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The world population is expected to expand by 39.4 % to 9.6 billion in 2060 (UN World Population Prospects, revised 2010). Meanwhile, Japan is expected to see its population contract by nearly one-third to 86.7 million, and its proportion of the elderly (65 years of age and over) will account for no less than 39.9 % (National Institute of Population and Social Security Research in Japan, Population Projections for Japan 2012). Japan has entered the post-demographic transitional phase and will be the fastest shrinking country in the world, followed by former Eastern bloc nations, leading other Asian countries that are experiencing drastic changes.

A declining population that is rapidly aging impacts a country's economic growth, labor market, pensions, taxation, health care, and housing. The social structure and geographical distribution in the country will drastically change, and short-term as well as long-term solutions for economic and social consequences of this trend will be required.

This series aims to draw attention to Japan's entering the post-demographic transition phase and to present cutting-edge research in Japanese population studies. It will include compact monographs under the editorial supervision of the Population Association of Japan (PAJ).

The PAJ was established in 1948 and organizes researchers with a wide range of interests in population studies of Japan. The major fields are (1) population structure and aging; (2) migration, urbanization, and distribution; (3) fertility; (4) mortality and morbidity; (5) nuptiality, family, and households; (6) labor force and unemployment; (7) population projection and population policy (including family planning); and (8) historical demography. Since 1978, the PAJ has been publishing the academic journal *Jinkogaku Kenkyu* (The Journal of Population Studies), in which most of the articles are written in Japanese.

Thus, the scope of this series spans the entire field of population issues in Japan, impacts on socioeconomic change, and implications for policy measures. It includes population aging, fertility and family formation, household structures, population health, mortality, human geography and regional population, and comparative studies with other countries.

This series will be of great interest to a wide range of researchers in other countries confronting a post-demographic transition stage, demographers, population geographers, sociologists, economists, political scientists, health researchers, and practitioners across a broad spectrum of social sciences.

More information about this series at <http://www.springer.com/series/13101>

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Biodemography of Fertility in Japan

 Springer

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Preface

Why are Japanese people having fewer children? Why is human fertility decreasing in many parts of the global population? These questions are simple but nonetheless quite difficult to answer. Research in Japan and other countries suggests, albeit indirectly, that low fertility is not merely the consequence of people's choices but also the result of biological inability to have a child regardless of a couple's desire. In other words, in addition to social and cultural factors that induce people to choose not to have (any more) children, biological/physiological factors (e.g., increases in infertility) may play important roles in fertility trends.

When couples start childbearing later in life (which is especially prevalent in recent years), their fecundity (the biological ability to conceive) is expected to be lower than that of couples who start childbearing when younger. It is suspected that the reproductive aging of couples trying to conceive leads to increased infertility, which is linked to low fertility. In addition to this secular change in childbearing ages, which has been observed in many countries in the world, we suspect that social and cultural factors peculiar to Japan may play a role in the trend toward low fertility in this setting.

Social, cultural, and biological factors interrelate to form fertility trends. Using a proximate determinants concept, we can decompose fertility into biobehavioral factors that are related to sociocultural factors. This decomposition of fertility is useful when trying to understand the mechanisms of fertility trends. Among the list of proximate determinants proposed by James W. Wood (i.e., age at marriage or entry into sexual union, age at menarche, age at menopause, age at onset of pathological sterility, duration of lactational infecundability, duration of the fecund waiting time to conception, probability of fetal loss, length of the nonsusceptible period associated with each fetal loss, and length of gestation resulting in live birth), we place particular emphasis on two components—duration of fecund waiting time to conception and duration of lactational infecundability—as well as their sub-components. These two components are related to both biological and cultural factors and show significant between- and within-population variations. By focusing on these two variables, we hope to understand the characteristics of fertility trends that are either unique to Japan or common across Japan and other settings.

The primary objective of this book is to present our original data regarding the fertility of Japanese population based on the concepts of proximate determinants of fertility. We also focus on similarities and differences in proximate determinants of fertility between couples in Japan and in other settings. By contrasting our results with data from other countries, we intend to provide a deeper understanding of how Japanese fertility is affected by various components.

The first chapter (by Konishi and Tamaki) summarizes the theoretical model of proximate determinants of fertility and introduces the terminology that will be used in this book. It also describes what is currently known about the social and biomedical background of low fertility in Japan. In the second chapter (by Konishi and Tamaki), we report original data collected in the biodemography project conducted in Japan in 2014 by Konishi and Tamaki. In addition, we include a review of previous studies on factors related to time to pregnancy (TTP) and lactational infecundability that target populations in Japan and overseas. Data from the biodemography project and a review of previous studies (Chap. 2) demonstrate that duration of lactational infecundability and TTP may be longer among Japanese couples than among those in Western settings. The longer TTP of Japanese couples may be linked to low coital frequency and possibly to menstrual cycle alterations, which are related to social factors such as prolonged working hours and the preference for thinness. The third chapter (by Yoshinaga) summarizes previous studies on a possible association between chemical exposure and TTP and presents original Japanese data from Yoshinaga and colleagues on this topic. Considering that previous studies report—albeit inconsistently—an impact of environmental exposure on TTP and that there are massive numbers of chemical substances surrounding the contemporary populations, it is possible that within-couple variations in TTP can be partly explained by couples' exposure to various substances. Finally, in the last chapter (by Konishi, Tamaki, and Yoshinaga), we propose future research topics to better understand mechanisms of fertility changes in Japan. We believe it will help us to obtain more detailed answers to the following question: Why do low fertility levels persist in many parts of the global population?

Lastly, we thank Dr. Kathleen A. O'Connor, Dr. Masahiro Umezaki, and a reviewer who read the earlier draft of this book and gave critical comments.

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