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Batabyal, Amitrajeet and Higano, Yoshiro and Nijkamp,
Peter

Rochester Institute of Technology, University of Tsukuba,
Jheronimus Academy of Data Science, Netherlands

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Introduction to Disease, Human Health, and Regional Growth and Development in Asia¹

by

Amitrajeet A. Batabyal,²

Yoshiro Higano,³

and

Peter Nijkamp⁴

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Department of Economics, Rochester Institute of Technology, 92 Lomb Memorial Drive, Rochester, NY 14623-5604, USA.
Internet aabgsh@rit.edu

3

University of Tsukuba, Tsukuba Science City, Japan. Internet higano@jsrsai.jp

4

Jheronimus Academy of Data Science, 's-Hertogenbosch, The Netherlands. Internet p.nijkamp@jads.nl and Alexandru Ioan
Cuza University, Iasi, Romania.

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Abstract

We have two objectives in this book. First, we bring together in one place, original research that sheds light on the myriad connections between disease, human health, and regional economic growth and development. Second, given the contemporary salience of Asia in world affairs, we concentrate on the trinity of disease, human health, and regional economic growth and development in different regions within Asia. Following this introductory chapter, there are nine chapters and each of these chapters—written by an expert or by a team of experts—discusses a particular research question or questions about disease, human health, and regional economic growth and development within Asia.

Keywords: Asia, Disease, Economic Development, Human Health, Regional Growth

JEL Codes: I12, I15, R11

1.1. Preliminaries

The systematic study of research questions in what is now called health economics began with a prescient paper by Selma Mushkin in 1962 which asked readers to think of health as an investment. This paper was quickly followed by two other papers that collectively laid the foundations of modern health economics. The first of these two papers was by Kenneth Arrow in 1963 and this paper looked at the nexuses between uncertainty and the welfare economics of medical care. The second of these two papers was by Grossman in 1972. This second paper focused on the notion of health capital and then proceeded to analyze the connections between health capital and the demand for health.

Today, health economics is a burgeoning field within economics and it is fair to say that economists working in many different fields have studied questions concerning, *inter alia*, the allocation of medical resources, the organization of healthcare markets, the spatial distribution of diseases, and importantly for this book, the connections between disease, human health, and economic growth. There are two central findings in this literature.⁵ The first finding is that the relationship between human health and economic growth is *bi-directional* in nature. What this means is that although advances in human health positively influence economic growth, economic growth, in turn, helps humans become healthier. The second finding is that although improvements in human health have an instrumental value in that they promote economic growth, these improvements are valuable in and of themselves, quite apart from their instrumental value.

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See Bloom and Canning (2008) and Weil (2014) for a more detailed corroboration of this claim. In addition, a comprehensive overview of studies of health differences between rural and urban areas can be found in Ishikawa *et al.* (2015).

What are some of the ways in which human health affects economic growth? First, there is the direct productivity effect. This means that individuals who are healthier are able to work more effectively from both physical and mental standpoints. In addition, Weil (2007) points out that adults who are healthier as children typically acquire more education based human capital. Apart from this direct productivity effect, Kalemli-Ozcan *et al.* (2000) and Hazan (2009) show that better health in the form of mortality reductions raise the return on human capital investments which, in turn, increase the level of schooling and positively influence economic growth. Kalemli-Ozcan (2002) points out that from a parental perspective, reduced mortality leads to a reduction in the number of surviving children and hence this permits higher investment in human capital which, presumably, affects economic growth in a positive way.

It is important to recognize that most of the extant studies about the nexuses between human health and economic growth have focused on *countries* as the unit of analysis. Although there exists some research on the connections between human health and economic growth in *regions* where the word *region* refers to geographical entities that are smaller than nations,⁶ neither economists nor regional scientists have studied the nexuses between the trinity of disease, human health, and regional economic growth and development in a systematic manner. Given this lacuna in the extant literature, the first of two objectives in this book is to bring together in one place, original research that sheds light on the myriad connections between disease, human health and *regional economic growth and development*.⁷

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See, for instance, Deaton and Paxson (2001), Thomas and Frankenberg (2002), and Lawton Smith *et al.* (2016).

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Batabyal and Nijkamp (2017) note that irrespective of what region in the world one looks at, if one is interested in lifting large numbers of people out of poverty then it is essential to design and implement policies that promote economic growth. This line of thinking is now so much a part of orthodox thinking that it features standardly in the literature on economic growth. For instance, in a prominent textbook, Ray (1998, p. 47) points out that of “all the issues facing development economists, none is quite so compelling as the question of economic growth.”

