Chapter 1
Introduction

1 Introduction

Acknowledgments

This book was written by the three principal investigators (PIs) of the Japanese Study of Aging and Retirement (JSTAR). Analogous to the international standard of longitudinal panel data on aging and retirement, JSTAR is a large enterprise with multiple researchers and administrative staff involved in the project.

Japan was the latest starter to construct a world standard database on aging and retirement among the industrialized countries when this project started in 2005. While Japan has been experiencing the fastest pace of aging among industrialized countries, it was a disgrace that Japan was the only one left behind in the ongoing move toward creating an internationally comparable database on middle-aged and elderly persons. The lack of available data delayed the evaluation of social security policies and made it impossible for Japan to provide valuable experience as the country at the forefront of population aging, despite being closely watched by the rest of the world.

Thus, we needed to catch up with other industrialized countries by producing a study as quickly as possible. Under very strict time and monetary constraints, the success of JSTAR relied heavily on the enthusiasm and the hard work of the researchers on the JSTAR team as well as the profound understanding and generosity of countless people. We are sure that JSTAR could never have reached this stage without them. It is not possible to thank everyone by name, but we hope that each person involved knows that we are truly grateful for the cooperation given. We emphasize that a tremendous number of people helped the project anonymously and greatly contributed to its success. As representatives of the JSTAR team, we would like to express appreciation for their understanding and continuing support for the success of JSTAR. Among the many people who provided invaluable assistance, we would like to mention the following people.

First, we thank all the participants in this study for their cooperation and patience. The final number of participants in the first wave exceeded 4,200 individuals. Despite having to undergo a lengthy face-to-face interview, very exceptional in Japan, the participants understood the purpose and the significance of the study in terms of both domestic and international perspectives and were committed to the social responsibility of improving understanding of the aging society and policy effectiveness. In that sense, they are not only participants in JSTAR but also contributors to worldwide studies on aging and retirement. We sincerely hope that they enjoyed participating in this study and will continue to participate in the project in the future with intellectual curiosity and social responsibility. Needless to say, we also thank interviewers for their diligent work, professional expertise, and exceptional patience to obtain cooperation from the interviewees. The earnest and enthusiastic efforts of the interviewees and interviewers form the backbone of this project.

Second, we thank two institutions that provided funds for the data collection. First, the Research Institute of Economy, Trade and Industry (RIETI) provided the full funding for the pilot studies and covered more than half of the total costs for the first wave. The JSTAR project was initiated by Masaru Yoshitomi, former RIETI

CRO, who continued to encourage the project to progress successfully under a "new economics of aging" project at RIETI for which Ichimura and Shimizutani have been responsible since 2005. We also thank other RIETI staff members, especially Kozo Oikawa, Yuji Hosoya, and Akira Kawamoto. The funds provided by RIETI were spent for the survey in Kanazawa and Adachi. The remaining part of the first wave was funded by the "Project on Economic Analysis of Intergenerational Issues" supported by the Ministry of Education, Culture, Sports, Science and Technology of Japan (grant number 18002001). The project has been led by Noriyuki Takayama at Hitotsubashi University and Shimizutani has been in charge of the subproject on retirement for constructing and using this dataset. The funds provided by the project were spent for the surveys in Sendai, Takikawa, and Shirakawa. We emphasize that the unit of the survey is the municipality and each survey in a municipality is autonomous and separately funded by different institutions, which contrasts with a national representative survey. As described in the text, our sampling design is different from a typical national representative sampling since we sought to collect as many respondents as possible from a municipality with the same culture, history and policy environment to adjust for unobserved heterogeneity. At the same time, we utilize the summary datasets from the surveys in the five municipalities together for analyses including those in this book and make public the large part of anonymized datasets to allow researchers to examine a variety of health, aging, and retirement topics at the national level. Some parts of the dataset such as the details of the health expenditures and details of the residential location information need to be withheld for confidentiality reasons.

Third, we thank the five municipalities of Sendai city, Kanazawa city, Takikawa city, Shirakawa town, and Adachi special ward in Tokyo. We are certain that the cooperation and profound understanding shown by these municipalities was crucial to the success of JSTAR and, without it, we would not have been able to obtain a high response rate or official records on medical and long-term care use. We requested assistance from each municipality in three aspects: writing a letter to individuals selected in the sample to ask for cooperation with JSTAR under the name of the municipality (the cooperation included any responses to questions and confirmations from the individuals in the sample), providing the survey agency a list of names and their addresses that were randomly chosen using household registration in each municipality, and offering information on medical and long-term care use records held by municipalities if a respondent agreed. We are not able to list here all the names of the persons who cooperated with the process of JSTAR, but a large number of government officials, from the mayor to section staff, whether met directly or not, kindly cooperated with this project. In addition, Ota ward in Tokyo gave us cooperation in performing pilot studies, which greatly enhanced our understanding of a field survey on middle-aged and elderly people. We thank Mikio Kawa for introducing government officials in charge at Kanazawa and Takikawa to us. The day-to-day operation of JSTAR was done by a survey agency (Kazuo Shikano and Tsukasa Ueno) and RIETI (Naoto Nagase) including instructions and follow-up with each interviewee.

Fourth, we thank the HRS, ELSA, and SHARE teams. HRS (Health and Retirement Study), ELSA (English Longitudinal Survey on Aging) and SHARE (Survey on Health, Ageing and Retirement in Europe) are the role models for JSTAR. When we started JSTAR in 2005, Robert Willis gave us instructive suggestions to follow SHARE, a cross-national survey in Europe for our work on Japan. In summer 2005, Ichimura, Shimizutani and Haruko Noguchi (JSTAR team) met Axel H. Börsch-Supan at Mannheim Research Institute for the Economics of Aging and Robert Willis, David Weir, and Olivia Mitchell at the Survey Research Center (SRC) at University of Michigan. They very willingly provided constructive and realistic suggestions to initiate JSTAR, which greatly facilitated starting the survey. We are also grateful to David Weir, Arie Kapteyn, Richard Suzman, James Smith, and Kenneth Langa who visited us at RIETI to further discuss JSTAR in summer 2006 and gave us very knowledgeable and practical advice. David Weir and John Phillips at the National Institute on Aging (NIA) also visited RIETI in 2007 for further instructions and Nicole Kirgis and Heidi Guyer kindly provided an intensive TTT (Train-The-Trainers) program to supervisors of the surveys at each municipality before starting the first wave in January 2007. Japanese translation of the initial questionnaire and TTT was funded by the National Institute on Aging through the HRS team. We also benefited from discussions with ELSA team members including Michael Marmot, Richard Blundell and James Banks. We also thank Jinkook Lee and Dararatt Anantanasuwong, and Albert Park for the suggestions from a previous similar survey in Asia. Jinkook Lee and John Phillips visited us again in June 2008 for further consultation on JSTAR. All these people have provided us continuing support and encouragement for JSTAR whenever required, whether it involved visiting or communicating through email on several occasions including during the International Social Security Project by the National Bureau of Economic Research (NBER).

Again, we would like to emphasize that the list above is far from complete and we owe a debt of gratitude to many other persons for their professional help indispensable to the success of the first wave of JSTAR. For the analysis in this book, we thank Takashi Oshio and Kazuo Yamaguchi (both of whom belong to the JSTAR team) as well as Naohito Abe and Daiji Kawaguchi for constructive suggestions, and Yoichi Goto, Junya Hamaaki, Hidetada Kato, Shintaro Minami, Hisakazu Matsuyama and Koji Miyawaki for their excellent research assistance. We also thank KNT for logo design and Terri Nii for her editing work. We believe that this book will represent at least a small part of the tremendous contributions of the people involved in this project. Moreover, we would be delighted if JSTAR provides useful data to researchers around the world on aging and retirement and a pragmatic opportunity for formulation of more effective policies founded on scientific evidence both in Japan and internationally.

1.1 Preface

This book provides an overview of the first wave of the Japanese Study of Aging and Retirement (hereafter "JSTAR"). Using this rich and unique dataset, we describe in detail how middle-aged and elderly Japanese live in terms of economic, social, health, and family status. In this project, our intention is to paint a picture of the lives of people that is both zoomed in to focus on individuals and zoomed out to provide a panorama, and extract scientific findings which we hope are innovative and insightful regarding life in Japan as well as other countries in the world. Moreover, we try to connect these new scientific findings to efforts toward enhancing the effectiveness of policymaking.

JSTAR project researchers aimed to construct a world-class longitudinal dataset on middle-aged and elderly Japanese persons to enable researchers worldwide to perform scientific investigation on aging and retirement from an international perspective. JSTAR builds on the shoulders of preceding large scale "family" surveys like HRS (Health and Retirement Study), ELSA (English Longitudinal Survey on Aging), SHARE (Survey on Health, Ageing and Retirement in Europe) all of whose teams' knowledge, instructions, and encouragement were indispensable to initiating JSTAR.

In particular, this book emphasizes a comparison between Japan and SHARE, a study performed in more than 10 countries in continental Europe. The reason that we chose SHARE as a reference among the "family" of world standard datasets on aging and retirement is that only SHARE transcends national borders and performs multiple-country surveys and thus prioritizes transnational information. As described below, the origin of JSTAR is found in SHARE in that we started the project with SHARE as a direct role model. The contents and analyses of this book are generally comparable with those in Health, Ageing and Retirement in Europe: First Results from the Survey of Health, Ageing and Retirement in Europe (2005), edited by Axel H. Börsch-Supan, which we call the "SHARE book" below.

The most important message of this book is the similarity and diversity of life circumstances for middle-aged and older people across both individuals and municipalities even within Japan. Of particular interest is the substantial variation in many life aspects of middle-aged and elderly across individuals.

JSTAR and SHARE as well as other HRS type surveys find a substantial diversity across individuals in middle and older ages in their samples. The SHARE book emphasizes an enormous wealth in diversity of cultures, histories, and policy approaches in continental European countries and on the resultant different shapes of individual behavior across nations. The diversity across municipalities and individuals within a country provides unusually large potential to extract new scientific findings and policy implications for population aging. JSTAR's unique features are found in the homogenous living circumstances in culture, history, and policy within a municipality, in contrast to the large gap in the same seen in different countries. This means that, when examining topics related to aging and retirement, it is easier to control for unobserved heterogeneity caused by innate characteristics across regions without relying on a fixed effect model, and thus to distill the effect of what interests researchers more clearly.

This advantage is especially important for analysis on aging and retirement. Similar to European countries, Japan has been aging and is currently one of the most aged societies in the world. The aging process in Japan will continue in the future and in fact will even accelerate. However, we must keep in mind that aging takes place in all domains of life and the effect of aging on people's living standard is not uniform but very diverse. The diversity comes both from individual heterogeneity and different cultural, historical and policy backgrounds. We believe that our focus on variations in a large number of individuals in selected municipalities which are controlled for cultural, historical, and policy environment is a unique approach to examining a variety of topics on aging and retirement and contributes to rethinking a way of sampling survey data.

JSTAR and SHARE and other "family" surveys like HRS and ELSA share the common motivation and philosophy to understand a variety of levels of aging, from individuals to countries, from an international perspective. The first wave of JSTAR, which took place in the first half of 2007, contains data on individual living circumstances of 4,200 persons in five municipalities scattered in the eastern geography of Japan. JSTAR has made every effort to construct data comparable with SHARE and other surveys so that researchers worldwide are able to explore the Japanese experience of aging and retirement in a comparable way.

This book presents the first results from the JSTAR baseline data. We realize that this is only a first step to a better understanding of aging and retirement in Japan. Additional research agendas will be more clearly investigated when longitudinal data is available and when more in-depth econometric analyses are performed. However, we believe that even a cross-sectional analysis will reveal many unexplored findings which stimulate further scientific research. As the SHARE book emphasizes, aging is inevitable and affects all of us both as individuals and societies. Together with the "family" members, we hope that JSTAR will push forward our scientific frontiers on aging and retirement so that the innovative knowledge will contribute to the enhancement of happiness and well-being of all the people on the earth.

1.2 Population Aging in Japan

The main background of the JSTAR project is population aging. Population aging is one of the most serious social and economic challenges in modern society. Japan is not an exception and has experienced the most drastic demographic change among industrialized countries. The pace of population aging in Japan is far faster than that of other industrialized countries. As of 2005, one of every five people in Japan was aged 65 or older. In the meantime, we have witnessed the fertility rate fall to an historically low level. The ongoing drastic demographic changes—population aging combined with lower fertility—are posing an unprecedented challenge to the Japanese economy. Other countries undergoing population aging are keenly watching how Japan will cope with this daunting challenge.

While Japan and European countries are the most "aged" nations in the world, the share of the older demographic is currently higher in Japan (over 20%) than the average in European countries. In addition to the historically high level of the proportion of the aged, the pace of aging in Japan is literally unprecedented and is far more rapid than in European countries. The proportion of population aged 65 and over out of the total population was about 5% in 1950, increasing to 12.5% in 1990, and then reaching 20.2% in 2005. According to the latest population projections released by National Institute of Population and Social Security Research (NIPSSR) (2007), the share of those aged 65 years and above is expected to reach 30.5% of the total population in 2025, and further increase to 39.6% in 2050.

The aging of Japan is occurring much faster than in Europe whose proportion of the population aged 65 and over is projected to increase to 28% in 2050 as the SHARE book shows. In other words, in terms of the share of the elderly population, Japan faces the most severe demographic challenge in the world. Among the major European countries, Italy has the largest share of the elderly in 2005 (19.7%) and will also have the largest in 2050 (32.7%), which is still much lower than that of Japan.

Figure 1-2-1 illustrates the population pyramids in Japan at three different points in time: 2005, 2025, and 2050. A dynamic process of demographic change is neatly described in the change of share in the three pyramids. A textbook explanation describes the general path of a population pyramid from first a mountain (or Mt. Fuji)-shaped outline (larger younger generation and smaller older generation) to a diamond-shaped form (the middle-aged group is dominant) and then an urn-shaped outline (larger older generation and smaller young generation). The pyramid in Japan, which is currently diamond-shaped, will become a typical urn shape like that of SHARE countries. The most dominant age cohort is moving upward and, in 2050, the largest age cohort will be those aged around 80. The top-heavy shape is evidence that the Japanese demographic pyramid in the future will be very unstable in that a thin base must support a large head.

