether "population health has an intrinsically distributive dimension" and hence a necessary concern for health equity (Reid 2016: 27). In the case of population health science, issues of equity are built into the science at least as much as any other theoretical component is. This chapter and this book do not seek to offer a competitor theory in the existing literature on the nature of health equity. Instead, it proceeds from philosophical examination of population health *science*, to offer some guidance on the relationship between philosophy and population health science, which includes some points about meta-ethics via critique of how equity concepts can and should function within the population health science community.

I argue that philosophy of public/population health must be more cautious about its assumptions regarding the precise definition and/or moral foundation of health equity. Contrary to a widespread presumption among public health ethicists, we do not need to first achieve a community consensus on either of these before doing good work in public/population health science research or interventions. Indeed, in a diverse world, it is both unrealistic and unethical to reject

pluralism about the nuances of what health equity is or what its philosophical foundations are. While I place great value on the scholarship debating these matters, it is imperative that we not assume the endpoint of such debates is that one position wins. For example, I am sympathetic with the “capabilities approach” (Venkatapuram 2011), but do not want this view imposed on others who have alternative conceptions of health equity (Galarneau 2016). As a matter of both philosophy of science and meta-ethics, making headway in health equity debates would be well served by reducing the reliance (especially by philosophers) on hypothetical cases and problems, and increasing attention to the plethora of real (and really messy) cases of health inequities. In a related point, I argue for a shift in health equity deliberations: insofar as health governance and health promotion are two sides of the same coin, (Kickbusch and Gleicher 2012: x), health equity is better served by fostering equitable social structures of health governance. One important piece of that process is ensuring that diverse forms of knowledge, especially the oft-undervalued knowledge held by non-scientists, are respected and included in population health science. The chapter is followed by a case study that illustrates the health equity dynamics discussed in the chapter: the field of scientific research on racial and ethnic health disparities.

Chapter 8 offers “humility” as a guiding philosophical concept for the continued development of a fruitful population health science. The final chapter offers humility as the thread that ties together the disparate strands of population health research and practice. I argue population health experts would be wise to recognize that thread, or risk having the field of population health science unravel. The chapter begins with a restatement of the book’s orientation, philosophy of population health in the form of philosophy *for* population health. The book aims to contribute to the project of helping population health science to refine and make progress on its disciplinary path—it is already oriented in the right direction.

The chapter argues that three types of humility are essential to a successful and ethically sound population health science. First, epistemic humility is essential, in that population health science requires open-mindedness on matters such as how non-scientist members of a population can have knowledge about that population. Second, the chapter argues for sectoral humility, since population health science (in its efforts to promote health in all corners of social life) requires intersectoral collaboration between government, non-profits, healthcare companies, and more. Third, interdisciplinary humility is essential because population health science is an interdisciplinary field, which not only requires collaboration between multiple disciplines, but also requires that these must be collaborations among equals—for example, epidemiology has no primacy over medical anthropology. The chapter reflects on some of the challenges of educating future experts in population health science.



## What are the book's philosophical methods and commitments?

This book is offered in a spirit of humble interdisciplinary collaboration, expounded in Chapter 8. Philosophy's role in this interdisciplinary project is a unique piece of a whole, and my role in philosophy is likewise just a unique and small piece of a whole. Philosophy is not monolithic—it is many different things and accordingly has many different contributions to make to population health science. What this book can and will bring to the table is largely dictated by the combination of my skill set and the scope of this project as a philosophical study of a branch of science that has not received much previous attention. This book appears in a series titled “History and Philosophy of Biology,” and likewise my PhD is in History and Philosophy of Science. With that as my background, this book takes on a more wide-ranging set of literatures and methodologies.

Philosophy of science in practice, as promoted and organized by the Society for Philosophy of Science in Practice, brings the methods and literature of philosophy of science to bear on the philosophy of population health insofar as it features the communities, theories and practices of applied health scientists. “Philosophy of science *in practice*” is used to indicate a respect for the messiness that far too many philosophers of science have tried to set aside in their abstract representations of scientific processes. Population health science is driven by practical goals in health promotion, an endeavor quite unlike the mythologized theoretical physicist's search for universal truths about nature.