Several observers such as Mahbubani (2008) and Batabyal and Nijkamp (2017) have pointed out that in the last two centuries, as the West (North America and Western Europe) was holding sway on the world stage, Asian nations were largely bystanders, reacting to progressive surges of Western commerce, thought, and power. However, there is now an ongoing shift in the global center of gravity. Specifically, geopolitical and economic power are steadily moving away from the West to Asia and therefore Asia is returning, according to Mahbubani (2008), to the global center stage it occupied for eighteen centuries before the rise of the West.

As pointed out by Allison (2017) and Rachman (2017), this state of affairs has led to a significant amount of hand-wringing and soul-searching in the West. Specifically, the rise of Asia has led to some rebalancing in America's foreign policy and in particular to President Obama's pivot to Asia, and now to President Trump's trade war with China.⁸ The geopolitical and economic rise of Asia raise important questions about disease, human health, and regional economic growth and development in this vast continent. In addition, given the contemporary salience of Asia, Sen (2001) has rightly observed that lessons learned about regional economic growth and development in Asia are likely to prove useful for the design and implementation of apposite policies in other parts of the world. This state of affairs provides a rationale for the second of our two objectives and that is to analyze disease, human health, and regional economic growth and development in *Asia*.

Following this introductory chapter which comprises Part I of the book, there are nine chapters and each of these chapters—written by an expert or by a team of experts—discusses a particular research question or questions about disease, human health, and regional economic

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See Batabyal (2018a, 2018b, 2018c) for additional details on this last point.

growth and development in Asia. For ease of comprehension, we have divided the present volume containing ten chapters into four parts. Part II of this book focuses on South Asia and this part consists of five chapters. Chapter 2 provides a detailed discussion of inter-state and rural-urban disparities in the consumption of food, the intake of calories, and undernourishment in India. Chapter 3 sheds light on the geography of excess weight in urban regions across a variety of states in India. Chapter 4 discusses the nature of health systems and the productivity effects of changes in health expenditures in the post-reform period in various Indian states. Chapter 5 utilizes a survey to examine the nature and the effects of gender perspectives on what this chapter calls a “health related situation” in a rural region in northern Bangladesh. Finally, chapter 6 also uses a survey to comment on the nature of the “health related situation” confronted by elderly people in a couple of remote villages in northern Bangladesh.

Part III concentrates on Southeast Asia and this part of the book consists of two chapters. Chapter 7 looks at international trade policy and asks what impacts reforms in trade policy have on nutritional intake and food security in different regions within Indonesia. Chapter 8 analyzes the nature of health inequities in the Philippines between the richer and the poorer regions on the one hand and between Muslim majority and non-Muslim majority areas on the other.

Part IV focuses on East Asia and the single chapter (Chapter 9) in this part of the book uses a questionnaire survey and propensity scores to shed light on the nature of medical expenditures in clinics and hospitals by individuals living in the Kanto region of Japan. The focus of part V of this book is on Oceania. The final chapter 10 utilizes household survey data from 2009-2010 merged with geospatial data from the United Nations to analyze the connections between distance to healthcare facilities, health, and healthcare usage in Papua New Guinea.

With this preliminary discussion out of the way, we now proceed to comment on the intellectual contributions of the individual chapters in this book.

1.2. South Asia

1.2.1. Undernourishment in India

When it comes to describing India's economy, there is no gainsaying the fact that there is an incongruity between macro and micro metrics. When we look at macro metrics such as aggregate economic growth rates, increases in per capita income, and declines in poverty rates, the country performs impressively. However, as noted by Dreze and Sen (2013), when we look at micro metrics concerning the health of children, the extent of undernourishment, the availability of medical care and social services such as sanitation, the country's performance is much less laudatory.

Given this state of affairs, chapter 2 focuses on food consumption in India, the nutritional implications of this consumption, and the related points of calorie intake and undernourishment. A key aim of this chapter is to shed light on the roles played by the public distribution system (PDS) and the mid-day meal scheme (MDMS) in alleviating the extent of undernourishment. To undertake this exercise, the chapter uses detailed information about household consumption and expenditure on food and non-food items contained in the unit records of the 68th round (July 2011 to July 2012) of India's National Sample Survey (NSS). In particular, 101,651 households are surveyed and this round of the NSS provides detailed information on food consumption and expenditures on approximately 170 food items.