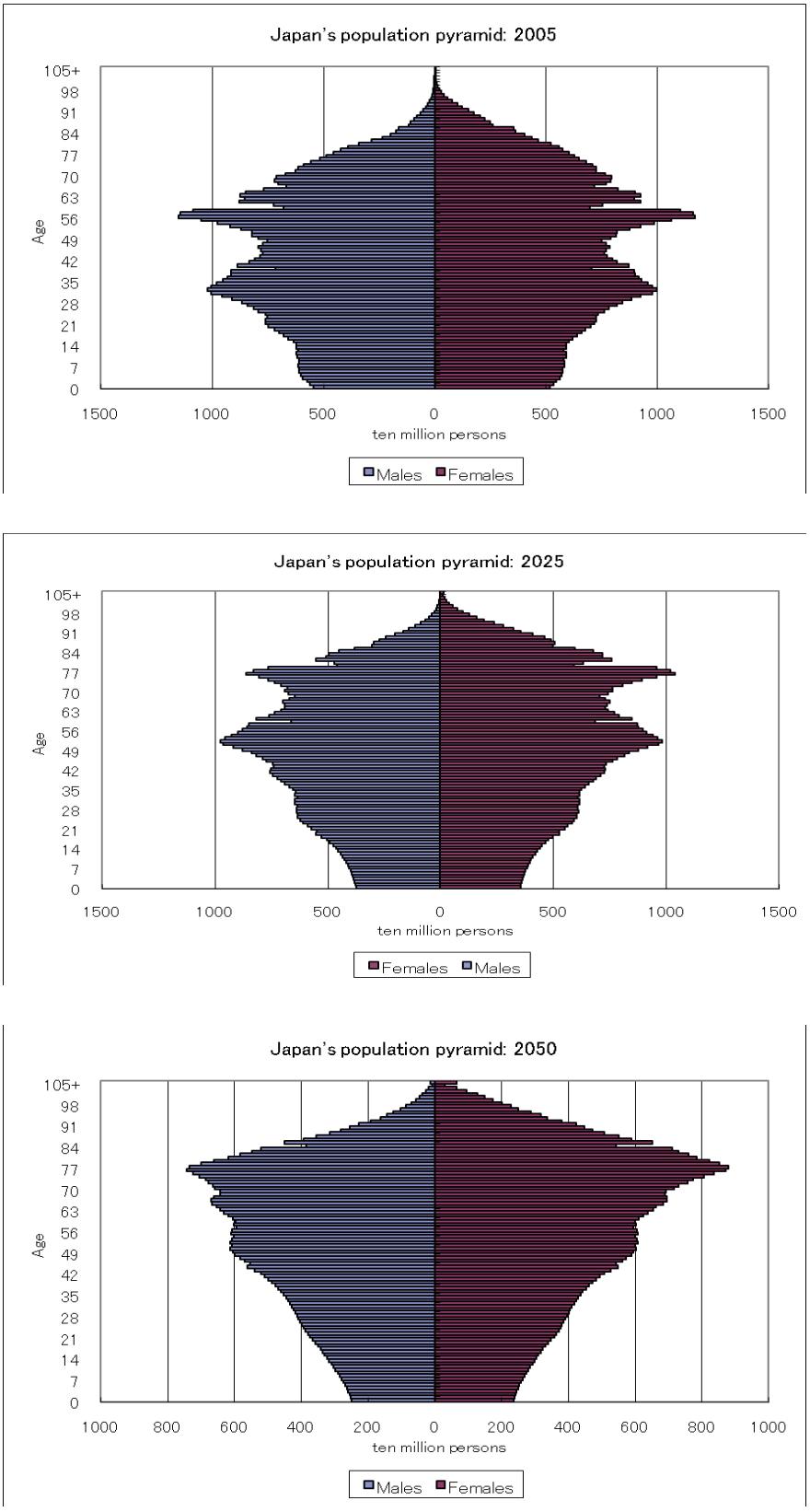

Figure 1-2-1 Japan's population pyramid in 2005, 2025, and 2050

There are two driving forces propelling the aging process in Japan: low fertility and increased life expectancy. Japan's birth rate remains at an historically low level. Figure 1-2-2 shows that the total fertility rate of 3.65 in 1950 declined to 1.54 in 1990. The rate further declined to 1.26 in 2005 and slightly recovered to 1.32 in 2006. Japan's current total fertility rate is comparable with Italy (1.32), Spain (1.35) and Germany (1.34) whose total fertility rates belong to the lowest group among European countries (all figures are current as of 2005 and available from EUROSTAT "Population and social condition"). Despite several policy measures taken by the government to stimulate the birth rate, the projection of fertility rates in the future is pessimistic. According to the population projections by NIPSSR (NIPSSR (2007)), the total fertility rate will level off for the next four decades: the medium variant of the fertility rate is projected to be 1.23 in 2025 and 1.26 in 2050 (1.54 at the high variant and 1.06 at the low variant in 2050). In contrast, EUROSTAT's projections show that the total fertility rate will be 1.40 for Italy and 1.45 for Germany in 2050, all of which are much higher than that of Japan (EUROSTAT (2005)).

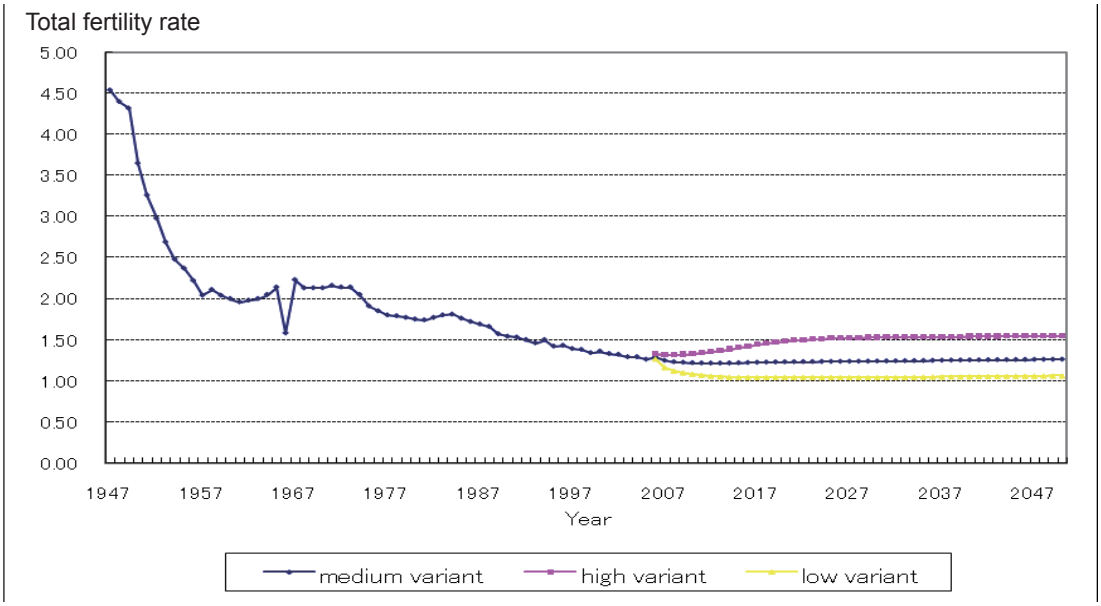

Figure 1-2-2 Total fertility rate in Japan

At the same time, Japanese life expectancy is now one of the longest in the world. Figure 1-2-3 illustrates life expectancy at birth by gender in 2003 when the data is available for all the 14 countries in the figure (OECD 2007), i.e. 12 European countries, the US, and Japan. The life expectancy at birth was 78.4 years for males and 85.3 years for females, both of which were the longest in the world. While the life expectancy at birth for males is similar to Sweden and Switzerland, that for females is even more remarkable. The difference in longevity is greater if comparing Japan and the US: 3.6 years longer for Japanese males and 5.2 years longer for females. What accounts for the world's longest life expectancy for Japanese people is surely a fascinating topic to be explored from a variety of angles. JSTAR provides an opportunity to examine the striking difference between Japan and other countries, a subject that has attracted interest from researchers from around the world.

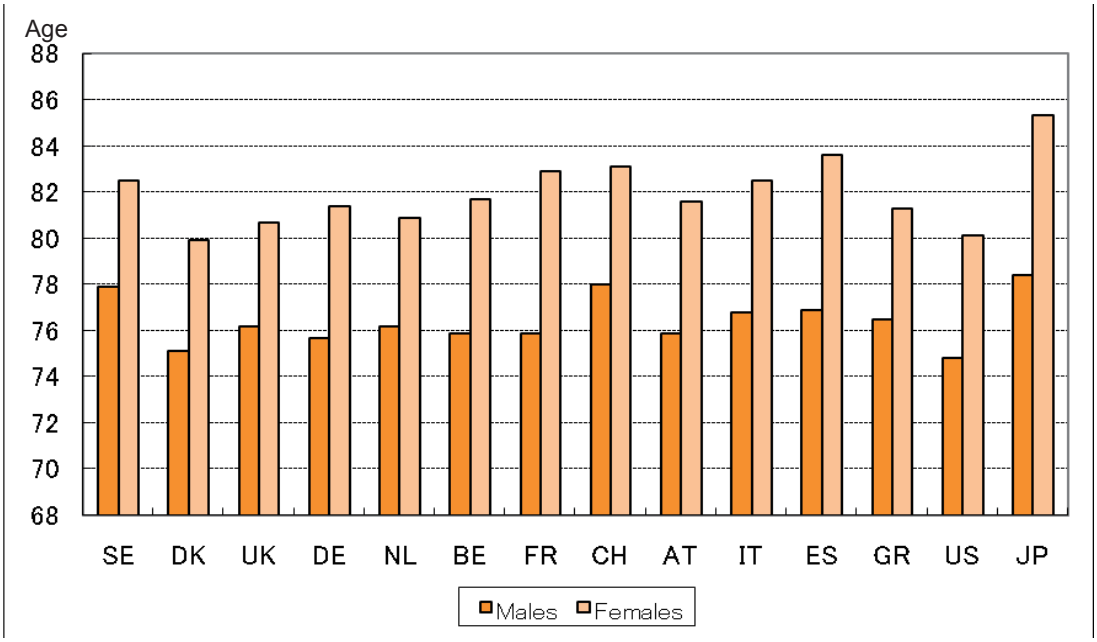

Figure 1-2-3 Life expectancy at birth, 2003

The long life expectancy will continue to be in favor of Japan in the future. According to the NIPPSR estimation (NIPPSR 2007), the medium variant of life expectancy at birth will extend to 81.4 years for males and 88.2 years for females in 2025, and further increase to 83.4 years for males and 90.1 years for females in 2050. On the other hand, according to EUROSTAT (2005), the life expectancy at birth in the SHARE countries will extend to 80-84 years for males in 2045-2050 (the longest is 83.6 in Italy and Austria) and 84-89 years for females (the longest is 89.1 in France and 88.8 in Italy). The life expectancy for Japanese males is comparable with the longest expectancy in Europe and that for Japanese females exceeds that in all European countries.

The lower fertility rate and the longer longevity result in a higher old age dependency ratio. The ratio in this subsection is defined as the number of elderly aged 65 and over to population aged between 15 and 64. We should keep in mind that this definition is different from that in the SHARE book which calculates the number of the elderly aged 60 and over to that of those aged between 20 and 60. The data source is the United Nations (2007). Japan's old age dependency ratio was only 8.3% in 1950 and as of 2005 is 29.8%, which is comparable with Denmark and Italy. However, the figures in 2050 are remarkable (United Nations 2007), as seen in Figure 1-2-4. Japan's old age dependency ratio will increase dramatically to 73.8% in 2050 and will exceed the highest in Europe (63.3% in Spain) by 10 percentage points and is almost twice as large as that in the US (34.1%). Those observations imply that burden of aging is exceptionally larger for Japan than other industrialized countries. Similar to Europe, the dependency ratio has received so much attention in policy debates in Japan since the higher old age dependency ratio may be associated with a larger burden of tax and social security contribution from younger generations. In this sense, Japan's future must be viewed very soberly.

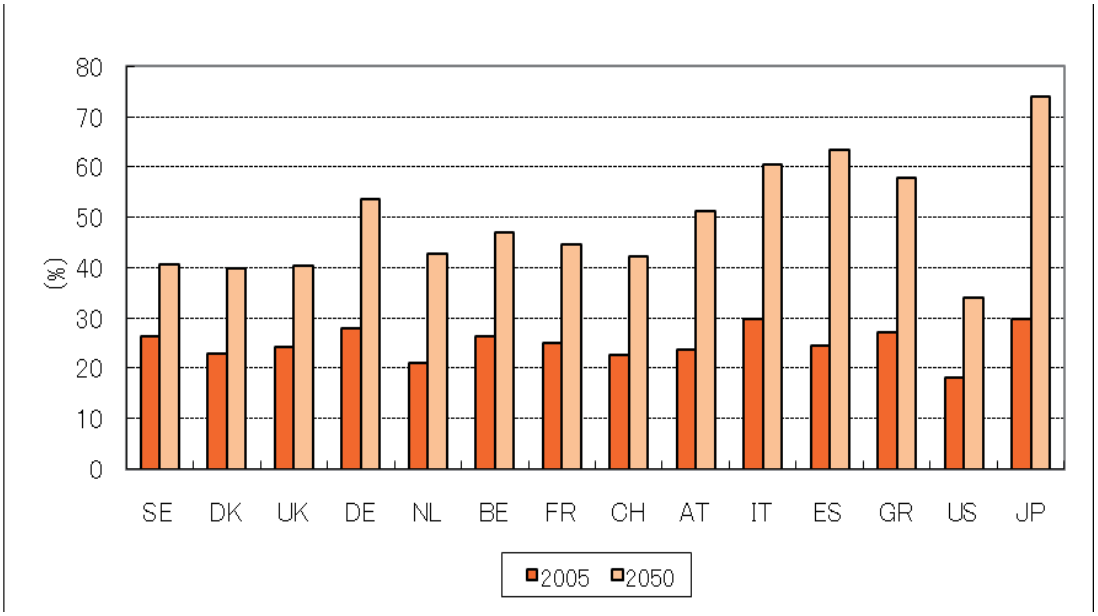

Figure 1-2-4 Old age dependency ratio, 2005 and 2050 (population 65 or over to population 15 to 64 years)

Fortunately, the negative effect can be mitigated by the higher labor force participation rate in Japan. In addition to demographic changes, we need to take account of when people retire and their required social security benefits as well as medical and long-term care. These considerations are also associated with family and social networks, to which we should expand our scope. According to EUROSTAT (Employment rate of older workers by gender), Japan's employment rate of workers aged between 55 and 64 is 81.4% for males and 51.2 % for females (see Figure 1-2-5). The male employment rate of Japanese is higher than that of Switzerland whose rate is the highest in the SHARE countries (76.4%) and twice as large as that of France whose rate is the lowest (40.5%). This observation implies that the high dependency ratio might be somewhat compensated by the higher employment rate in Japan. In contrast, the employment rate for Japanese females is 51.2% and located at the middle of SHARE countries, i.e. between the higher group (67.0% in Sweden and 58.1% in Switzerland) and the lower group (23.0% in Italy and 26.0% in Belgium). This figure shows that there is a large scope to stimulate the female labor supply in this age group in Japan.

