Causation in Population Health Informatics and Data Science

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Preface

Human civilization as we know it would look very different were it not for collective efforts to maintain and improve population health. Access to the means that support individual and community health is a human right. The continued improvement of global public health must be an administrative and political priority, at local, regional, and national levels. So many health administrators, scientists, field workers, students, project coordinators, nurses, and physicians work tirelessly toward that goal. Better population health means better lives.

Academic schools and departments of medicine and public health are charged with the generation of new knowledge to help with this endeavor. Because effective medical and public health practice needs a solid scientific foundation, we need to devise methods that ensure the generation of unbiased data, reliable information, solid evidence, and useful knowledge. Most of these methods are computer-based; informatics and data science thus play a crucial role in this research. Accordingly, considerable attention has been paid over the past decade to the development of public health informatics, with the second edition of a comprehensive textbook [1] and the creation of an academic journal, the *Online Journal of Public Health Informatics* (ojphi.org). Most recently, *Population Health Informatics* has been added to the mix [2]. The field covers a broad variety of informatics applications in population health research and practice. One crucial issue, however, is the lack of substantial effort to improve the *interpretation* of population health data and inference, i.e., the generation of new knowledge [3, p. 100–1]. The central issue here is the lack of methods for interpretation and inference that help turn data into information, information into evidence, and evidence into knowledge.

This is the void this book attempts to fill, by bringing in a third perspective that comes from the growing interest among philosophers in causal explanation and mechanisms in the health sciences. Imagine a Venn diagram with three circles: one is informatics and data science, the second is the health sciences, and the third is philosophy of science. The topic of this book is situated right in the middle of the multidisciplinary space defined by the diagram, where all three circles overlap and where, as of yet, not much has been published.

This book had a lengthy gestation and many have helped along the way. Olaf Dammann would like to thank Guanglan Zhang, Naftali Weinberger, Olaf Wolkenhauer, Alex Broadbent, Ted Poston, Paul Thagard, and all his students and colleagues at Tufts for many interesting and helpful discussions. First and foremost though, a big thanks to Christiane, Lina, and Laura for their love, patience, and support. Benjamin Smart would like to thank Veli Mitova and Michael Talibard for their comments on earlier versions of Chaps. 3 and 4, Em Watson for her love and support, and his coauthor for relentless patience. Both authors appreciate the continued guidance offered by our editor Grant Weston at Springer.

We hope to generate a fruitful debate that will develop some of the ideas discussed in this book. We have tried to offer food for thought in a palatable way, and all errors are ours. Our last chapter is a standing invitation to contact us to join the conversation. As the chef of a good restaurant would say, if you don't like our food, tell us; if you do, tell others.

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