The analysis conducted in this chapter generates a number of salient findings. First, it is shown that there exist significant *spatial differences* in food consumption. For instance, it is

shown that some of the southern states such as Tamil Nadu and eastern states such as Assam consume much higher levels of rice and lower levels of wheat relative to western states such as Maharashtra and Gujarat. Even so, within a particular state, the data do *not* reveal any major rural-urban differences in food consumption.

Next, this chapter sheds light on regional differences in the prevalence of undernutrition (POU) in India. We learn that because rural poverty, in general, is higher than urban poverty, the rural POU rates are also higher than the urban POU rates when looked at from an “all India” perspective. This finding does *not* always hold when we look at rural-urban differences in individual states. Somewhat counterintuitively, this chapter shows that POU rates in the relatively wealthy states of Gujarat and Tamil Nadu are *higher* than the corresponding rate in the relatively poorer state of Bihar. Finally, although evidence in favor of the PDS as a welfare program is mixed, the same cannot be said about the MDMS. In particular, the latter program appears to be doing a good job of reducing undernourishment among participating households.

While chapter 2 rightly concentrates on the analysis of undernourishment in India, it is also true that parts of India now face the problem of unhealthy weight levels and the associated health risks. To what extent do these issues constitute real public policy challenges? This question has recently been much discussed in the Indian press---see Anonymous (2007) and Verma (2016)---and it is also the subject that is addressed in Chapter 3.

1.2.2. Excess weight in urban India

In many parts of India, the health related issue that increasingly requires attention has little to do with undernourishment and more to do with unhealthy food consumption habits. Chapter 3 begins its analysis of the geography of excess weight in urban India with two sobering

observations. First, it points to the twin problems of excess weight and obesity on the one hand and the excess weight and obesity driven *rise* in the incidence of non-communicable diseases on the other. Second, it notes that lifestyle changes such as the higher likelihood of eating meals outside one's home and the increasing use of labor saving devices such as washing machines have together contributed to a situation in which India now ranks third behind the United States and China in terms of the number of people who are either overweight or obese.

Next, this chapter uses the most recent, i.e., the 2011-2012 round of the Indian Human Development Survey (IHDS2) to analyze patterns in excess weight and obesity rates for adult men and women in urban India. The key metric that is used to delineate an individual's weight status is his or her body mass index (BMI) which is defined to be the ratio of an individual's body weight in kilograms divided by the square of his or her height in meters. We are told that even though the number of overweight or obese individuals is rising in rural areas, the problem is particularly acute in *urban* areas and this explains why the emphasis of this chapter is on urban India.

The analysis is conducted for groups of states in India that together represent most of the nation. There are clear regional differences across a whole host of health and literacy measures across different parts of India. In particular, there is a considerable amount of *regional* variation in the proportion of men and women who fall into different weight classes. This notwithstanding, it is disquieting to learn that of all the regions that are studied in this chapter, there is *not* a single region in which the fraction of individuals who are either overweight or obese is less than 25 percent. In addition, when one looks at men and women in the four different weight classes by region, 13 percent (12 percent) of urban males (females) are underweight, 58 percent (53

percent) have normal weight, 24 percent (25 percent) are overweight, and 6 percent (10 percent) are obese or morbidly obese. An implication of these and other findings is that from an overall standpoint, there are more *women* than men who are either overweight or obese.

Given the above findings, the chapter next discusses possible explanations for the observed variation in weight across the regions that are studied. We learn that, *inter alia*, differences in diets, differences in the extent to which people are engaged in the labor market, and differences in the utilization of a variety of labor saving devices explain the regional variation in weight.

Why focus on excess weight and obesity? The chapter notes that this focus is justified because the incidence of a variety of non-communicable diseases such as cardiovascular diseases in general and diabetes is higher in individuals with what the chapter calls an “unhealthy BMI.” The policy lesson to grasp is that “excessive nourishment” is a problem and addressing this problem will require policymakers to focus on strategies that promote active lifestyles and, particularly in the south of India, diversify diets so as to reduce the excessive current reliance on rice consumption.

1.2.3. Productivity of public health expenditures in India

The recommendations made by the so called Bhore committee in 1946 and the subsequent adoption of the National Health Policy in 1982-1983 suggest that for quite some time, the government of India has been attempting to provide more equitable access to healthcare and to generate improved health outcomes across the different states.