The employment of the elderly can be described as employment of someone of retirement age after that person has initially left the labor force. In contrast to several European countries which experience "early retirement," Japan currently enjoys a late retirement age. Figure 1-2-6 depicts the "effective" retirement age, which is defined as a weighted average of net withdrawals from the labor market at different ages over a five year period for workers initially aged 40 and over, for 15 developed countries in the 2002-2007 period (OECD 2008). The latest retirement age is observed in Japan for both males and females; 69.5 years for males and 66.5 years for females. The figure for Japanese males is higher than that for Sweden, the second highest, by 3.8 years while that for females is higher than Switzerland, the second highest, by 2.4 years. It is remarkable that the gap in the effective retirement age between Japanese males and French males (58.7 years) with the lowest retirement age exceeds 10 years.

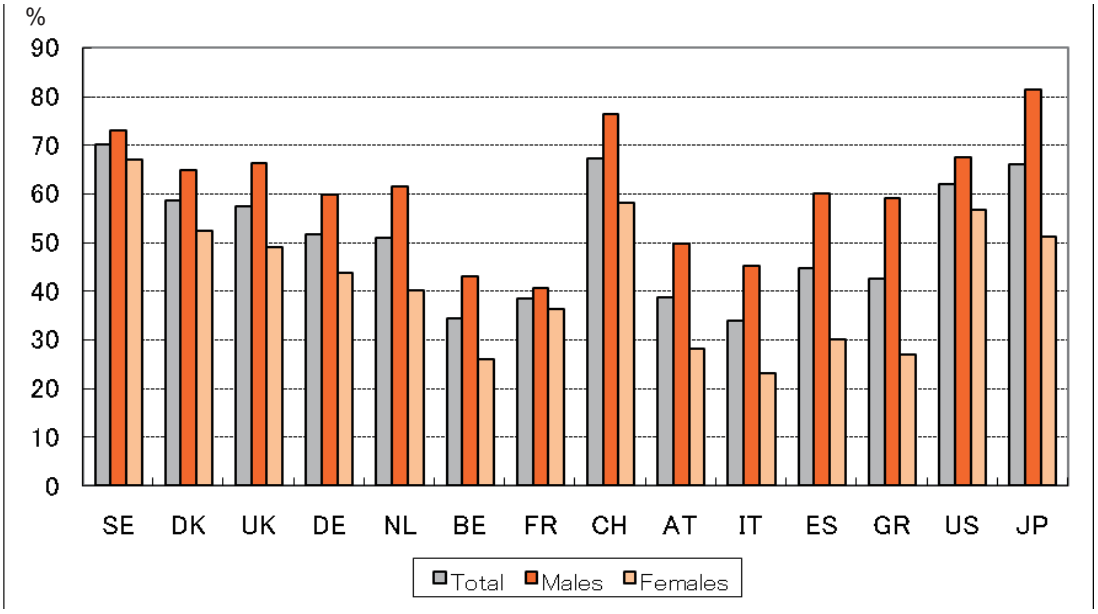

Figure 1-2-5 Employment rates of workers aged 55-64, 2007

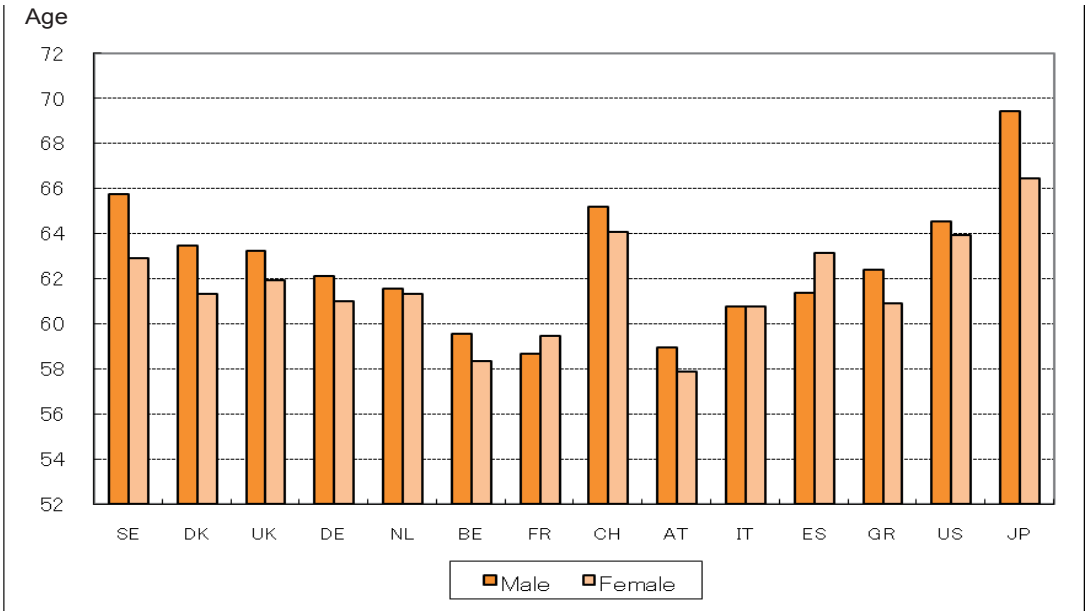

Figure 1-2-6 Average effective age of retirement (2002-2007)

Late retirement is one of the most distinct features of the elderly labor supply in Japan. Understanding what accounts for Japanese retirement behavior is surely important not only for Japan but also other developed countries which suffer from early retirement. JSTAR provides information on a variety of pathways to retirement as well as key affecting factors including economic/health status and quality of workplace and family/social networks, most of which are measured in an internationally comparable way. We believe that one of the most important contributions in JSTAR will be found in uncovering and examining the unique Japanese retirement behavior from a variety of angles to extract policy implications for other developed countries.

Even if the rapid speed of aging and sharp rise in the old age dependency ratio might be somewhat offset by the higher labor force participation, one might wonder whether Japan can escape from a huge burden of social security and health expenditure. Here we will review two large components of expenditure related with aging: pension benefits and health expenditure.

Figure 1-2-7 illustrates the net replacement rate for an average earner from mandatory pension programs. The replacement rate is a measure of pension generosity and the net replacement is defined as the individual pension entitlement net of taxes and contributions as a percentage of individual pre-retirement earnings net of taxes and contributions. According to the figure, the replacement rate of Japan is the lowest among the 14 countries. Excepting the UK, the rate is about 60% or more in European countries and exceeds 90% in Greece, Netherland and Austria, which is consistent with the findings in the SHARE book that the share of current public pension expenditure out of GDP is lowest in the UK (about 5%), and highest in Austria (almost 15%). In terms of replacement rate, the Japanese pension program is less generous, which mitigates social security expenditure. Due to the difference in definitions and projected years, it is difficult to compare future pension expenditures between Japan and the SHARE countries. According to the latest official projections released by Ministry of Health, Labour and Welfare (MHLW 2006), the total amount of social security expenditure (pension, medical, and welfare) will be 1.41 trillion yen in 2025 which corresponds to 26.1% of national income in the case that social security reforms are enforced.

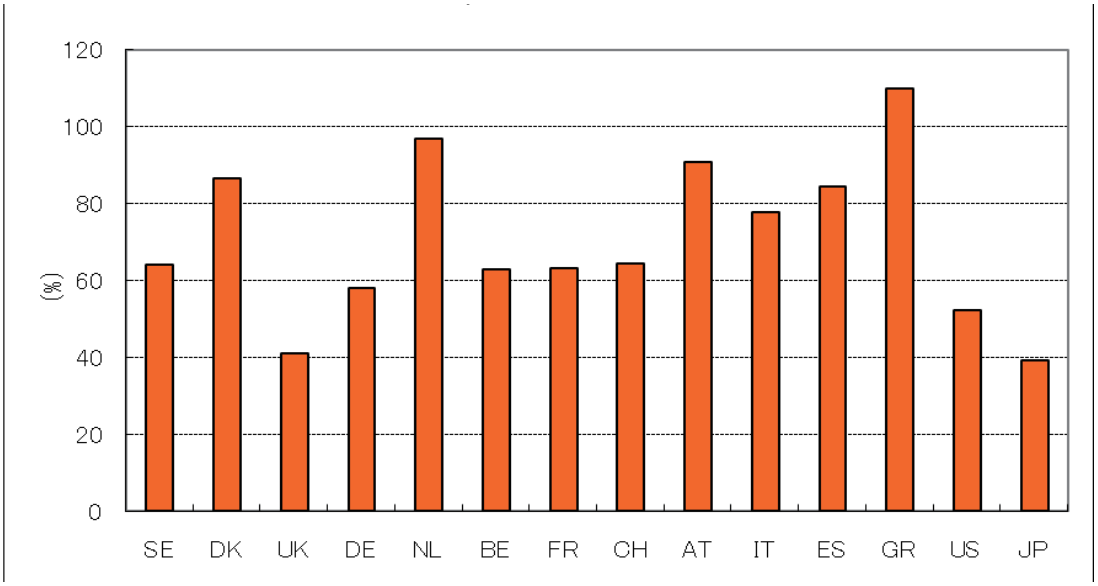

Figure 1-2-7 Net replacement rate for an average earner from mandatory pension schemes

The public pension program also works as a device to redistribute resources among people, which is closely related with the issue of poverty. In recent years, there has been tremendous policy debate on economic inequality in Japan which some attribute to a larger proportion of the elderly whose inequality is larger than younger generations. Although there has been no consensus on the factors, that the poverty rate for the elderly in Japan is higher than other industrialized countries must be recognized.

Figure 1-2-8 reports poverty rates among people aged 65 and over in 2000 (Förster & Mira D'Ercole 2005). The poverty rate is defined as the proportion of individuals with equivalised disposable income less than 50% of the median income of the entire population. Note than there is no data for Belgium and Spain. We observe that the proportion of the poor in Japan is 21.1%, which is much higher than all the other countries except Greece and the US. In most SHARE countries, the poverty rate among the elderly is relatively low compared to Japan. While the lower replacement ratio of the public pension program might contribute to the large disparity in disposable income of the elderly, what accounts for the larger proportion of the poor in the Japanese elderly should be addressed from a variety of angles, including income and wealth at retirement, mutual transfers among family members, and health deterioration. JSTAR provides rich data to explore who the poor elderly are and the differences between the rich and the poor among the elderly.

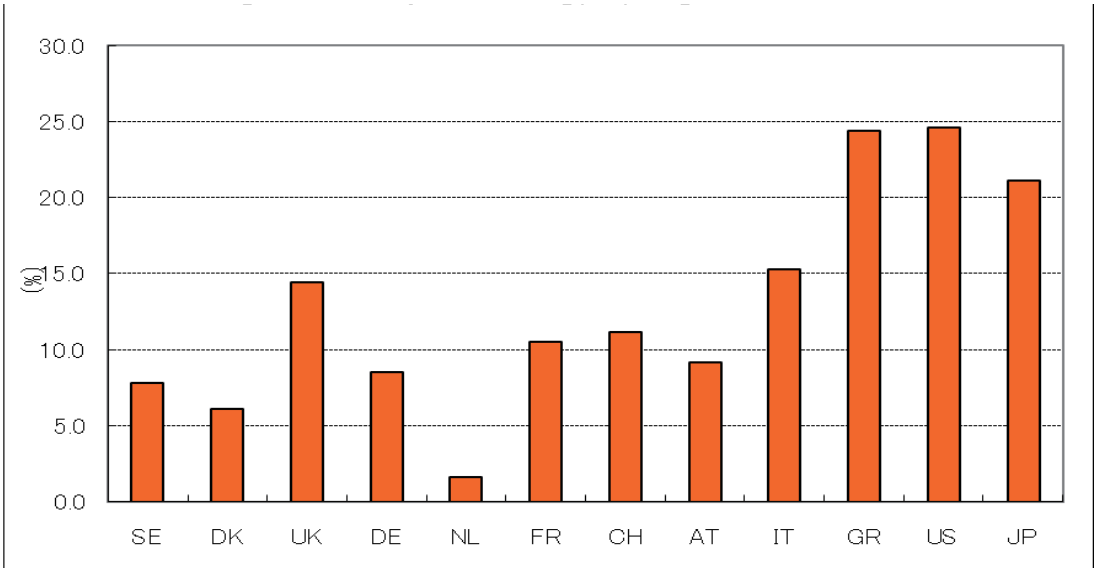

Figure 1-2-8 Poverty rates among people aged 65 and over, 2000

Lastly, we turn to the size of health expenditure. One striking feature is that Japan has the longest life expectancy in the world and at the same time its medical expenditure is relatively small. Figure 1-2-9 reports health expenditure per capita on a dollar basis and the share relative to GDP in the 14 industrialized countries, which is taken from OECD (2007). The amount of health expenditure per capita is about US$3,000 in Japan, which is comparable with that in the U.K. Although health expenditure per capita is smaller in some European countries like Italy, Spain, and Greece, it is larger in most countries. In particular, the figures for Switzerland and the US are twice as large as that for Japan.

The lower amount of medical expenditure per capita in Japan among industrialized countries is also evident in the share of medical expenditure relative to GDP. In 2004, the share of medical expenditure to GDP was 8.0% in Japan, which is the lowest among the countries (OECD 2007). The highest is 15.2% for the US and the share for all European countries ranges between that of Japan and the US. We believe that JSTAR enables exploration of what accounts for the low medical expenditure relative to economic size in Japan. Health status along with economic and social circumstances

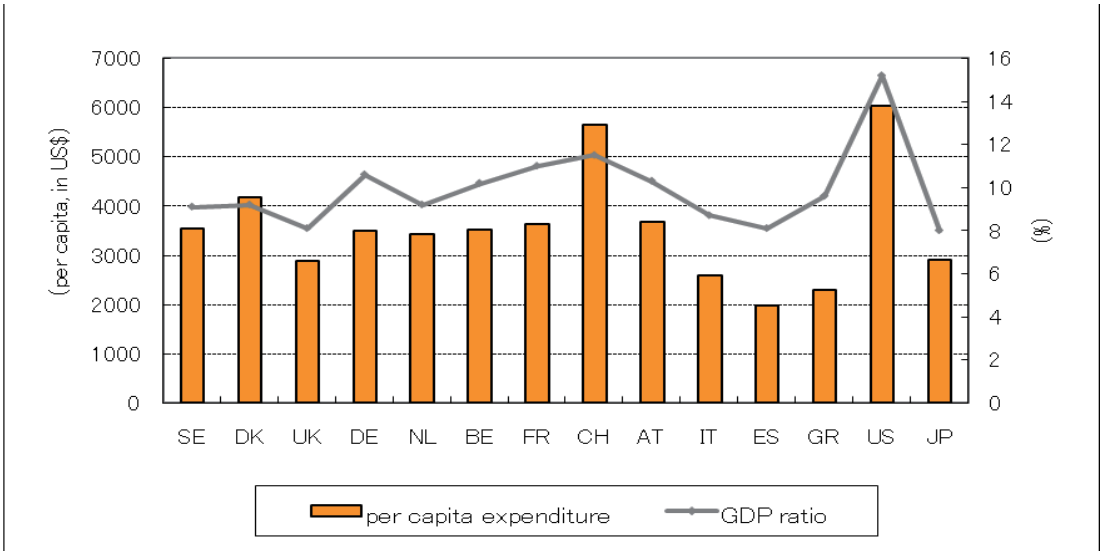

Figure 1-2-9 Health expenditure per capita, 2004

is a possible factor but a comprehensive dataset to explore the topic has been lacking in Japan. JSTAR includes a variety of variables related with those factors and enables researchers to find a key factor to mitigate health expenditure in Japan.

