

Introduction

Marzenna Anna Weresa, Christina Ciecierski and Lidia Filus

The COVID-19 pandemic has revealed that health is crucial to economic and social life. Healthcare systems are related to patient care, including both the treatment of diseases and disease prevention as well as the functional and institutional frameworks of the healthcare industry. The system of healthcare varies globally. Significant disparities persist between countries regarding burden of disease, the levels and sources of healthcare funding, infrastructure development, institutional functioning, public policy priorities, etc. Despite these differences, there is a common understanding that the primary goal of any healthcare system is to enhance the health of its population, in the most effective manner possible, using available resources in an as efficient manner as possible. Undoubtedly, this underlying question requires extensive continuous research.

The definition of a healthcare system evolves continuously, becoming broader and more complex over time. A healthcare system consists of many elements, such as access to comprehensive medical care along with health promotion, disease prevention, financing schemes, share of government responsibility in health, etc. In view of this broad definition of a healthcare system, this book focuses on a wide spectrum of health-related issues ranging from risk factors for developing a disease to medical treatment and frameworks for healthcare systems. Aging populations, increasing costs of healthcare, advancing technology, and challenges created by the COVID-19 pandemic require an innovative, conceptual and methodological framework. This book offers an interdisciplinary approach to studying health-related issues by combining efforts of researchers from mathematics, medicine and economics. It also explores the various problems within health sector and healthcare systems and provides examples of how these can be analyzed using a variety of conceptual frameworks and mathematical models. Results yield implications for health policy.

The key objectives of the book are as follows:

- to assess the role of risk factors, including socioeconomic conditions, as they relate to cancer incidence and zoonotic foodborne diseases;
- to identify the costs and benefits along with the practical application of a value based health care approach in improving the clinical effectiveness of treatment;

- to search for common institutional traits that improve the efficiency and overall performance of healthcare systems;
- to study select determinants of public health outcomes, including population density, bank density and public financing of research;
- to compare the performance of the pharmaceutical sector in selected countries, including but not limited to: innovation divide, share in international trade, and the perceived value of pharmaceutical companies to potential investors;
- to provide recommendations for health policy regarding the direction of health care reform in a post-pandemic era.

This book consists of three parts further divided into chapters that are devoted to various aspects of health-related issues. Part 1 includes three chapters focused on population-based concerns regarding disease incidence including but not limited to: race, ethnicity, socio-economic status and environment as factors of disease. Part 2 features four chapters ranging across a variety of health-related industries and their subsequent impact on the public health-related outcomes. Finally, Part 3 focuses exclusively on performance measures related to the pharmaceutical industry in both global and country-specific contexts.

The contribution of this book is three-fold and pertains to theoretical, empirical and methodological concerns. With regard to its theoretical contribution, the book narrows the gap in research by combining the perspective of disease treatment with institutional factors and other determinants of health care outcomes that include but are not limited to: population density, bank density, public financing of research programs devoted to health and well-being. In addition, the conceptual framework for value-based healthcare systems will be developed and discussed. In sum, this book provides an interesting framework for further complex inquiry into healthcare systems. The book also contributes to the empirical literature and in particular, to sectoral studies that extend knowledge about the functioning of the pharmaceutical industry within the global economy. These empirical analyses of the pharmaceutical industry assess the innovation divide between countries with regard to the pharmaceutical sector, which is a factor in the overall innovation gap of the world economy. The analyses are supplemented with a mapping of the international trade flows in pharmaceutical goods, which allows for tracing changes in exports and imports induced by the COVID-19 pandemic. The value of taking this sectoral approach is enhanced by the inclusion of investor perspectives regarding pharmaceutical company performance as listed by the Warsaw Stock Exchange in Poland.

The research results presented in this book have value for practitioners and in particular, for health policy makers. Policy implications based on research

findings are identified and recommendations for future policy directions are suggested.

Lastly, through its integration of economics, medicine and mathematics, this book offers new methodological insights regarding interdisciplinary research and collaboration. A variety of mathematical and statistical methods were used throughout the book including regression models, hierarchical cluster analysis, statistical modeling, and correlation analysis for studying diverse health-related issues.