Looked at in the aggregate, the government’s *share* of total health expenditures increased from 22.5 percent in 2004-2005 to 29 percent in 2014-2015. During this same time period,

out-of-pocket expenditures as a percent of total health expenditures decreased slightly from 69.4 percent to 62.6 percent. Finally, private expenditures on health insurance as a percent of total health expenditures increased from a minuscule 1.6 percent to an only slightly less minuscule 3.7 percent. Clearly, the *increase* in the government's share of total health expenditures and the *decrease* in out-of-pocket expenditures as a percent of total expenditures together tell us that there has been an uptick in the financial protection available to households as far as healthcare payments are concerned. Even though this is a good thing, we still know relatively little about the *productivity* of public health expenditures.

Given this state of affairs, the basic objective of chapter 4 is to contribute to the extant literature on health efficiency studies in India by analyzing changes in the productivity of public health expenditures undertaken by the major states in the nation. To this end, the chapter first measures the health system productivity change (HSPC) and the health expenditure productivity change (HEPC) for 17 prominent states for the time period from 2004-2005 to 2015-2016. The two major health outcomes that also are the two key outputs are the crude death rate (CDR) and the infant mortality rate (IFR).

Next, this chapter utilizes three inputs and the two (undesirable) outputs mentioned above to set up and solve a linear programming problem where the goal is to ascertain the efficiency of input use in alternate states. The analysis demonstrates that there are unambiguous *differences* in HSPC during the study period. In particular, the interstate differences have become more pronounced after 2009 and we learn that the disparity in what this chapter calls "health system productivity change" has risen from 2004-2005 to 2014-2015.

As far as the HSPC ranks of the individual states are concerned, the analysis shows that

of the 17 states under study, nine have improved their ranks over the pertinent time period, two have held their ranks, and six have gotten worse. The picture is only a little different when one looks at changes in HEPC ranks. Specifically, in the 2004-2005 to 2014-2015 time period, ten states improved their ranks, one state held its rank, and the remaining six reached lower ranks.

The central message emerging from the analysis undertaken in chapter 4 is that even though the productivity changes studied in the pertinent time period are mixed, when one looks at the coefficient of variation, these productivity changes are particularly *volatile*. The chapter contends that a partial explanation for this volatility lies in the way in which health expenditures are allocated in the individual state revenue and capital accounts.

1.2.4. Gender and health in rural Bangladesh

Moving on from India to its eastern neighbor Bangladesh, chapter 5 begins the proceedings by reminding the reader that when one considers a health related problem, it is *not* sufficient to look narrowly at health alone. Instead, one needs to focus on a whole host of cultural, demographic, and socioeconomic factors that have a direct bearing on an individual's access to healthcare. As such, this chapter sheds light not just on health related problems in rural Bangladesh but also on what this chapter calls the "health related situation."

Specifically, this chapter uses surveys to interview the male and the female residents of a remote village named Kathalbari in northern Bangladesh about the health related situation that confronts them. Of the 303 households in Kathalbari, some declined to answer the personal questions contained in the interviews and hence their non-participation left the author of this chapter with usable responses from 199 individuals.

The first finding in this chapter is that the socioeconomic circumstances of a Kathalbari

resident have a significant impact on the health related situation that (s)he confronts. In this regard, we learn that the extent to which a resident is aware of diseases and health issues more generally and the likelihood that this resident will seek medical services when needed is fundamentally dependent on the resident's age, occupation, and income. That said, because over 90 percent of the households being studied in this chapter earned about US\$183 per month, it is extremely *difficult* for these households to lead a healthy lifestyle. This basic difficulty is compounded by the facts that more than 70 percent of the households in Kathalbari live in what are essentially mud houses and that almost 50 percent of them have *no* sanitary toilets in their houses.

Clearly, the maintenance of hygiene is a challenge in Kathalbari. This is, in part, responsible for the prevalence of several diseases such as diabetes, stomach problems, and what this chapter calls "female diseases." Somewhat surprisingly, we learn that even though the doctors staffing the government health centers and hospitals are disproportionately male, female respondents do not think of this as a barrier and they unhesitatingly discuss their health problems with the various male doctors. Even so, we learn that some of the practices employed by menstruating women---unwittingly, in an attempt to maintain hygiene---may well increase the likelihood of infections and female diseases in the long run.

Two key lessons emerge from the analysis conducted in chapter 5. First, the government needs to do all it can to ensure that Kathalbari residents have access to sanitary toilets. Second, the health condition of a male depends primarily on his ownership of land. In contrast, the health condition of a woman depends mainly on her consumption of proteins, the nature of the house she lives in, and her use of contraceptives. Therefore, *gender differentiated* policies are required

to ameliorate the health situation confronting Kathalbari residents. How might things change if one were to focus not on the gender dimension of the health related situation but, instead, on the geriatric aspects of this situation. This topic is addressed in chapter 6.