What is more interesting is to relate health expenditure with health care. Figure 1-2-10 performs an analysis similar to that in the SHARE book which takes life expectancy as a measure for the output of health care or the ultimate goal of a health care system. The SHARE book classifies the SHARE countries and the UK into four categories, depending on health expenditure per capita and life expectancy: the first group includes countries with high health care expenditures and good results in terms of life expectancy such as France, Sweden, and Switzerland. The second group contains countries with low expenditures and low life expectancies, most prominently the UK. The third group refers to countries which manage to have well above average life expectancy but that spend a smaller share of GDP on health care, such as Italy and Spain. The fourth and the most disturbing group includes the countries in which life expectancy is low, but health care expenditures are nevertheless above average, prominently Denmark. Note that the data on life expectancy and health care expenditure in the SHARE book dates to 2001 but that in this chapter it dates to 2003, although the data source is the same.

The figure demonstrates that Japan is an outlier and is located far above the average life expectancy but spends smaller medical expenditure. Another outlier is the US which suffers from larger medical expenditure and shorter life expectancy. This unlikely combination of the long life expectancy and low medical expenditure in Japan poses a puzzle for both researchers and policymakers. One might argue that this is because Japanese people are extremely healthy but another view might be that the Japanese health care delivery system is unusually efficient. Alternatively, other factors might explain the ambivalent combination. While there has so far been no consensus on what accounts for this observation, it is critical to disentangle the main causes for the unusual combination for both Japan and other countries that have a huge medical expenditure burden. In other words, the Japanese experience has a large potentiality to provide useful lessons for other countries.

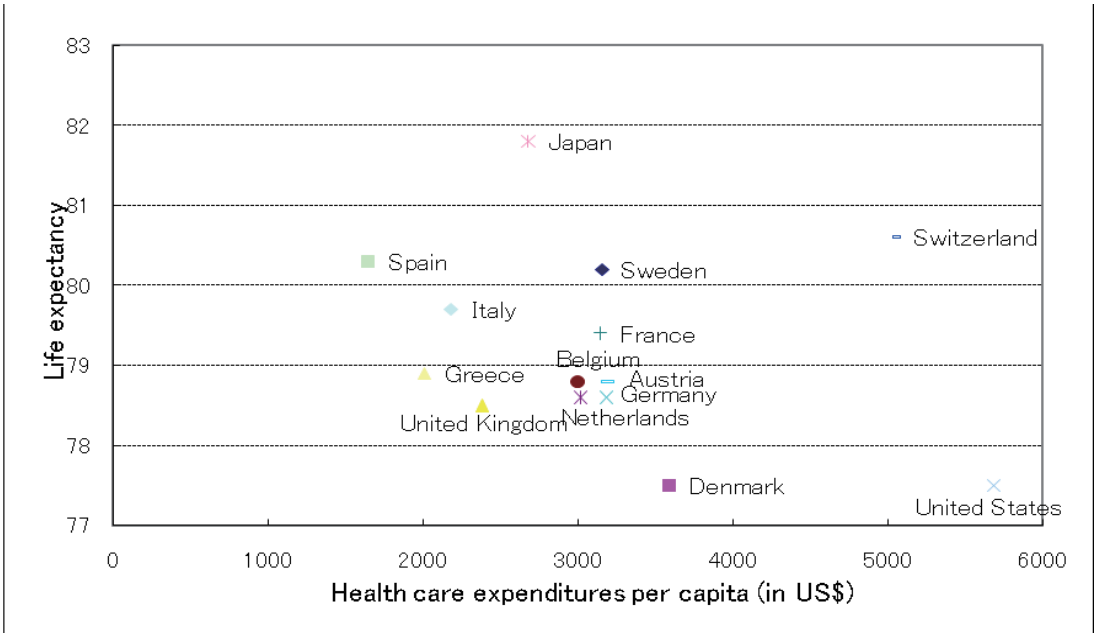

Figure 1-2-10 Health care expenditures and life expectancy in 2003

While Japan is now enjoying late retirement and lower health expenditure, it would be too optimistic to believe that this pattern will continue in the future. In both Europe and Japan, pension and health care reforms are always placed top priority on the agenda of policymakers and the direction of the debate usually focuses on cutting the total amount of government expenditures. Unfortunately, a large volume of policy debates on these social systems has not been supported by empirical evidence. To be fair, we have little knowledge on the mechanism of how public policy affects individual behavior and how the government can cut expenditure without negatively impacting people's well-being. What is described in this subsection is based on casual observations whose details are not firmly established; further, there has been no data available to examine causes and interactions of these observations and thus to extract scientific findings and useful policy implications for Japan and other counties with challenges of an aging population.

JSTAR is the first data in Japan to tackle these topics from an international perspective, and, together with SHARE and other family surveys, expands the knowledge frontier on a global scale to contribute to the design of more effective policies.

1.3 Individual Aging: Health, Economics, and Social Networks

Aging takes place at a variety of levels from the national to the individual and affects all of us in all domains of our lives. In terms of a national population, this is especially true for Japan which experiences an unprecedented speed of aging in the world. There has been a large volume of debates on population aging and not a day passes without a report in the media about population aging in Japan. See Shimizutani (2006, 2007) for further discussion related to this subsection.

We notice that virtually all arguments put forward thus far on the need to reform the social security system apply the same reasoning. The first part of the reasoning asserts that under the rapid speed of aging, an increase in the number of elderly who are "supported" by the pay-as-you-go social security system leads to an inevitable increase in social security expenditures including pension payments and medical and nursing care expenses. The second part claims that Japan's fertility rate remains low and the number of young people who "support" the social security system is unlikely to increase substantially. There seems to be no definitive fertility-boosting measure and therefore little likelihood of a sharp recovery. The third part of the reasoning is that the combination of population aging and low fertility translates into a decreasing number of the supporting population and a rapidly increasing number of the supported population, which invites an imbalance between social security benefits with the result that the burdens will trigger collapse of the social security system.

As a consequence, this type of argument warns that the social security burden per active person will increase to an unsustainable level, thus undermining Japan's economic vitality and ultimately make the social security system unsustainable and calls for drastic reforms of pay-as-you-go social security programs that must be implemented immediately. Indeed in recent years, major and successive reforms have been implemented in the pension, medical care, and long-term care programs. However, the reality remains that Japan has been unable to find a fundamental solution despite all the lengthy discussions year after year. We still do not see that any tangible improvement has been made to the nation's social security system.

We should observe that the most important viewpoint seems to have been missing in all the arguments to date. This type of "traditional" argument, which can be also called a "macro and institutional approach," has serious caveats in that it works solely on funding in a fragmented fashion with little collaboration across bureaucratic boundaries. As a result, the approach discards two missing perspectives essential to the debates.

First, this approach ignores the individual level decision-making (e.g. reactions to different incentives) and focuses exclusively on the funding side. Thus, most of the debates have concentrated on to what extent overall social security expenditures and the resulting burden on the younger generation will increase as a result of further aging of the Japanese population. Such arguments typically present the estimates of the aggregate expenditure on social security based on the projected future benefits, resulting from a systematic calculation. While we do not deny that discussion of social security funding is important, any argument discarding individual decision-making will not be

productive. In particular, the way individuals will respond to different incentives and policy changes is a critical question to improve economic efficiency. Changes in pension benefits would change the patterns of income and asset distribution by age group as well as the patterns of labor supply. Likewise, changes in self-burden of medical and nursing care costs would alter demand for these services. Moreover, it is very likely that the scarce evidence on policy impacts has left public policies unchecked and inefficient.

Second, the traditional approach does not deal with the well-being of the elderly. Well-being should be measured from multiple angles including economic, health, and family and social networks. In particular, the diversity of individual circumstances of the elderly in terms of those aspects must not be ignored. The living circumstances for those in their late 60s are totally different from those for people in their 80s. Some elderly people earn a high income, live in good health, and are blessed with family and friends. Others suffer from a low income and live in poor health without family. Policy effectiveness of the social security program is not separable from health conditions of individuals and their families, household economic status, family relationships, and social activities. No effective policy can be generated from discussions that treat the different subgroups of the elderly as one and the same. Fine-tuned policies in full consideration of diversity among individuals cannot be developed from discussions focused exclusively on funding.

What is worse in Japan is the (unnecessary) division of social security policy across areas. While pensions, medical care, and nursing care as well as elderly employment and family relationship are closely interrelated, they have been discussed separately and links between them have been extremely weak. Policy effectiveness should be measured from the viewpoint of beneficiaries, not from that of the government agencies that implement the policies. No effective policy can be formulated by viewing lives of the elderly only partially, as if they were separate entities, for instance, as a pensioner, as a recipient of medical services, and as a nursing care receiver. Government policies must be evaluated on whether they, in terms of collective effect, contribute to the improvement of the living standards of the elderly.

Despite enormous discussion taking the traditional approach, many topics essential to understanding the effect of aging have not been covered or sufficiently clarified to date. The following are just a few examples:

1. Do people have sufficient funds upon retirement to support them the rest of their lives? What role should public pensions play in supporting retirement? Answers to these two questions will clarify what constitutes an appropriate allocation of pension benefits.
2. What are the reasons behind the unusually late retirement age in Japan? This is a topic of great interest to European countries where the spread of early retirement is causing a rapid increase in the social security burden.
3. What impacts do the pension system, the system of mandatory retirement at a fixed age, and the health status of the elderly have on labor supply? This is important from the viewpoint of how Japan should prepare for the predicted labor shortage.

4. How should roles be allocated between in-home and facility-based nursing care? What types of people can rely on family care? Is the existing nursing care system truly improving the quality of life for those receiving its services? What is the role of the family? While Japan possesses the greatest longevity in the world, why is the proportion of Japanese who consider themselves happy smaller than in other countries?

5. When the price of medical and/or nursing care or the proportion of the price paid by individuals is raised, does it reduce unnecessary benefits or hinder the provision of necessary benefits? In what type of people can such effects be observed? What are effective measures to prevent the deterioration of health conditions, i.e., an increase in the level of care needed? Clarifying these points is essential for reforming the medical and nursing care systems.

Thus, we need to endeavor to formulate a new approach that emphasizes individual decision-making (microeconomic-based) and the overall welfare of the elderly. The basic criteria underpinning this approach is quite simple: whether or not a social security policy is useful should be assessed from the point of view of the beneficiaries. For that, we should look at how elderly people respond to different incentives in a variety of life aspects such as their health condition, employment status, financial status, family ties, and links with friends and communities. This is because the social security system is closely interrelated with and thus inseparable from all these factors.

This sort of idea is certainly quite natural and common internationally but has been missing in most arguments in Japan, partly due to the lack of data in Japan. Given the rapid pace of population aging, a fundamental change in thinking is imperative and urgently needed. However, it is no easy task to capture the overall picture of elderly people's living standards and reflect diverse circumstances of the elderly in public policies. The only way to take in the voices of individual elderly people and link the reality of their life to social security policies is to build and then analyze a large micro-level dataset that contains a wealth of information. This type of survey contributes to "evidence-based policymaking" too. Indeed, some public policies have failed to achieve their goals and instead ended up causing unexpected side effects. It is thus necessary to conduct a strict ex post facto evaluation of each policy, using actual data to examine whether the goals have been met, whether there have been any side effects or wasted resources, and to use the evaluation results for further institutional improvement. Eliminating waste related to social security policies is particularly meaningful because the cost of social security benefits represents a significant portion of Japan's national budget.

Indeed, a series of large-scale panel surveys of middle-aged and older people is being undertaken in many countries to ostensibly establish a "world standard," as represented by the Health and Retirement Study (HRS) in the United States, the English Longitudinal Study of Ageing (ELSA) in Britain, and the Survey of Health, Ageing and Retirement in Europe (SHARE) in continental Europe. The HRS is being conducted under the leadership of the University of Michigan and serves as a role model for the following survey. These moves are starting to proliferate among Asian countries such as South Korea and Thailand, as well as China and India.

All these surveys uncover the individual circumstances of aging. Population aging is often associated with pessimistic concerns about declining health and deteriorating productivity and uncertainty after retirement. At the same time, individual aging process is very diverse and the variation of individual circumstances increases with age. This pattern is becoming more diverse due to the longer life expectancy. As the SHARE book demonstrates, we need to keep in mind that any topic related with aging should be examined from multiple interdisciplinary angles emphasizing economic status, health status, and family and social networks. These linkages have been largely ignored in Japan, partly due to data availability and because most of the previous findings are fragmental.

Each of these surveys has hundreds of extremely diverse questions about health, economic status, employment, family relations, and participation in social activities since aging affects all domains of an individual's life and all important elements including retirement, health and health care, how time is spent, income and consumption, family relationships, and social networks are closely linked. This complexity calls for multidisciplinary expertise applied to the survey. The accumulation of such data will make it possible to identify, for instance, how elderly people would react to certain policy changes and what sort of incentives would be effective in eliminating wasteful expenditures. In the US, whenever formulating a new social security policy, the White House reportedly checks with the HRS for supporting scientific evidence.

Survey respondents represent a broad spectrum ranging from pre-retirement people aged around 50 to the elderly, many of whom are medical and nursing care users. Also common to all these surveys is that interviewers conducted face-to-face interviews with respondents, they used computers (CAPI: computer-aided personal interview), and the interviews consumed significant time. Database development in these countries is being carried out as part of an international joint project and surveys are, through close coordination among country leaders, deliberately designed to allow for international comparison.