Philosophy of medicine is methodologically closely related to philosophy of science in practice, but insofar as medicine is more than just applied science, the philosophy of medicine literature and methods brings a unique ingredient to the book. This book is in part a work of philosophy of medicine, and making sense of population health science will require entering into conversation with both classic debates in the area (e.g., the philosophical nature of health and disease), and emerging topics for the field (e.g., philosophy of causation in epidemiology). To repeat the above point, though, population health science is not a subfield of medicine in a disciplinary sense or in an institutional sense of being part of the healthcare sector. So, this book necessarily includes much outside philosophy of medicine.

Public health ethics and health justice overlap with bioethics and with social and political philosophy, the massive distributive justice literature, and of course have a long history of contending with population-level health. This book will engage with all of these, though the goal of this book is not to offer a direct competitor theory of (public) health justice/equity as others have done (Powers and Faden 2006; Daniels 2008; Ruger 2010; Nussbaum 2011; Venkatapuram 2011). This book is foremost concerned with articulating and defending a view of the philosophical foundations of population health *science*, which in turn sheds light on how the global project of promoting health equity can and should be pursued by diverse practitioners (see Chapter 7). A commitment to coupled ethical-epistemic philosophical practice undergirds my approach to philosophy of



population health science (Katikireddi and Valles 2015; Tuana 2013). The ethical and evidentiary aspects of population health science dynamically interact with each other. Population health science requires both ethical rigor and epistemic rigor, and these two features cannot be neatly separated.

The history of population health science is a crucial feature of this book for two reasons. First, as a matter of scholarly practice, I concur with Hansen's famous position that philosophical understandings of a science are vacuous without also examining the corresponding history of science (Hanson 1962). Second, in the case of population health science, attending to the history of the field seems to be the best means of getting a handle on what the field's philosophical commitments are and why. This is why Chapter 2 will present a history of population health science.

Related to my endorsement of philosophy of science in practice, I contend that we should turn to day-to-day practitioners and glean from their own experiences what the pressing philosophical questions are and take it seriously when they offer solutions to them. As an ethically and theoretically motivated reform effort, population health science has always been explicitly engaged with a wide range of abstract and applied philosophical questions. What is health (Kindig 2007)? Who ought to control health governance, and how (Kickbusch 2007)? How can we address the inequitable treatment of marginalized populations in a way that re-empowers them (Government of Western Australia Department of Health 2015)? Some scientific communities may be reluctant to reflect on philosophical matters, but this community is not one of them. This book will reflect that a massive amount of effort has already been profitably spent in sorting out the philosophy of population health science. Some excellent work has certainly been done by professional philosophers (e.g., Goldberg 2009), but population health scientists themselves have produced a body of insightful philosophical literature, largely untapped by professional philosophers.

To be clear, one of the most compelling reasons that this book will engage so closely with the philosophical insights of non-philosopher scholars of population health science (people whose occupations, publication venues and/or scholarly communities place them primarily or entirely outside capital-P-Philosophy) is that paying close attention to them serves the *liberatory project* (see, for example, Medina 2013; Kidd et al. 2017). Oppression and injustice are pervasive, and scholars of population health science have shown an admirable commitment to the global project of liberation. Leading figures in their field have argued passionately for LGBTQ rights and the value of thinking intersectionally about the nexus of sexuality–gender–race, etc. (Galea 2018: 145–150); lucidly contextualized appalling racial health inequities inside even larger patterns of dehumanization, and classist and colonialist disempowerment (Kindig 2017); fought to articulate and proposed international policy steps to address systematic neglect of the diverse indigenous peoples of the far north (Young 2013); and so on. As Chapter 2 will explain, an important piece of population health science's history is its rooting in Latin American radical liberation theories (Diez Roux 2016; Krieger 2011: 163–190). Feminist philosophy, racial health equity

scholarship, indigenous epistemology, and all sorts of other liberatory literature—some by philosophers and some not—will appear often in the book. Population health science is, and ought to be, oriented toward justice and liberation and so this book happily follows suit.

### **What this book is not, and what it will not do**

Because this book sits at the intersection of so many areas, and takes on a somewhat amorphous interdisciplinary field of science, the book needs to set a realistic scope. It cannot, and will not attempt to, address every important subfield, topic, dispute, text, argument, etc. related to this sprawling topic. In fact, this is an opportune moment to remind readers that population health science is unique and deserving of intensive philosophical attention in large part *because* it aims to think far more broadly than even the already-broad field of public health. This is not an excuse for any problematic oversights or absences in the upcoming chapters, but it is a reason why the book will necessarily leave many open avenues untraveled. Moreover, when the book does pass up would-be subject matter, it should not be interpreted as an indication that I devalue them—or even that I value them less than the subject matter that is included. Rather, the content that is—and isn't—here is based on my judgments of how I can best articulate, argue for, and synthesize, a cogent cohesive set of contributions to scholarship. As the narrative progresses, I will strive to accompany my arguments with corresponding statements of what I am indeed trying to achieve and why I am trying to achieve it.