1.2.5. Geriatric health in rural Bangladesh

Like chapter 5, chapter 6 concentrates on health issues in rural Bangladesh and it also sheds light on the so called health related situation confronting individuals and not just on health *per se*. The focus in this chapter is explicitly on geriatric health. To this end, the chapter uses questionnaires to conduct face-to-face interviews in five villages---Hiramanik, Atbil, Dhaknai, Fakirtari, and Haribhanga---with men and women aged 56 years and older.

The completed questionnaires give rise to empirical data and chapter 6 utilizes this data to conduct statistical analyses and specifically to test two specific hypotheses about the health related situation confronting the elderly in the above five villages. First, it is shown that irrespective of gender, age-class, or income-class, elderly people in the five villages being studied differ significantly in the quality of life they experience. In this regard, the quality of life experienced is assumed to be a function of how satisfied one is with one's occupation, housing, sanitation and personal hygiene, transport facilities, old age allowance, and the provision of social policy services.

Chapter 6 demonstrates that many of the elderly people being studied have *no* savings and that their monthly expenditures typically *exceed* their monthly income. Therefore, they have to take loans and the resulting loan repayment constitutes a significant burden on them and, in addition, it prevents them from having a good quality of life. As such, it is no surprise to learn that quite apart from gender and age-class considerations, there is a non-trivial positive

correlation between an elderly person's monthly income and the quality of life that (s)he is able to enjoy.

Chapter 6 concludes by noting that elderly people get little attention or respect and that their plight continues to worsen over time. Therefore, this chapter argues in favor of creating what it calls an "Ageing Welfare Ministry" that will be responsible for, *inter alia*, increasing the old age allowance and widow benefits, providing informal education, providing health cards, and establishing old age homes for the destitute and the disabled. With this discussion of the five chapters about South Asia that comprise Part II of this book out of the way, we now turn to the two chapters on Southeast Asia that make up Part III of this book.

1.3. Southeast Asia

1.3.1. Trade reforms and nutrition in Indonesia

Chapter 7 begins by asking the reader to consider a particular staple food that is imported into a nation. It then points out that if trade policy either raises the price or bans the import of this staple food then it is likely that poor people who rely on this food will either reduce their consumption of this staple food or switch to other low cost food items with potentially *lower* nutrient content. If this happens then this chain of events may well lead to increased nutritional deficiencies in the affected country.

Next, this chapter analyzes the implications of the above chain of events in the context of Indonesia---the largest country in Southeast Asia and the fourth most populous nation in the world. The focus on Indonesia arises from a variety of public health related concerns. In this regard, we learn that poor hygiene practices, inadequate sanitation, and food insecurity have collectively contributed to malnutrition in Indonesia and some of the relevant metrics here are

alarming. Consider two such metrics. In 2016, the dietary energy consumption of 18 million Indonesians fell *below* the minimum required to maintain a healthy life. In addition, 20 percent of pre-school children in the nation suffer from *acute* vitamin A deficiency.

Because of the complexities involved in quantifying the variety of non-tariff barriers to trade, chapter 7 concentrates on tariff barriers exclusively. It then points out that even though tariffs are set at the national level, this chapter is interested in ascertaining the impact of tariffs on a representative household in individual *districts*. Given this interest, the chapter constructs two measures that capture the output and the input tariff exposures faced by individual districts in Indonesia.

The econometric analysis conducted in this chapter leads to several fascinating results. For instance, the structural model reveals that a causal connection exists between the tariff barriers and nutrition status. In addition, we learn that a one standard deviation *decrease* in the average tariff rate leads to a 0.59 standard deviation *increase* in the nutrition status variable. This basic result is reinforced by the Lagrange multiplier test indices which show that the estimated impact of the “TradeBarriers” variable on the “NutritionStatus” variable possesses the expected negative sign and that it also is highly significant statistically.

This chapter rightly concludes on a cautious note. It points out that the *total* impact of openness to trade is likely to include channels that have not been formally modeled in the chapter because of data limitations. We are told that subject to data availability, a fuller accounting of the above mentioned total impact will involve the analysis of a more general model that permits a researcher to simultaneously consider the positive and the negative impacts of trade reforms in an integrated manner.