JSTAR shares the philosophy and analytical motivation of SHARE and other family surveys. First, economic status in terms of income and wealth is strongly correlated with health and well-being of the elderly, though the direction of causality is not well understood. This association is also deeply examined in Chapter 2 of this book. Individuals with lower economic status are more likely to have worse health status and vice versa. Second, health status is also linked with family and social networks (Chapter 3). Individuals with better health status are more likely to enjoy closer family and social linkage and vice versa. Third, economic status is also connected with family and social networks through a variety of forms of mutual transfers. The critical issue is to disentangle the causal relationship among the three areas; in fact, unless it is well analyzed, we cannot extract useful implications for more effective policymaking. The linkages among (1) income security and personal wealth, (2) kinship and social networks, living arrangements, and (3) physical and mental health, disability, and mortality are also affected by public policy including social security, redistribution, and housing policies. In other words, we should examine the relationship between the private and public domain on aging and retirement issues.

A world standard survey would require the knowledge and dedication of researchers, enthusiastic cooperation with the survey by individuals in the sample as well as sufficient understanding of the survey by public institutions. Although tens of millions of yen are needed for each round of the survey, the amount represents less than 0.001% of the annual expenditure on medical and nursing care in Japan. In order to continue future waves of JSTAR, it is imperative to gain the understanding of a large number of local governments and develop multifaceted cooperation among foundations and other entities concerned with social security. When these attempts are successfully achieved, Japan will make headway toward beneficiary-oriented social security policies and its accumulated knowledge will be utilized all over the world.

1.4 How JSTAR was Created

This subsection describes the development process of the JSTAR project. As we emphasized, construction of micro-level data that provide the foundation for policy debate is indispensable to redesigning the social security system. The United States has established an effective research system that collects and utilizes a wide range of individual information on economic, employment, and health statuses of the middle-aged and elderly and their family and social networks, a system that is now becoming a "world standard." This type of research system now prevails in Europe and several Asian countries, too. First and foremost, Japan must make up for its delays and catch up with the rest of the world.

Indeed, as of 2005, Japan was the only industrialized country left not engaged in creating a "world standard" database. Not only has this delayed the evaluation of social security policies, it has created a situation in which Japan, despite being closely watched by the rest of the world, has been unable to offer its unique and valuable experience as the country at the forefront of population aging. In other words, Japan is standing at a crucial point in shifting to a beneficiary-oriented system and to develop social security programs firmly based on empirical findings.

It is very easy to insist on the importance of a world standard database on aging and retirement in Japan but it is very difficult to construct one. Japan's earlier attempts to conduct longitudinal surveys of middle-aged and older people were segmented and fell far short of the world standard. What we really need is longitudinal, multidisciplinary, and internationally comparable survey data. This is surely a challenge and calls for extraordinary enthusiasm and hard work of researchers, genuine cooperation of interviewees and interviewers, ample understanding among relevant government and other public agencies, vigorous input from leading researchers all over the world, and sufficient funding. That this type of project is demanding in many aspects is the main reason that a Japanese version of world standard research on the middle-aged and elderly people has not been available.

Although belated, moves toward conducting large-scale, world standard longitudinal surveys of middle-aged and older people have begun to emerge. Dr. Masaru Yoshitomi, former RIETI President and CRO, with serious concerns about the lack of firm empirical evidence and effective policy implications in any debates on social security program, started the "new economics of aging" project in 2004. Starting from April 2005, a group of keen researchers led by Yoshitomi have been actively working toward making Japan's first world standard longitudinal dataset on aging and retirement. This project was further stimulated at Axel Börsch-Supan's presentation on SHARE at a National Bureau of Economic Research (NBER) International Social Security meeting in Lake Como, Italy in May 2005. Ichimura and Shimizutani, who have been affiliated with RIETI, initiated the project in June of the same year. They contacted Robert Willis (former principal investigator of HRS) and Axel Börsch-Supan (coordinator of SHARE) both of whom were very willing to collaborate on starting a Japanese version of HRS/ELSA/SHARE. In July, together with the Japanese team members, we

previewed datasets available in Japan and translated the common parts of the SHARE questionnaires into the Japanese language and examined a variety of research questions in order to identify additional questions to those in SHARE. In August, we visited both PIs at the Mannheim Institute for Aging and Survey Research Center (SRC) at University of Michigan with Haruko Noguchi (Japan team). The discussion with the HRS/SHARE teams was extremely useful for starting our project and formed the base of JSTAR.

HRS/ELSA/SHARE take an interdisciplinary and longitudinal approach and thus are the role models of JSTAR and our innovations rest on these preceding projects. Conversations and discussion with the HRS/ELSA/SHARE teams facilitated the starting of JSTAR and it is fair to say that JSTAR could not have succeeded in such a short time without the cooperation and assistance of the members of those project teams. In fact, we set up the JSTAR team in summer 2005 which included Hashimoto, and completed the first version of the questionnaire and performed pilot surveys in the Ota and Adachi wards in the center of Tokyo in November 2005. The time lag between our visit to the HRS/SHARE teams and implementation of these pilot studies was only four months. Consultations with the HRS/ELSA/SHARE teams also contributed to making JSTAR comparable with the international family of surveys. During the same period, we also discussed availability of other datasets and a new survey on aging with project leaders gathering panel data in Japan.

We learned a lot from the two pilot studies in Tokyo including how to cope with lower response rates. We continued preparations for a full-scale panel survey of middle-aged and older people comparable to the world standard. We have kept close contact with the leaders of HRS/ELSA/SHARE from whom we have received enthusiastic support. In a workshop held on August 4-5, 2006 at RIETI, we had extremely substantive and pragmatic discussions on topics such as questionnaire contents, survey methods, and response rates. This workshop was realized primarily with the support of the National Institute on Aging (NIA) and prominent attendees included HRS and SHARE leaders, indicating the degree of interest in Japan's population aging problem and social security policies based on empirical analysis. One of the most impressive statements in the conference was from the director of the NIA. He stated that HRS has been contributing to the formulation of overall social security policies in the US, and whenever considering a new policy, the White House checks with HRS as to whether there is scientific evidence that supports a certain policy.

Following the completion of two preliminary surveys and several meetings with the HRS/ELSA/SHARE teams, we further developed our questionnaire and survey instrument throughout 2006. In fall 2006, we negotiated with several municipalities to request cooperation with the survey and obtained strong support from five local governments who provided a linkage with data from official statements of medical and nursing care use. We required the survey agency to select interviewers with superior performance. In fall 2006, we also held a "Train-The-Trainers" program with help from the Survey Research Center at University of Michigan and two instructors gave two-day intensive training for supervisors in charge of each municipality.

The first full-scale survey was launched in Shirakawa town in January 2007. The individuals in the sample were aged between 50 and 75 and randomly chosen based on household registration held at each municipality. In the first wave, we excluded those who are institutionalized due to difficulty to contact, but we hope in the future to be able to interview a first-wave interview subject even if he/she is subsequently institutionalized. We started the survey in each municipality between January and the beginning of April 2007.

Before starting to perform the survey, the principal investigators (Ichimura, Hashimoto & Shimizutani) and Katsunori Kondo (Japan team) gave two-day instruction regarding the survey to interviewers in each municipality emphasizing the significance of the survey and answering any inquiries including details about the questionnaire and usage of personal computers (CAPI). The PIs also conducted follow-up interviews at least twice with most of the interviewees some weeks after the survey started in each municipality. The survey concluded in Kanazawa in July 2007. After completing all the interviews, we began to sort the dataset examining data quality (identifying outliers) and response rate to each question. We performed a host of cross-checks and plausibility checks of all data but more work on data cleaning process was necessary. Although a huge workload, it was incumbent on us to carefully examine the data since if a mistake or inappropriate element were not identified in the first wave, the negative effects would last in the following surveys.

The analyses in this book are based on a cleaned dataset but it must be said that some errors remain. We will continue working to solve those issues and add more work on imputations before the data is released and made open for researchers in the world. Micro-level data from JSTAR, processed so as to protect the individuals' identities, will be made available to researchers under restricted conditions, enabling the objective examination of policy effects. We will strive to release the data as early as possible to the interested research community, together with a web-based user support system.

Unquestionably, only when such a large-scale panel survey is undertaken in Japan will it become possible for the government to formulate effective social security policies firmly based on empirical analysis and for researchers to explore new scientific findings from the Japanese experience. By breaking down the walls of institutional or financial arguments, we must reconsider social security policy from the viewpoint of the elderly, and, at the same time, we will be able to generate new knowledge and ideas useful not only in Japan but also internationally. As Dr. Yoshitomi put it, it would be "disgraceful" if Japan continues to basically be the only developed country without a world-standard panel survey of the elderly amid the rapid aging of its population. We do hope that this project will gain understanding and support from as many people as possible.

1.5 Our Sample: 50+ in Japan

1.5.1 Introduction

The individuals in the baseline sample of JSTAR are aged between 50 and 75 and live in five municipalities in the eastern area of Japan. The cities are Takikawa city in Hokkaido, Sendai city in the Tohoku area, Adachi ward which is a special city in the center of the Tokyo metropolis, Kanazawa city in the Hokuriku area and Shirakawa town in a mountainous town in the Chubu area. More than 4,200 individuals in the sample kindly participated in the survey with eager cooperation and the response rate is close to 60%, which is much higher than the Japanese standard and is comparable with the "family" surveys in other countries.

In contrast to those surveys, we did not use the standard national representative random sampling but chose to conduct stratified random sampling within each municipality after selecting the five municipalities. We emphasize the three merits of our sampling design.

First, the sampling allows us to collect data on individuals in a homogenous health, economic, and social policy environment; they live in the same municipalities. The sample size for each municipality is sufficiently large for econometric analysis. Typically, national representative random sampling samples data from a few hundred regions with a few dozen individuals for each region. This approach may be effective in reproducing the "national representative" averages. However, this methodology may not be effective for econometric analysis and policy evaluation. The biggest problem is that we cannot control for unobserved innate difference across regions. It is natural to assume that individual decision-making is affected by different environments and is responsive to different incentive programs. In most cases, empirical analyses using national representative samples deal with unobserved heterogeneity employing an indicator variable to represent each region, but we need to explicitly consider the heterogeneity of those environments in order to obtain estimates with smaller inconsistency. A few dozen individuals for each region is not sufficient to conduct reliable econometric analysis and we need to combine individuals from many regions in an empirical analysis. In contrast, our sampling design enables us to analyze what interests us without being affected by different circumstances which affect individual behavior in health and economic and social networks since this method collects a large number of individuals in the same environment, i.e. in the same municipalities. While the current number of municipalities is too small, by collecting data from more municipalities with different characteristics, eventually we will be able to cover most types of municipalities in Japan. Even now, we will show that by reweighting, some of the observed national characteristics can be reproduced by our sample with some accuracy.

Second, because we received the endorsement from each of the municipalities the response rate was higher. Most recent surveys in Japan have suffered from lower response rates compared with the international standard. A response rate of 15-30% is not rare in Japan. We obtained a high degree of cooperation from government officials of five municipalities and those cities sent a letter to encourage each respondent

to participate in JSTAR, which surely improved the credibility and trustworthiness of JSTAR, and therefore helped to raise the response rate. Moreover, each municipality publicized the survey in the regular newsletter to residents (most local governments publish newsletters to citizens every month or every two weeks). Furthermore, government officials were in charge of responding to questions and answers from individuals who received the letter and indeed many individuals in the sample made calls to city hall to confirm that the survey was authorized by the municipality. As a result, the response rate of JSTAR is 60%, which is comparable to the international standard. It would have been impossible to receive the endorsements from all the municipalities if we had conducted the standard random sampling.

Third, we put in a request to the municipalities and received permission to link our data with the official record on medical and long-term care use for those individuals from whom we received permission. Again, this would not have been possible with the standard sampling design. Precise information on medical and elderly care use is indispensable to the evaluation of health policies. Japan has a mandatory universal medical and long-term care insurance program. While medical insurance for company employees is covered by their employers, self-employed workers and retired persons are covered by a national mandatory plan called the National Health Insurance (NHI) program which provides hospitalization and medical services. The long-term care insurance (LTCI) program, which started in 2000, also covers all residents in Japan and provides non-medical elderly care for those who are aged 65 and over and approved to use care services through the public program. The insurers of the NHI program and the LTCI program are municipalities or their alliances and they retain official records on use of medical and elderly care services. JSTAR asked the respondents who are participating in these programs to give permission to connect the survey data with official records on monthly service use of those two programs for the previous 24 months. By doing so, we were able to obtain precise data on health services use. While those services for people aged 75+ are provided through an independent insurance program from April 2008, there was no respondent eligible for the scheme in the baseline data collected in the first half of 2007 but there will be after the second wave.

1.5.2 Overview of Five Municipalities in the Baseline Wave

Next, we will briefly describe the five municipalities. Figure 1-5-1 illustrates the location of the five municipalities, all of which are located in the eastern part of Japan. We plan to expand the number of municipalities to cover all regions in Japan in the future, to cover the country from northernmost Hokkaido to southernmost Okinawa. In general, the larger the number of municipalities from which data is collected the easier it will be to relate the data back to the overall population because we would obtain a larger number of individuals in more diverse circumstances.

Takikawa city is located in the central part of Hokkaido which is the most northern prefecture in Japan. The population exceeds 40,000 persons in 20,000 households and the area is 116 square kilometers. Most of the city consists of plains located between two large rivers. The climate is cold and the temperature on average is 7 degrees Celsius but the gap in temperature in summer and winter is very large. Usually, it snows from the end of November until the beginning of April. The most important in-

Figure 1-5-1 Location of the five municipalities

dustries in Takikawa city are transportation and commerce. Several railways intersect at Takikawa station and a national road passes through the city between Sapporo (the largest city in Hokkaido) and Asahikawa (the second largest). While Takikawa city does not have any large coal mining sites, there were many coal producing sites in its surrounding areas. In the past, the city flourished when coal production was profitable. After most of the coal mining sites were closed, Takikawa has been a declining city, and in this respect is typical of many middle or small sized cities in Hokkaido.

Sendai city is the largest urban city in the Tohoku region and its population exceeds one million with about 450,000 households. Sendai was a castle city governed by a powerful governor (*daimyo*) from the beginning of the Edo period (1603-1868) and it has been the center of the Tohoku area in terms of industry, education, and government administration since the Meiji period (1868-1912). While most municipalities in the Tohoku area suffer from declining population in recent years, Sendai's population has been increasing due to vital economic activities and convenience in transportation including easier access to Tokyo. Sendai's economic activity is often called the "branch economy," i.e., most Japanese large companies established their Tohoku branch in Sendai. The city's area is very large, 788.09 square kilometers, and expands from the mountain area in the west to the Pacific Ocean in the east. Sendai city consists of a variety of districts including both very urban and rural areas. The climate is relatively cold compared to Tokyo, but it does not snow as much as in Hokkaido or areas facing the Japan Sea. Sendai is a traditional city with a large number of historic and cultural sites, which are clearly found in the center of the city, though many traditional sites were destroyed by bombing during the Second World War. It is often discussed that the innate character of the people is very modest and durable.