I will avoid philosophical jargon and population health science jargon as much as possible in this book. I do this for practical and theoretical reasons. Practically, I wish to spark dialogue between philosophers and population health science professionals, a goal that is best served by speaking to both audiences at the same time. Theoretically, jargon manifests a disciplinary exclusivity that contradict the spirit of inclusivity that I and population health science both endorse. Misunderstandings and knowledge disconnects are inevitable to some extent, but insofar as I share population health science's belief that promoting population health is a collaborative endeavor, it requires efforts to make the conversation as inclusive as possible. It is already limiting enough that I am primarily writing this book for a postgraduate audience.

It is worth taking a moment to acknowledge some of the important questions that I have reluctantly chosen to set aside for the purpose of keeping the book focused on answering a limited set of linked questions. For one, I have set aside the book's planned section on the meaning of "population" since it seems that the question, "what is a population in population health science?" is less pressing a question than I originally anticipated. While Millstein makes a strong case for why a single "population" definition would be desirable in evolutionary biology and ecology, it is less clear that population health science needs a similarly unified concept of population (Millstein 2014). As Kindig surmises, based on Young's population health book, virtually any grouping of people can qualify

as a population: geographic region, a nation, global members of a religion, etc. (Kindig 2007). Krieger shows that there are indeed interesting philosophical questions at stake in how and why one uses different population concepts (Krieger 2012; see also the discussion of population lumping vs. splitting in Chapter 6), but I largely leave this question aside in the book.

Future work is needed to further explore the intersections of philosophy of population health science and philosophy of environmental science. Important work has already been done on issues such as philosophy of environmental health (Resnik 2012; Elliott 2011), despite a historical divergence between the literatures of medical bioethics and literatures on the ethics of non-human biological subjects such as non-human animal welfare (Thompson 2015). Yet, issues such as climate change (Chapter 4's case study) create a pressing need for investigations of how population health science and environmental science's respective philosophical issues interrelate (MacPherson 2013; Valles 2015; Dwyer 2009). There will be frequent discussion of environment broadly (safe neighborhoods, etc.), but the environmental philosophy literature will only make limited appearances.

There is also much future work to do on the question of how population health science's discipline formation process meshes with existing philosophy of science theories for how scientific disciplines evolve. Thomas Kuhn's famous "paradigm shift" language (Kuhn 1962) has been used by both supporters (Peterson et al. 2016) and critics (Poland et al. 1998) to describe population health as a genuine scientific revolution, a discontinuous change from older models of public health. Is this an accurate account of what population health science is, or is the field better viewed through the lens of "research program" (better illuminating the continuities with other past and current scientific endeavors; Lakatos 1968) or perhaps "scientific repertoire" (better illuminating the institutional and collaborative influences of the field; Ankeny and Leonelli 2016). Like Miriam Solomon's (2015) and Jeremy Howick's (2011) texts on philosophy of evidence-based medicine, I choose to refrain from devoting the enormous amount of space required to adequately explore if/how this new field technically qualifies as "revolutionary." In a related matter, this book will engage with evidence-based medicine in Chapters 6 and 8, but there is much more work to be done exploring these two parallel efforts to reform health research and practice, all the more so because both emerged in the 1990s out of frustrations with the health science status quo (Evidence-Based Medicine Working Group 1992; Evans et al. 1994).

## **Onward**

Something big has been happening in the world of public health science: an effort to revise, reform, reorient, or arguably even to revolutionize how we think about and practice health promotion for groups of people. I use the term "population health science"; others use "the population health approach" (Arah 2009); "public health 3.0" (DeSalvo et al. 2016); or just what some consider good contemporary public health (Rudolph et al. 2013). Like Diez Roux, I am more

concerned about the content of the ideas than the terminology—“the more synonyms we have, the better” (Diez Roux 2016: 620)!

The task ahead is to stitch together fragmentary pieces of insights from many scholars, assembling a cohesive philosophy of population health science. The first step in this process is to turn to the history of population health science.

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