1.3.2. Health imbalances in the Philippines

After Indonesia, we move to the Philippines in chapter 8. The central objective of this chapter is to discuss the factors that are responsible for the continued presence of healthy inequity in the Philippines. The chapter forcefully argues that inequalities in health and avoidable health outcomes are collectively responsible for the persistence of all manner of health inequities. This notwithstanding, we learn that it is *not* possible to divorce a study of these inequities from underlying considerations of extant social injustices in the Philippines.

The analysis conducted in this chapter demonstrates that both life expectancy at birth and maternal mortality rates have, respectively, improved and reduced over time. These advances have been made possible because of enhancements in medical technologies, particularly in the treatment of communicable diseases. This salubrious state of affairs notwithstanding, we continue to see pockets of health deprivation. To drive home this point persuasively, this chapter focuses on Mindanao. We learn that relative to babies born in the National Capital Region (NCR), babies born in the Autonomous Region of Muslim Mindanao (ARMM) are twice as likely to die in the first five years of their lives.

One of the issues this chapter concentrates on is the role that out-of-pocket health expenditures play in impoverishing the typical Filipino household. The discussion in this chapter paints a gloomy picture of the extent to which out-of-pocket expenses can be catastrophic for low-income households in different parts of the Philippines. We are told that even though the level of expenditure that would be classified as catastrophic is clearly a function of the income threshold one uses for such a classificatory purpose, even for relatively conservative thresholds, large numbers of the Filipino population are vulnerable to catastrophic health expenditures.

Therefore, in order to avoid such catastrophic health expenditures, households commonly minimize their use of healthcare facilities and this, in turn, leads to undiagnosed diseases with potentially greater negative consequences further down the road.

This chapter concludes by noting that three points deserve a lot more attention in the Philippines than they currently get. First, even though the decentralization of the provision of health services to the individual provinces is in principle a good idea, the outcome of this decentralization needs to be monitored frequently. The outcome of such monitoring will sometimes mean intervention by the central government to appropriately target the worst performing provinces. Second, the present lack of health professionals, their unequal distribution across the Philippines, and insufficient investment to improve the nation's healthcare infrastructure need to be addressed urgently. Finally, the services provided by PhilHealth, the nation's primary social insurance platform, will need to be combined effectively with those provided by private insurance companies to increase both utilization rates and payments for the cost of hospitalizations. This completes our discussion of the two chapters that comprise Part III of this book. We now shift gears and proceed to discuss medical expenditures in Japan, the topic that is covered in the single chapter that makes up Part IV of the book.

1.4. East Asia

1.4.1. Medical expenditures in Japan

As noted by Akiyama *et al.* (2018) and many others, with a rapidly ageing population, healthcare costs in Japan are on the rise. To combat these rising costs, the Japanese government has been attempting to reform the healthcare system by, *inter alia*, promoting clinical specialization and collaboration. This state of affairs raises the following question: compared to

patients who choose to receive care in a clinic, do patients who go to a hospital pay more? Because this question has not been studied thus far, chapter 9 uses a questionnaire survey to interview individuals in the Kanto region of Japan and sheds light on this question.

The reader will note that, in a way, the key question of interest in chapter 9 is a study of out-of-pocket health expenditures, an issue that has already been deemed to be significant in the context of the Philippines in chapter 8. That said, it turns out that in Japan, the extent of the out-of-pocket expenditure one incurs is significantly a function of one's *age*. Specifically, children under age six and individuals over 70 years of age pay 20 percent of actual medical expenses whereas people over 75 years of age pay only 10 percent of the actual medical expenses.

The analysis conducted in chapter 9 is based on data from a questionnaire survey administered to individuals in the Kanto region which consists of the Tokyo metropolis and the prefectures of Ibaraki, Tochigi, Gunma, Saitama, Chiba, and Kanagawa. We are told that the direct application of a regression model to the data is likely to be *misleading* because individuals with higher healthcare needs---such as those with chronic conditions---are likely to visit hospitals more frequently and hence have higher out-of-pocket expenses. To get around this problem, chapter 9 uses the concept of a propensity score where the *probability* of a hospital visit is viewed as a propensity score and the basic idea is to match propensity scores to concentrate on how the clinic versus hospital distinction---and not other variables---affects out-of-pocket health expenditures.

The analysis conducted leads to several interesting findings. First, we learn that individuals who own their own home and those who are more focused on the *quality* of

healthcare received are more likely to visit a hospital rather than a clinic. That said, region and location specific variables are very important. For instance, individuals who live closer to a hospital choose to visit hospitals. In addition, those who live close to a railway station tend to choose clinics over hospitals.