Adachi city is located in the northeast part of metropolitan Tokyo, bordering Saitama prefecture. The population of the city is about 650,000 persons with about 300,000 households and the area is 53.20 square kilometers. While the area is the third largest among the 23 wards (special cities) of Tokyo, Adachi city is characterized as a downtown district and is the densest municipality among the five JSTAR municipalities. Most of the area consists of low elevation plains with many rivers. The main industry of the city before the Second World War was agriculture in most areas and commerce and transportation in the most southern area. After the war, many people who lived in other Tokyo wards moved to Adachi city. Now the most dominant industry is small-sized manufacturing and many new apartments have attracted younger generations. We note that Adachi's average income level is the lowest among the 23 special wards in Tokyo.

Kanazawa city is located in the Hokuriku region facing the Japan Sea and serves as the center of the region. Like Sendai, Kanazawa has a long tradition and was established as a castle town with a powerful governor in the Edo period. Kanazawa has many rivers and ports and is a center of regional transportation. Kanazawa's population is about 460,000 persons with180,000 households and the area is 467.8 square kilometers. Kanazawa is often called a "little Kyoto" and the center of the city especially is a very traditional and cultural area. There are many cultural and historic sites in the city (Kanazawa was not bombed during the Second World War) and there are famous regional dishes and arts (china, etc.). Downtown Kanazawa has beautiful and

traditional streets with many temples, Japanese gardens (Kenroku-en park) and museums. Kanazawa is one of the most popular tourist towns in Japan and attracts foreign visitors. There are also many novelists born in Kanazawa and novels that describe the city. Kanazawa is a rainy city and it snows a lot in winter. In the surrounding area, there are many residential areas and agricultural activities.

Shirakawa town is located in Gifu prefecture, north of Nagoya city, and is a mountainous area in the Chubu region. Shirakawa town is full of nature including many beautiful streams and woods. The town is known for production of Japanese tea called "Shirakawa cha" and the lumber industry (and residential construction using lumber). The area is large at 237.9 square kilometers, and the variation in elevations from sea level is also large (from 150 meters to 1,223 meters) in the town and people can live in only 5% of the area. Shirakawa is typical of a mountainous rural town in Japan and the population has been declining to about 10,000 persons with 3,300 households and the share of elderly aged 65 and over in the total population exceeds 30%. The average temperature is 12 degrees Celsius and it is cold in winter but it does not snow much.

1.5.3 Main Historical Events for the Individuals in the JSTAR Sample

The age of the individuals in the JSTAR sample is between 50 and 75 as of the first half of 2007. The oldest person in the sample was born in 1932 and the youngest in 1957. When we need to construct a longitudinal data to distinguish between age effect and cohort effect, we should keep in mind that, when looking at the age gradient in any topics in this book, we need to pay attention to both the 25-year age gap between the oldest and youngest in the sample and the drastic difference in life experience in each generation.

Table 1-5-1 summarizes main historical events for those generations in their lives. The individuals in the oldest group in their 70s in 2007 (we call them the "70s group" here) were born in the first half or the middle of the 1930s. There was a world-wide economic depression and many international conflicts in the 1930s and the living standard became worse and worse until the end of the Second World War in 1945 when this population was elementary school students. Those in their 60s in 2007 (we call them the "60s group" here) were born before or after the end of the Second World War while those entering their 50s in 2007 (we call them the "50s group" here) included the first baby boomers (born in 1947-1950).

After the reconstruction period, the Japanese economy entered a high growth era from the mid-1950s when people in the 70s group began to work. Most of the individuals in the 60s group were still in school. The youngest people entering their 50s were born in 1957 and did not experience the hardest periods of Japan in the 20th century. In the 1960s, the growth rate of the Japanese economy further accelerated and the economic boom lasted until the mid-1970s. During this period, Japanese people enjoyed a higher living standard, which is represented by widespread acquisition of TV sets, air conditioners, and cars, as well as greater economic presence in the international community. The Tokyo Olympic games in 1964 were a symbol of Japan's expanded presence as a large economic power. Another symbolic event was EXPO '70 in Osaka. Around 1970, the 70s group was entering middle-age and most of the individuals in the 60s group began to work and those in the 50s group were still school students.

Table 1-5-1 Chronology of modern Japanese history

			Birth years of JSTAR respondents			
1920s	1923	Great Kanto Earthquake				
	1929	Great Depression began				
1930s	1931	Manchurian Incident				
	1933	Withdrawal from the League of Nations	1932			
	1937	Japan-China war began		1937		
	1939	Outbreak of World War II in Europe				
1940s	1941	Outbreak of the Pacific War				
	1945	Atomic bombs in Hiroshima and Nagasaki; end of World War II				
	1947	New Constitution of Japan came into effect			1947	
1950s	1950	Korean War began	18	13		
	1953	Television broadcasting began				
	1956	Member of the United Nations				
		High growth era; "no longer wartime economy"				1957
1960s	1960	Plan to double national income	28	23	13	
	1962	Cuban missile crisis				
	1964	Tokyo Summer Olympics; Shinkansen train operation began				
	1966	Izanagi Economic Boom				
	1969	First moon landing by Apollo				
1970s	1970	EXPO '70 in Osaka	38	33	23	13
	1972	Reversion of Okinawa to Japan				
	1973	First oil crisis; end of the high growth era				
	1979	Second oil crisis				
1980s	1985	Plaza Accord	48	43	33	23
	1986	Outbreak of the bubble economy				
	1987	Louvre Accord; privatization of Japan Railways				
	1989	End of the Showa Era; introduction of consumption tax				
1990s	1990	Persian Gulf War	58	53	43	33
	1991	Collapse of the bubble economy				
	1995	Kobe Earthquake; sarin gas attack on Tokyo subway				
	1998	Nagano Winter Olympic Games; bankruptcy of large companies				
2000s	2001	9.11 Terror attacks on the United States	68	63	53	43
	2002	Japan and Korea co-host World Cup soccer games				
	2004	Chuetsu Earthquake				
	2007	Started JSTAR First Wave	75	70	60	50

After the first oil shock in 1973, the Japanese economy entered a stable growth period at a new stage with many events of international turbulence including the second oil shock in 1979. It is fair to say that Japanese economic growth substantially slowed in the second half of the 1970s and a more pessimistic view of the future prevailed, which might have affected the life design of the 70s group. Around 1980, the individuals in the 70s group were in their mid-40s and those in the 60s group were also aged between the mid-30s and the beginning of their 40s. These people began to work in the high growth era and indeed experienced the downturn of long-run economic growth. In contrast, most of the individuals in the 50s group began to work after the first oil shock and were in their mid to late 20s in 1980.

In the second half of the 1980s, Japan enjoyed again high growth in the bubble economy and asset prices in stocks and land increased at historic levels. In the beginning of the 1990s, the bubble economy collapsed and Japan began to experience a decade-long recession. The economic downturn was more severe in the second half

of the 1990s when many bankruptcies including prestigious banks and security companies took place. During that period, most of the individuals in the 70s group retired while those in the 60s and 50s groups experienced hard times with more corporate restructuring and higher unemployment.

After 2000, although the Japanese economy recovered, the recovery was not powerful. At the same time, there have been more serious public concerns about the future; with the rapid speed of aging combined with the decline in fertility and longer life expectancy, people are concerned with the growing uncertainty about the sustainability of the social security program. These trends are not really new but most people became very conscious of them after 2000. During the period, more people in the 70s group retired and became eligible for public pensions and this is also the case for some in the 60s group. People in the 50s group were still in their prime age.

1.5.4 JSTAR Sampling Design

We sampled 2,000 persons aged between 50 and 75 in Sendai, Adachi, and Kanazawa and 1,000 persons in the same age range for Takikawa and Shirakawa by the two-step stratified sampling. The first level strata are defined by randomly determined locations within each municipality: there were 100 locations each in Sendai, Adachi, and Kanazawa, and 50 locations each in Takikawa and Shirakawa. Within each location, 20 individuals were randomly chosen.

The locations were determined by the following procedure: the size of the population was divided by 100 or 50 (depending on the city) to obtain the interval size and then after randomly determining a starting location using the household registry data, the subsequent locations were picked by moving down the registration list by intervals starting from the last point. This method works because the household registry data are sorted by address.

The Japanese household registry is reliable and most government statistics also depend on it. The difference between JSTAR and SHARE is that in the former, the municipalities are not randomly selected but were randomly chosen in the latter. We will turn to this point at the end of this subsection.

Aided by the support from local governments, we attained a reasonable response rate of 60% which is comparable to the international standard. While we see a higher response rate in a rural area (i.e., Shirakawa) and among older age groups, JSTAR successfully attained reasonable response rates in all municipalities.

1.5.5 Response Rate of JSTAR

Table 1-5-2 represents the response rate by municipality and age. The table shows two types of response rate. One is defined as the number of the respondents for the interview divided by the sum of the number of the respondents and the number of refusals. The other is defined as the number of respondents for the interview divided by the number of the individuals in the list to be interviewed. The difference comes from those whom an interviewer could not contact for any reason (see the discussion about Table 1-5-3 below). In what follows, we proceed with the discussion using the former definition of the response rate.

Table 1-5-2 Response rate by gender, age, and municipality

(1) ALL Municipalities

Age	# of samples (A)	# of respondents (B)	# of refusals (C)	Response Rate (I) = (B)/((B)+(C))	50-64 or 65-74	Response Rate (II) =(B)/(A)	50-64 or 65-74
75	87	40	32	64.05%	63.27%	57.40%	56.47%
74	268	158	85				
73	247	138	83				
72	249	149	75				
71	307	188	97				
70	335	184	109				
69	345	202	107	62.51%		55.58%	
68	259	154	80				
67	287	161	90				
66	297	157	108				
65	372	193	135				
64	372	195	138	58.48%	56.43%	51.26%	46.92%
63	351	183	129				
62	329	183	106				
61	265	129	98				
60	304	141	119				
59	395	188	148	55.50%		45.41%	
58	491	222	184				
57	408	188	144				
56	395	167	146				
55	357	164	123				
54	343	147	133	55.34%		44.35%	
53	296	133	113				
52	308	140	101				
51	287	131	98				
50	298	128	103				
Total	8252	4163	2884	59.09%		50.45%	

(2) Sendai

Age	# of samples (A)	# of respondents (B)	# of refusals (C)	Response Rate (I) = (B)/((B)+(C))	50-64 or 65-74	Response Rate (II) =(B)/(A)	50-64 or 65-74
75	21	5	14	52.03%	56.03%	45.93%	48.82%
74	58	30	22				
73	43	20	19				
72	57	21	26				
71	62	33	24				
70	66	32	25				
69	79	47	23	59.43%		51.22%	
68	57	36	18				
67	67	32	20				
66	83	33	37				
65	83	41	31				
64	103	51	35	55.84%	51.79%	46.78%	40.62%
63	92	39	39				
62	78	41	25				
61	71	35	23				
60	75	30	33				
59	105	45	42	51.50%		39.82%	
58	134	53	54				
57	102	43	37				
56	116	40	42				
55	103	42	35				
54	93	30	40	48.89%		35.81%	
53	83	30	33				
52	81	32	30				
51	87	30	33				
50	100	37	37				
Total	2099	908	797	53.26%		43.26%	

(3) Kanazawa

Age	# of samples (A)	# of respondents (B)	# of refusals (C)	Response Rate (I) = (B)/((B)+(C))	50-64 or 65-74	Response Rate (II) =(B)/(A)	50-64 or 65-74
75	32	14	10				
74	58	34	21				
73	42	24	15	63.35%		55.80%	
72	50	27	18				
71	56	34	16				
70	81	45	23		62.03%		55.14%
69	66	34	22				
68	46	25	16				
67	64	36	22	60.66%		54.46%	
66	51	33	16				
65	76	37	31				
64	88	44	42				
63	83	47	27				
62	103	60	32	61.07%		55.99%	
61	58	34	18				
60	77	44	27				
59	115	47	55				
58	126	58	53				
57	97	44	42	52.51%		45.90%	
56	96	45	36				
55	91	47	32				
54	101	44	44				
53	73	32	28				
52	102	46	35	54.55%		45.73%	
51	64	32	25				
50	93	44	33				
Total	1989	1011	739	57.77%		50.83%	

(4) Takikawa

Age	# of samples (A)	# of respondents (B)	# of refusals (C)	Response Rate (I) = (B)/((B)+(C))	50-64 or 65-74	Response Rate (II) =(B)/(A)	50-64 or 65-74
75	3	1	2				
74	38	25	11				
73	39	17	18	65.14%		60.43%	
72	40	30	8				
71	57	36	19				
70	58	33	18		62.08%		57.26%
69	58	30	24				
68	48	25	18				
67	45	24	17	59.23%		54.33%	
66	43	22	19				
65	60	37	17				
64	56	30	19				
63	50	30	16				
62	49	27	16	60.01%		52.67%	
61	40	18	18				
60	48	23	16				
59	48	28	12				
58	56	28	15				
57	33	18	10	62.77%		51.53%	
56	56	27	20				
55	36	17	13				
54	21	8	9				
53	32	12	16				
52	27	10	12	49.44%		40.37%	
51	29	14	8				
50	0	0	0				
Total	1070	570	371	60.57%		53.27%	

(5) Shirakawa

Age	# of samples (A)	# of respondents (B)	# of refusals (C)	Response Rate (I) = (B)/((B)+(C))	50-64 or 65-74	Response Rate (II) =(B)/(A)	50-64 or 65-74
75	19	15	1	90.61%	90.09%	84.41%	84.14%
74	54	43	5				
73	55	42	7				
72	46	40	6				
71	53	49	3				
70	36	33	1				
69	47	39	6	89.39%		83.77%	
68	37	31	4				
67	29	25	1				
66	37	31	4				
65	41	34	4				
64	32	27	4	85.50%	85.80%	76.71%	73.82%
63	34	28	5				
62	34	25	5				
61	26	20	2				
60	20	12	3				
59	32	24	5	85.00%		71.13%	
58	56	44	4				
57	64	43	7				
56	44	27	8				
55	43	32	6				
54	45	34	5	87.04%		75.00%	
53	33	26	3				
52	32	23	3				
51	45	34	5				
50	33	24	5				
Total	1027	805	112	87.79%		78.31%	

(6) Adachi

Age	# of samples (A)	# of respondents (B)	# of refusals (C)	Response Rate (I) = (B)/((B)+(C))	50-64 or 65-74	Response Rate (II) =(B)/(A)	50-64 or 65-74
75	12	5	5	53.87%	54.94%	47.15%	47.91%
74	60	26	26				
73	68	35	24				
72	56	31	17				
71	79	36	35				
70	94	41	42				
69	95	52	32	55.84%		48.53%	
68	71	37	24				
67	82	44	30				
66	83	38	32				
65	112	44	52				
64	93	43	38	47.29%	46.78%	41.09%	38.25%
63	92	39	42				
62	65	30	28				
61	70	22	37				
60	84	32	40				
59	95	44	34	44.92%		35.90%	
58	119	39	58				
57	112	40	48				
56	83	28	40				
55	84	26	37				
54	83	31	35	48.75%		38.27%	
53	75	33	33				
52	66	29	21				
51	62	21	27				
50	72	23	28				
Total	2067	869	865	50.12%		42.04%	

The overall response rate is 59.1%, close to 60%, which is unusually high compared to the recent Japanese standard and is internationally comparable with other "family" surveys. Even if we take the second definition, the response rate exceeds 50%. The high response rate of JSTAR should be emphasized especially when we consider that it is an extraordinarily burdensome survey (on average it takes an hour and a half to complete) and the internationally comparable response rate is evidence that JSTAR is comparable with other family surveys not only in terms of comparability of the questionnaire but also in terms of reliability of data quality.

