Preface

Mounting scientific evidence generated over the past decade points to the significant role played by the myriad attributes of our cities’ built environments in shaping our health and well-being. Nonetheless, the attainment of healthy cities still remains a massive unmet challenge to urban societies at all levels of development. The production and socio-spatial distribution of health originate as a result of a complex interplay between contextual socio-economic, built and natural environmental as well as individual- and population-level factors; and this complexity is tricky to unravel. We undertook to write this book with this challenge in mind. In particular, we wanted to bring together the disciplines of urban planning, public health and epidemiology and show how once again in the modern history of urban planning they have need of each other. The modern era of urban planning in the UK, and the West as a whole, started under the influence of public health studies and policy concerns. We believe that it is time to reunite the two fields in more than a rhetorical manner.

To decipher the impact of healthy (or unhealthy) places upon health outcomes, the book hypothesizes that the constituent components of the built environment, especially the configuration and design of land uses and street networks, govern the distribution of resources and services and configure neighbourhood activity space. They thereby influence individual physical activity behaviour, social interactions, general well-being and specific health such as weight outcomes and mental health. The underlying causal hypothesis in the book, and in the field of studies that it reviews and extends, is that the configuration of urban space and the distribution of opportunities within its subspaces influence physical activity and influence exposure to health-enhancing and -subtracting factors.

The transport networks of a city, particularly its road grid, can be thought of as distributing the benefits and costs of living together in a city. For this reason, property prices are highly correlated with the accessibility conferred by the grid. The urban grid also distributes health risks. If this is so, then it should be possible to use urban accessibility measured from the road network to both explain and predict individual health variations within cities.
Chapters 1–4 conceptualize the *urban health niche* as a novel holistic and spatially explicit paradigm in health-related urban planning and public health planning, and propose a method for empirically modelling the healthy city. Chapters 5–8 demonstrate how this paradigm, informed by accumulated research evidence, can be used to structure empirical studies and provide scientific evidence much needed to support healthy-city policy and planning. These empirical chapters show how we have created and integrated multi-level data sets pertaining to health, socio-economic, built and natural environments to constitute a high-resolution health niche database. We call this a *Spatial Design Network Analysis for Urban Health* model (sDNA-UH) after the sDNA spatial network analysis tool that conceptually and empirically underlies the implemented health niche model (http://www.cardiff.ac.uk/sdna/). The sDNA-UH model reported in this book has been developed for the assembly constituency of Caerphilly, an assembly constituency of South Wales in the UK.

State-of-the-art spatial and network analysis performed on UK Ordnance Survey MasterMap data layers creates objective measurements of urban built environment accessibility (morphological metrics – *morphometrics*). These are used to investigate fine-scale associations between urban configuration and individual health. We employ health data from the Caerphilly Prospective Study, a long-standing and internationally prominent cohort study of adult men. Using the morphometrics and the health data, we construct a series of multi-level cross-sectional and longitudinal models in Chapters 5–8 to examine the association between built environment configuration and individual health outcomes.

The conceptual and empirical chapters (Chapters 1–4 and 5–8 respectively) are intended to point to a more focused and evidence-based approach to investigating and designing for healthy cities. We hope that the book will encourage a new generation of scholars to pursue the new opportunities now available through innovations in data and spatial and network data analysis methods and technology.

The book is intended to be of interest to an interdisciplinary body of scholars, practitioners and policy makers within the domains of urban planning, spatial epidemiology, health geography, sociology, public health and psychology. The empirical studies in Chapters 5–8 are especially intended for advanced undergraduate and postgraduate scholars and urban health researchers who may want to integrate readily accessible spatial data with health data in constructing robust spatial epidemiological and public health models.

We wish to thank several individuals who helped us in the writing of this book. Our ideas for the book have been refined over time under the influence of contributions from many scholars, including some of the works
cited in the References. In particular we would like to thank Professor Peter Elwood, Professor Stephen Palmer and Professor Lawrence Frank for their encouragement during the course of the project. Professor Elwood’s influence goes back to the start of the careers of two members of the authoring team (Chris Webster and John Gallacher), and this is a good opportunity to thank him for shaping our respective intellectual journeys. We also thank our students and colleagues at Cardiff University for being a constant source of challenge and renewal in our academic pursuits. Special thanks are due to the anonymous respondents of the Caerphilly Prospective Study, whose health we study in this book. We further wish to thank the UK Ordnance Survey for the MasterMap data layers that formed the base for the construction of built environment metrics in this project. Thanks are also due to the UK Economic and Social Research Council and UK Biobank for their support of the authors’ WHealth modelling project (ESRC grant reference: ES/L003201/1 under its Transformative Research Programme) and UK Biobank Built Environment project (entitled Morphometric Analysis of the Built Environment in UK Biobank). The work presented in this book provided a pilot run for the scaled-up version in these research projects. At the same time, the ESRC project provided resources towards the completion of the book, which contains the fullest statement in print of the methodology underlying the WHealth modelling paradigm. We express our thanks to Jo Betteridge, Caroline Cornish, Emily Neukomm and Alex Pettifer at Edward Elgar for their patient help with the editing of the original manuscript. Last but not the least, we owe special gratitude to our families for their constant encouragement and support, as well as for patiently enduring this project with us.

Chinmoy Sarkar
Chris Webster
John Gallacher