The central policy lesson emanating from this chapter is that if the Japanese government would like to promote the use of clinics over hospitals, then it needs to be aware of the point that locational attributes are *more* important than personal characteristics in determining the likelihood of a visit to either a clinic or to a hospital. In other words, *where* people live matters more than *who* they are. This concludes our discussion of the single chapter about medical expenditures in a Japanese region that comprises Part IV of this book. We now turn to the single chapter that makes up the final Part V of this book.

1.5. Oceania

1.5.1. Health and healthcare in Papua New Guinea

We know from the analysis in chapter 9 that accessibility to healthcare facilities---clinics and hospitals---affects the use of such facilities by individuals. What chapter 10 shows is that this matters not just in a relatively wealthy nation such as Japan but much more so in a poor, relatively isolated, and largely rural country such as Papua New Guinea. Specifically, this chapter takes data from the 2009-2010 Household Income and Expenditure Survey (HIES) and merges this data with geographical data on health facilities to study the ways in which distance from healthcare facilities and the quality of the extant transportation services influence the utilization of healthcare facilities. In addition, this chapter also studies how the access to and the utilization of healthcare facilities varies by *gender* and by whether an individual seeking care is

from a rural or from an urban area.

The conceptual model employed in this chapter is based on the prominent work of Grossman (1972). This model thinks of individuals as being endowed with an initial stock of health at birth. This initial stock of health depreciates over time until death occurs. However, individuals have the ability to take concrete actions to modify the rate of depreciation of the initial stock of health. Individuals select the intertemporal utility maximizing levels of the health stock and total consumption in each time period subject to, for instance, production, resource, and budget constraints. A suggestion emanating from the model being utilized is that distance and travel time to healthcare facilities reduce the *demand* for healthcare.

The econometric analysis undertaken in chapter 10 shows that for the entire sample under consideration, an increase in the distance to the closest healthcare facility *negatively* affects both facility utilization and individual health. That said, factors other than distance and travel time also materially influence an individual's health status. Specifically, in both rural and urban areas, men report health complaints less frequently than women. However, the analysis in this chapter does generate some puzzling results. Here are two examples. First, the impact of having improved toilet facilities is *different* in rural and urban areas. Second, when either injured or sick, urban residents are *less* likely than rural residents to visit a healthcare provider. These baffling results point to the need for conducting more research to clearly comprehend the determinants of both healthcare facility use and an individual's health status in Papua New Guinea.

1.6. Conclusions

Issues at the interface of the trinity of disease, human health, and economic growth and

development are of central concern to regions located in many different parts of Asia. After many millennia of uneven growth and development, the Asian continent in general now has great opportunities for accelerated regional economic growth and development. As pointed out in section 1.1, the geopolitical and economic rise of Asia give rise to salient questions about the nature and the effects of rapid economic growth and development in this part of the world. In addition, given the contemporary significance of Asia, lessons learned about the nexuses between disease, human health, and the salutary impacts of healthy human beings on regional economic growth and development in Asia are likely to prove useful for the design and implementation of disease-targeting and health-enhancing policies in other parts of the world.

Given this state of affairs, our objective in this book is to demonstrate how regional economic growth and development can be promoted by effectively targeting diseases and, in the process, enhancing the health of the population in a variety of different regions within Asia. We have done so by providing analytic accounts of many of the pertinent research questions written by experts. These experts have great credibility because of two important reasons. First, they are active researchers themselves. Second, they are also some of the leading contemporary voices on public policy concerning the positive impacts of human health maintenance on regional growth and development in Asia.

In this introductory chapter, we have attempted to provide a holistic and coherent context within which one may view the emergence and the study of the different research questions that are dealt with here. In addition, a perusal of the individual chapters plainly demonstrates the significance and the policy relevance of the research questions that are analytically studied in this book. Consequently, in the coming years, one may look forward to many stimulating and

policy relevant developments concerning the trinity of disease, human health, and regional economic growth and development in Asia that are directly or indirectly related to the topics studied in this book.