The response rate differs across age and municipalities. First, looking at the difference by age range, in general, the response rate increases with age. The highest rate is 64.1% for respondents aged 70 and over and the lowest is 55.3% for respondents aged between 50 and 54. One of the reasons that the cooperation rate is higher for those who are older is that younger respondents are busier and do not find time to have an interview. We should take this point when analyzing the dataset.

Next, we see a variation across municipalities. We observe higher cooperation in Shirakawa and Takikawa and lower cooperation in urban areas. The highest is Shirakawa where the rate is as high as 87.8%. The response rate for those aged 70 and over has the highest rate of 90.7% and that for those aged 55-59 has the lowest rate of 85.0% in Shirakawa. The second highest is Takikawa. The average response rate in Takikawa is 60.6%. The highest is again observed for those aged 70 and over (65.1%). We should note that the rate for those who are aged 50-54 is 49.4%, which is much lower than that for other age groups. The middle rank of the five municipalities is Kanazawa. The overall response rate is 57.8%. The highest is observed for those aged 70 and over and the lowest is observed for those aged 55-59. The fourth ranked is Sendai with an overall response rate of 53.3%. What is interesting is that the highest rate is observed for those aged 65-69, not aged 70 and over in Sendai. Adachi has the lowest response rate of 50.1%. The highest is observed for those aged 65-69 and lowest for those aged 55-59.

Table 1-5-3 represents the detailed response rate by survey item and reasons for no response. The response rate discussed above is based on the number of respondents for interview, the main body of the survey. The upper panel shows the slightly larger number of respondents who agreed to filling in a self-completion questionnaire ("leave behind") against those who also cooperated for the interview. The number of respondents for the nutrition survey, while smaller, is close to 3,900. The number of respondents who gave us the agreement to link the survey data with official records of National Health Insurance (NHI) and public long-term care insurance (LTCI) program is approximately 2,500. We asked only those who have those two types of insurances, consisting mostly of those aged 65 and over, to give us permission to link the public records with JSTAR. For example, a respondent who has a full time job at a firm and takes part in the health insurance program for employees was not asked for agreement on the NHI or LTCI programs.

The number of respondents who agreed to the second wave is about 3,800; i.e. about 90% of the respondents in the first wave agreed to have an interview again in two years' time. This is remarkably high for a Japanese panel study. We can expect the JSTAR sample to be stable.

Table 1-5-3 Response rate and reasons of no response

(1) Summary

Municipalities	Interview	Leave behind	Nutrition survey	Official medical/LTC records	Agree with the next wave	Response rate (interview)
Sendai city	908	927	905	424	768	53.3%
Kanazawa city	1,011	991	849	650	911	57.8%
Takikawa city	570	562	491	389	518	60.6%
Shirakawa town	805	809	768	517	776	87.8%
Adachi city	869	896	858	489	782	50.1%
Total	4,163	4,185	3,871	2,469	3,755	59.1%

(2) Number of samples, respondents and no response

Municipalites	# of samples	# of respondents	# of no response
Sendai city	2,099	908	1,191
Kanazawa city	1,989	1,011	978
Takikawa city	1,070	570	500
Shirakawa town	1,027	805	222
Adachi city	2,067	869	1,198
Total	8,252	4,163	4,089

(3) Reasons of no response

Municipalities	Moving out	Long-term absence	Absence	Refusals	Address unindentified	Not eligible	Others/ unidentified
Sendai city	40	41	232	797	15	16	50
Kanazawa city	31	49	115	739	26	4	14
Takikawa city	38	19	57	371	3	2	10
Shirakawa town	9	8	58	112	2	3	30
Adachi city	48	29	169	865	20	8	59
Total	166	146	631	2884	66	33	163

The lower panel reports the reason for no response. While the dominant reason is refusal, some individuals in the sample moved away, had a long-term or short term absence, were not eligible, or interviewers were not able to identify the address which is drawn from the household registration at each municipality.

We believe that there are three factors to explain the high response rates. First, the respondents had a profound understanding of the importance and significance of the survey and they held a high sense of responsibility toward its social value. Second, the interviewers were very enthusiastic about the survey, sharing a common motivation with the researchers on the JSTAR team. They were particularly motivated after the interviewer leaders in each district participated in the HRS team's "train the trainer" program. Third, each municipality encouraged the respondents to cooperate with JSTAR interviews.

1.5.6 Data Quality of JSTAR

There are two perspectives in evaluating the quality of the JSTAR data: first, whether the JSTAR data represents the population aged 50-75 in each municipality well, and second, whether the JSTAR data represents the Japanese population aged 50-75 well. We examine the JSTAR data from the first perspective in this section and discuss how we plan to examine the JSTAR data from the second perspective.

To our knowledge, the census data is the only one available whose sample size is sufficient for comparison with JSTAR in each municipality. Since other official data collects a small number of individuals from each municipality, which makes it difficult to reproduce the population of each municipality, we use it to examine whether JSTAR data can represent the population as a national representative. The Census is performed every five years; the one in 2005 is the closest in terms of timing.

Since the number of variables in the Census available at the municipality-level is limited, we will compare the results from JSTAR and the Census below, focusing on some selected variables: sex/age decomposition, marital status by sex/age groups, employment status by sex/age groups, and educational attainment by sex/age groups (Table 1-5-4). We performed a series of Chi-squared tests to examine the equality of the shares in JSTAR and the census at 5% significance assuming the sampling variation contribution of the census data can be ignored.

(1) Age composition by sex

In all municipalities except for Shirakawa, the fraction of individuals in the older age group tends to decrease after 55-59 in census data whereas in JSTAR data the fraction increases. Therefore the age composition is different in JSTAR data from the Census.

The JSTAR sample contains a smaller fraction of individuals in their 50s both for males and females. This is a direct reflection of the lower response rate for the younger cohort. The situation is worse for women in their 50s. Interviewers reported that often interview rejection occurs when husbands intervene even when wives were willing to participate. Effectively, then, for this group we need to get a positive response from both husbands and wives. In contrast, the share of 60-64 for females is not different from that in the Census except for Sendai.

(2) Marital status

The Census contains information on marital status, which is classified into four categories: never married, married, widowed, and divorced. We observe that the distribution of the marital status given age is remarkably consistent with the census data (Table 1-6-2). The Chi-square p-values show that the equalities of the married are not rejected with the 5% significance level except for a few cases for each of the categories. This result indicates that interview response is not strongly related to the marital status. The shares of non-married, i.e. never married, widowed, and divorced are very small.

(3) Employment status

The Census contains information on employment status classified into eight categories: mostly work, housework and work, attending school and work, absent from work, unemployed, housework, attending school, and other. We classified all work categories into "Worked," absent from work as "Absent from work," unemployed as "Unemployed," and the rest into "Not in labor force."

For both males and females, except for Adachi, the shares of "worked" in JSTAR and the Census are comparable although the similarity is not as good as that we saw for the marital status. For Adachi, the JSTAR sample contains a higher fraction of workers than in the Census. In other municipalities as well, in general, JSTAR participants are more labor market active than the Census population.

(4) Educational attainment

Lastly, we validate educational attainment data in JSTAR using the Census data for each sex/age category. Unfortunately the Census contains educational attainment data for Sendai, Kanazawa, and Adachi only. Thus the comparison is restricted to these three cities.

The educational attainment distribution in JSTAR data is different from that in the Census for both males and females across all age groups. The educational attainment is much higher in the JSTAR data than in the Census data.

In this section, we validate the JSTAR data by comparing some key variables with the population of each municipality using the Census data. We found that JSTAR succeeded in representing the population of each municipality in terms of both marital status and many of the work statuses for males at a given age. But we find that JSTAR does not represent the population of each municipality for the education attainment nor does it represent the work status of females well.

The natural next step is to find out whether the individuals from the five municipalities are able to represent the population in Japan by some reweighting scheme. As emphasized, the sampling design of JSTAR is not designed primarily to be nationally representative but to be suitable for policy evaluation on a municipality basis. Even so, it is worthwhile to see whether the individuals in the five-municipality sample can be used to represent the population of Japan. Indeed, we plan to validate several key variables using five government statistics as follows. The variables include income, wealth and health which are not available in the Census data.

1. *National Survey on Income and Expenditure (Zenkoku shouhi jittai chosa) in 2004*
2. *Basic Survey on Employment Structure (Shugyo kozo kihon chosa) in 2002*
3. *Survey on Employment of the Elderly (Kounenreisha shugyo jittai chosa) in 2004*
4. *Basic Survey on Social Lives (Shakai seikatsu kihon chosa) in 2001*
5. *Basic Survey on People's Lives (Kokumin seikatsu kiso chosa) in 2004*

Although these surveys are not censuses, the sample is randomly chosen from all regions in Japan and the sample size of those surveys is large enough to rely on the validation. We chose the latest version of each survey, most of which are performed every three to five years. While the methodology and the questionnaire questions related to the four key variables that we examine—employment, income, education, and