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References

- Allison, G. 2017. *Destined for War*. Houghton Mifflin Harcourt, Boston, MA.
- Akiyama, N., Shiroya, T., Fukuda, T., Murashima, S., and Hayashida, K. 2018. Healthcare costs for the elderly in Japan: Analysis of medical care and long-term care claim records, *PLoS One*, 13, e0190392.
- Anonymous, 2007. India facing obesity epidemic: Experts, *The Hindu*, October 12. <https://www.thehindu.com/todays-paper/tp-national/tp-andhrapradesh/India-facing-obesity-epidemic-experts/article14855739.ece><https://www.thehindu.com/todays-paper/tp-national/tp-andhrapradesh/India-facing-obesity-epidemic-experts/article14855739.ece>. Accessed on 1 November 2018.
- Arrow, K.J. 1963. Uncertainty and the welfare economics of medical care, *American Economic Review*, 53, 941-973.
- Batabyal, A.A. 2018a. Boycott China and avoid a trade war, *The Conversation*, May 4. <https://theconversation.com/boycott-china-and-avoid-a-trade-war-95736>. Accessed on 1 November 2018.
- Batabyal, A.A. 2018b. Why China can't meet Trump's \$200 billion trade demand, *The Conversation*, May 20. <https://theconversation.com/why-china-cant-meet-trumps-200-billion-trade-demand-96888>. Accessed on 1 November 2018.
- Batabyal, A.A. 2018c. Rules-based trade made the world rich. Trump's policies may make it poorer, *The Conversation*, June 10. <https://theconversation.com/rules-based-trade-made-the-world-rich-trumps-policies-may->

[make-it-poorer-97896](#). Accessed on 1 November 2018.

- Batabyal, A.A., and Nijkamp, P. 2017. Introduction to regional growth and sustainable development in Asia, in A.A. Batabyal and P. Nijkamp, (Eds.), *Regional Growth and Sustainable Development in Asia*, 3-19. Springer, Cham, Switzerland.
- Bloom, D.E., and Canning, D. 2008. Population health and economic growth, *Commission on Growth and Development Working Paper No. 24*, World Bank, Washington, DC.
- Deaton, A.S., and Paxson, C. 2001. Mortality, education, income, and inequality among American cohorts, in D.A. Wise, (Ed.), *Themes in the Economics of Ageing*, 129-170. University of Chicago Press, Chicago, IL.
- Dreze, J., and Sen, A. 2013. *An Uncertain Glory*. Princeton University Press, Princeton, NJ.
- Grossman, M. 1972. On the concept of health capital and the demand for health, *Journal of Political Economy*, 80, 223-255.
- Hazan, M. 2009. Longevity and lifetime labor supply: Evidence and implications, *Econometrica*, 77, 1829-1863.
- Ishikawa, N., Kourtit, K., and Nijkamp, P. 2015. Urbanization and quality of life, in K. Kourtit, P. Nijkamp, and R. Stough, (Eds.), *The Rise of the City*, 259-317. Edward Elgar, Cheltenham, UK.
- Kalemli-Ozcan, S. 2002. Does the mortality decline promote economic growth? *Journal of Economic Growth*, 7, 411-439.
- Kalemli-Ozcan, S., Ryder, H.E., and Weil, D.N. 2000. Mortality decline, human capital investment, and economic growth, *Journal of Development Economics*, 62, 1-23.
- Lawton Smith, H., Bagchi-Sen, S., and Edmunds, L. 2016. Innovation capacity in the healthcare

- sector and historical anchors: Examples from the UK, Switzerland, and the US, *Journal of Technology Transfer*, 41, 1420-1439.
- Mahbubani, K. 2008. *The New Asian Hemisphere*. Public Affairs, New York, NY.
- Mushkin, S.J. 1962. Health as an investment, *Journal of Political Economy*, 70, 129-157.
- Rachman, G. 2017. *Easternization*. Other Press, New York, NY.
- Ray, D. 1998. *Development Economics*. Princeton University Press, Princeton, NJ.
- Sen, A. 2001. Beyond the crisis: Development strategies in Asia, in A. Chowdhury and I. Islam, (Eds.), *Beyond the Asian Crisis*, 30-49. Edward Elgar, Cheltenham, UK.
- Thomas, D., and Frankenberg, E. 2002. Health, nutrition, and prosperity: A microeconomic perspective, *Bulletin of the World Health Organization*, 80, 106-113.
- Verma, S. 2016. No. 1 in underweight population, India among top 5 in obesity, *Times of India*, April 2. <https://timesofindia.indiatimes.com/india/No-1-in-underweight-population-India-among-top-5-in-obesity/articleshow/51656193.cms>. Accessed on 1 November 2018.
- Weil, D.N. 2007. Accounting for the effect of health on economic growth, *Quarterly Journal of Economics*, 122, 1265-1306.
- Weil, D.N. 2014. Health and economic growth, in P. Aghion and S. Durlauf, (Eds.), *Handbook of Economic Growth*, Volume 2B, 623-682. North Holland, Amsterdam, The Netherlands.