Table 1-5-4 Comparision of key variables between JSTAR and the census

		(1) Sex and age					(2) Marital status																			
		Sex					Never married					Married					Widowed					Divorced				
		JSTAR	SE	p-value	5% significance	CENSUS	JSTAR	SE	p-value	5% significance	CENSUS	JSTAR	SE	p-value	5% significance	CENSUS	JSTAR	SE	p-value	5% significance	CENSUS	JSTAR	SE	p-value	5% significance	CENSUS
Sendai																										
Male	All	100.00%				100.00%																				
	50-54	11.62%	1.53	0.0000	reject	24.09%	2.36%	0.72	0.2283	accept	2.96%	19.84%	1.90	0.3100	accept	18.91%	0.47%	0.33	0.1747	accept	0.25%	1.42%	0.56	0.2855	accept	1.13%
	55-59	22.78%	2.00	0.0813	accept	25.69%	1.80%	0.63	0.3798	accept	2.00%	21.58%	1.96	0.4128	accept	21.15%	0.51%	0.34	0.3753	accept	0.42%	1.80%	0.63	0.1963	accept	1.33%
	60-64	24.83%	2.06	0.0067	reject	20.10%	0.55%	0.35	0.2081	accept	0.92%	18.07%	1.84	0.2926	accept	17.09%	0.55%	0.35	0.4488	accept	0.60%	0.92%	0.46	0.4093	accept	1.03%
	65-69	20.96%	1.94	0.0050	reject	16.40%	0.36%	0.28	0.3439	accept	0.49%	14.98%	1.70	0.3037	accept	14.12%	0.89%	0.45	0.3406	accept	0.73%	0.18%	0.20	0.0924	accept	0.71%
	70-74	19.82%	1.90	0.0001	reject	13.72%	0.00%	0.00	0.1519	accept	0.24%	12.93%	1.60	0.2432	accept	11.86%	0.32%	0.27	0.0824	accept	0.96%	0.47%	0.33	0.3691	accept	0.38%
Female	All	100.00%				100.00%																				
	50-54	12.08%	1.60	0.0000	reject	23.34%	1.87%	0.67	0.3734	accept	1.66%	18.67%	1.92	0.4704	accept	18.53%	0.47%	0.34	0.2223	accept	0.80%	2.33%	0.74	0.2954	accept	1.97%
	55-59	19.57%	1.95	0.0069	reject	24.79%	1.84%	0.66	0.2983	accept	1.52%	18.36%	1.90	0.3359	accept	19.18%	2.14%	0.71	0.1535	accept	1.53%	2.14%	0.71	0.4922	accept	2.13%
	60-64	22.95%	2.07	0.0384	reject	19.50%	0.82%	0.44	0.3869	accept	0.96%	15.19%	1.76	0.3582	accept	14.56%	2.26%	0.73	0.4634	accept	2.19%	1.23%	0.54	0.3281	accept	1.50%
	65-69	25.36%	2.14	0.0000	reject	16.91%	0.81%	0.44	0.4543	accept	0.76%	12.89%	1.65	0.2274	accept	11.71%	2.26%	0.73	0.1473	accept	3.16%	0.97%	0.48	0.4533	accept	1.02%
	70-74	20.05%	1.97	0.0048	reject	15.45%	0.37%	0.30	0.2029	accept	0.72%	10.80%	1.53	0.1534	accept	9.33%	3.91%	0.95	0.2901	accept	4.47%	0.37%	0.30	0.2215	accept	0.68%
Kanazawa																										
Male	All	100.00%				100.00%																				
	50-54	10.32%	1.46	0.0000	reject	21.66%	2.41%	0.73	0.4740	accept	2.36%	17.33%	1.81	0.4857	accept	17.26%	0.96%	0.47	0.0001	reject	0.19%	0.96%	0.47	0.3853	accept	1.11%
	55-59	22.02%	1.98	0.0040	reject	27.69%	0.58%	0.36	0.0098	reject	2.23%	25.96%	2.10	0.0515	accept	22.69%	0.00%	0.00	0.0864	accept	0.42%	1.15%	0.51	0.2661	accept	1.52%
	60-64	30.28%	2.20	0.0000	reject	20.87%	1.27%	0.54	0.1738	accept	0.85%	17.55%	1.82	0.4256	accept	17.90%	0.32%	0.27	0.2541	accept	0.55%	1.74%	0.63	0.0883	accept	1.07%
	65-69	20.18%	1.92	0.0049	reject	15.69%	0.36%	0.29	0.3681	accept	0.47%	14.80%	1.70	0.2047	accept	13.45%	0.18%	0.20	0.0974	accept	0.69%	0.36%	0.29	0.2022	accept	0.69%
	70-74	17.20%	1.81	0.0306	reject	14.08%	0.00%	0.00	0.1287	accept	0.29%	12.58%	1.59	0.3910	accept	12.15%	0.94%	0.46	0.4960	accept	0.94%	0.38%	0.29	0.4791	accept	0.39%
Female	All	100.00%				100.00%																				
	50-54	15.00%	1.60	0.0017	reject	20.28%	1.35%	0.52	0.2713	accept	1.07%	16.77%	1.67	0.4054	accept	16.37%	0.00%	0.00	0.0275	reject	0.73%	2.16%	0.65	0.3066	accept	1.86%
	55-59	23.00%	1.88	0.0423	reject	26.40%	0.69%	0.37	0.1541	accept	1.18%	22.04%	1.85	0.2255	accept	20.67%	2.53%	0.70	0.1025	accept	1.78%	1.15%	0.48	0.0296	reject	2.45%
	60-64	22.40%	1.86	0.1382	accept	20.44%	0.36%	0.27	0.0974	accept	0.92%	17.15%	1.69	0.1267	accept	15.31%	2.19%	0.65	0.3672	accept	2.42%	0.73%	0.38	0.0690	accept	1.55%
	65-69	22.00%	1.85	0.0007	reject	16.67%	0.30%	0.25	0.1696	accept	0.65%	12.27%	1.47	0.2331	accept	11.24%	3.03%	0.77	0.3056	accept	3.44%	1.06%	0.46	0.4553	accept	1.11%
	70-74	17.60%	1.70	0.2010	accept	16.22%	0.00%	0.00	0.0308	reject	0.69%	10.69%	1.38	0.1473	accept	9.33%	5.16%	0.99	0.4945	accept	5.17%	0.37%	0.27	0.1327	accept	0.82%
Takikawa																										
Male	All	100.00%				100.00%																				
	50-54	3.86%	1.14	0.0000	reject	20.65%	3.75%	1.13	0.0600	accept	2.36%	13.14%	2.00	0.0544	accept	16.68%	0.00%	0.00	0.2365	accept	0.18%	1.88%	0.80	0.2084	accept	1.33%
	55-59	14.39%	2.08	0.0000	reject	24.36%	1.19%	0.64	0.3656	accept	1.43%	21.98%	2.45	0.2525	accept	20.39%	0.00%	0.00	0.1012	accept	0.57%	1.19%	0.64	0.2299	accept	1.76%
	60-64	24.91%	2.56	0.0087	reject	19.35%	0.00%	0.00	0.0870	accept	0.64%	16.62%	2.21	0.4943	accept	16.59%	0.82%	0.53	0.4854	accept	0.84%	1.91%	0.81	0.1411	accept	1.21%
	65-69	26.67%	2.62	0.0003	reject	18.70%	0.49%	0.41	0.3713	accept	0.37%	17.23%	2.24	0.4047	accept	16.69%	0.49%	0.41	0.2378	accept	0.89%	0.49%	0.41	0.3566	accept	0.67%
	70-74	30.18%	2.72	0.0000	reject	16.94%	0.00%	0.00	0.2288	accept	0.19%	15.95%	2.17	0.3048	accept	14.88%	0.20%	0.26	0.0574	accept	1.22%	0.79%	0.52	0.3095	accept	0.57%
Female	All	100.00%				100.00%																				
	50-54	5.39%	1.46	0.0000	reject	21.15%	1.63%	0.81	0.4498	accept	1.53%	11.39%	2.05	0.0195	reject	16.30%	1.63%	0.81	0.0908	accept	0.84%	6.51%	1.59	0.0000	reject	2.40%
	55-59	14.94%	2.30	0.0010	reject	23.32%	1.94%	0.89	0.0799	accept	1.03%	16.84%	2.41	0.3807	accept	17.59%	1.94%	0.89	0.3434	accept	1.62%	2.59%	1.02	0.3551	accept	3.00%
	60-64	22.82%	2.70	0.0809	accept	19.27%	0.35%	0.38	0.3570	accept	0.52%	15.41%	2.33	0.3936	accept	14.80%	2.10%	0.92	0.3928	accept	2.37%	1.40%	0.76	0.4262	accept	1.55%
	65-69	26.97%	2.86	0.0024	reject	19.74%	1.21%	0.71	0.0036	reject	0.29%	13.06%	2.17	0.3715	accept	13.79%	3.95%	1.25	0.3772	accept	4.36%	1.52%	0.79	0.3156	accept	1.18%
	70-74	29.88%	2.95	0.0000	reject	16.52%	0.23%	0.31	0.4112	accept	0.31%	11.02%	2.02	0.3712	accept	10.37%	3.90%	1.25	0.1909	accept	5.15%	1.15%	0.69	0.1483	accept	0.62%
Shirakawa																										
Male	All	100.00%				100.00%																				
	50-54	12.34%	1.68	0.0000	reject	21.84%	1.39%	0.60	0.1246	accept	2.27%	20.45%	2.07	0.0950	accept	17.87%	0.00%	0.00	0.1354	accept	0.32%	0.00%	0.00	0.0106	reject	1.37%
	55-59	27.30%	2.28	0.0192	reject	22.85%	0.88%	0.48	0.1653	accept	1.48%	19.77%	2.04	0.4071	accept	20.25%	0.66%	0.41	0.1178	accept	0.32%	1.54%	0.63	0.0507	accept	0.79%
	60-64	19.42%	2.03	0.0034	reject	14.54%	0.39%	0.32	0.1893	accept	0.79%	12.77%	1.71	0.4808	accept	12.69%	0.59%	0.39	0.3736	accept	0.48%	0.79%	0.45	0.2999	accept	0.58%
	65-69	18.11%	1.97	0.2142	accept	19.73%	0.29%	0.27	0.1714	accept	0.69%	18.30%	1.98	0.4150	accept	17.87%	0.86%	0.47	0.3947	accept	0.74%	0.29%	0.27	0.3400	accept	0.42%
	70-74	22.83%	2.15	0.1960	accept	21.05%	0.00%	0.00	0.1574	accept	0.26%	18.14%	1.97	0.2922	accept	19.25%	2.42%	0.79	0.0514	accept	1.43%	0.24%	0.25	0.2068	accept	0.11%
Female	All	100.00%				100.00%																				
	50-54	9.91%	1.66	0.0002	reject	17.38%	0.00%	0.00	0.2107	accept	0.20%	15.21%	2.00	0.3432	accept	16.03%	1.63%	0.70	0.0082	reject	0.60%	0.54%	0.41	0.4939	accept	0.55%
	55-59	17.65%	2.12	0.3330	accept	18.58%	0.00%	0.00	0.1275	accept	0.40%	15.32%	2.00	0.2633	accept	16.63%	1.30%	0.63	0.2908	accept	1.00%	1.96%	0.77	0.0003	reject	0.55%
	60-64	15.79%	2.03	0.1278	accept	18.23%	0.36%	0.33	0.3204	accept	0.55%	13.58%	1.91	0.2184	accept	15.13%	3.22%	0.98	0.0802	accept	2.10%	0.71%	0.47	0.2379	accept	0.45%
	65-69	22.91%	2.34	0.1846	accept	20.88%	0.00%	0.00	0.1014	accept	0.50%	16.36%	2.06	0.3658	accept	17.08%	3.67%	1.05	0.2958	accept	3.15%	0.56%	0.42	0.0271	reject	0.15%
	70-74	33.75%	2.63	0.0001	reject	24.93%	0.46%	0.38	0.2274	accept	0.25%	18.98%	2.18	0.2786	accept	17.73%	5.03%	1.22	0.1289	accept	6.59%	0.46%	0.38	0.3715	accept	0.35%
Adachi																										
Male	All	100.00%				100.00%																				
	50-54	8.91%	1.44	0.0000	reject	19.17%	2.74%	0.82	0.0770	accept	4.18%	14.79%	1.79	0.0823	accept	12.47%	1.10%	0.53	0.0000	reject	0.20%	0.55%	0.37	0.1286	accept	1.16%
	55-59	19.34%	1.99	0.0207	reject	23.71%	3.12%	0.88	0.2070	accept	3.92%	19.97%	2.02	0.0218	reject	16.22%	0.00%	0.00	0.0943	accept	0.44%	0.62%	0.40	0.0605	accept	1.61%
	60-64	20.61%	2.04	0.2742	accept	21.86%	1.62%	0.64	0.1757	accept	2.33%	18.35%	1.95	0.1083	accept	16.06%	0.27%	0.26	0.1258	accept	0.78%	1.62%	0.64	0.4185	accept	1.49%
	65-69	25.45%	2.20	0.0010	reject	19.31%	0.58%	0.38	0.1255	accept	1.21%	16.22%	1.86	0.2477	accept	14.99%	1.16%	0.54	0.4117	accept	1.04%	1.35%	0.58	0.3296	accept	1.12%
	70-74	25.70%	2.20	0.0000	reject	15.95%	0.47%	0.35	0.3758	accept	0.60%	14.05%	1.75	0.1901	accept	12.58%	1.26%	0.56	0.4158	accept	1.39%	0.16%	0.20	0.1114	accept	0.65%
Female	All	100.00%				100.00%																				
	50-54	9.54%	1.45	0.0000	reject	17.40%	0.45%	0.33	0.0307	reject	1.61%	14.28%	1.73	0.2044	accept	12.91%	1.34%	0.57	0.0533	accept	0.68%	1.34%	0.57	0.2197	accept	1.85%
	55-59	19.80%	1.97	0.1018	accept	22.43%	1.94%	0.68	0.2846	accept	1.59%	17.44%	1.88	0.3285	accept	16.63%	0.83%	0.45	0.1383	accept	1.48%	2.21%	0.73	0.4390	accept	2.33%
	60-64	20.54%	2.00	0.1770	accept	22.45%	0.53%	0.36	0.1243	accept	1.14%	16.84%	1.85	0.3476	accept	16.12%	3.74%	0.94	0.1239	accept	2.80%	1.07%	0.51	0.0968	accept	1.96%
	65-69	26.41%	2.18	0.0023	reject	20.73%	0.77%	0.43	0.4121	accept	0.87%	14.40%	1.74	0.3727	accept	13.84%	4.80%	1.06	0.2857	accept	4.24%	0.77%	0.43	0.1505	accept	1.36%
	70-74	23.72%	2.10	0.0001	reject	16.99%	0.35%	0.29	0.1657	accept	0.77%	12.61%	1.64	0.0134	reject	9.42%	2.98%	0.84	0.0137	reject	5.45%	1.05%	0.50	0.3722	accept	0.90%

(3) Employment status

		Worked					Absent from work					Unemployed					Not in labor force				
		JSTAR	SE	p-value	5% significance	CENSUS	JSTAR	SE	p-value	5% significance	CENSUS	JSTAR	SE	p-value	5% significance	CENSUS	JSTAR	SE	p-value	5% significance	CENSUS
Sendai																					
Male	50-54	22.20%	1.98	0.2375	accept	20.82%	0.00%	0.00	0.1685	accept	0.21%	0.94%	0.46	0.2972	accept	1.22%	0.00%	0.00	0.0457	reject	0.64%
	55-59	23.89%	2.04	0.1185	accept	21.57%	0.26%	0.24	0.4231	accept	0.31%	0.51%	0.34	0.0402	reject	1.54%	1.03%	0.48	0.4293	accept	1.12%
	60-64	16.23%	1.76	0.0071	reject	12.37%	0.18%	0.20	0.3546	accept	0.28%	0.74%	0.41	0.0682	accept	1.64%	2.95%	0.81	0.0199	reject	5.11%
	65-69	8.02%	1.30	0.0695	accept	6.31%	0.00%	0.00	0.1399	accept	0.27%	0.53%	0.35	0.3514	accept	0.69%	7.84%	1.28	0.2967	accept	8.56%
	70-74	4.26%	0.96	0.0804	accept	3.10%	0.00%	0.00	0.1872	accept	0.18%	0.32%	0.27	0.3312	accept	0.22%	9.14%	1.38	0.3342	accept	9.75%
Female	50-54	16.34%	1.82	0.0831	accept	13.98%	0.00%	0.00	0.2111	accept	0.16%	1.40%	0.58	0.0142	reject	0.58%	5.60%	1.13	0.0279	reject	8.18%
	55-59	14.08%	1.71	0.1567	accept	12.44%	0.31%	0.27	0.2300	accept	0.16%	1.22%	0.54	0.0417	reject	0.58%	9.18%	1.42	0.1018	accept	11.15%
	60-64	7.60%	1.30	0.0973	accept	6.07%	0.00%	0.00	0.2605	accept	0.10%	0.41%	0.31	0.2784	accept	0.26%	11.50%	1.57	0.2163	accept	12.78%
	65-69	5.32%	1.10	0.0023	reject	2.95%	0.00%	0.00	0.3121	accept	0.06%	0.32%	0.28	0.0883	accept	0.11%	11.28%	1.55	0.0915	accept	13.51%
	70-74	1.49%	0.60	0.4815	accept	1.46%	0.00%	0.00	0.3266	accept	0.05%	0.19%	0.21	0.0742	accept	0.04%	13.77%	1.69	0.4706	accept	13.65%
Kanazawa																					
Male	50-54	20.70%	1.94	0.2317	accept	19.31%	0.48%	0.33	0.0904	accept	0.20%	0.48%	0.33	0.2814	accept	0.71%	0.00%	0.00	0.0364	reject	0.73%
	55-59	25.39%	2.08	0.2433	accept	23.96%	0.58%	0.36	0.1998	accept	0.34%	0.29%	0.26	0.0449	reject	1.16%	1.44%	0.57	0.4707	accept	1.40%
	60-64	18.19%	1.85	0.0136	reject	14.46%	0.32%	0.27	0.4982	accept	0.32%	0.63%	0.38	0.1572	accept	1.15%	1.74%	0.63	0.0039	reject	4.33%
	65-69	10.16%	1.45	0.0149	reject	7.43%	0.00%	0.00	0.1171	accept	0.32%	0.36%	0.29	0.2645	accept	0.59%	5.17%	1.06	0.0878	accept	6.80%
	70-74	5.26%	1.07	0.1358	accept	4.20%	0.19%	0.21	0.3732	accept	0.27%	0.56%	0.36	0.0830	accept	0.24%	8.07%	1.30	0.2797	accept	8.87%
Female	50-54	14.87%	1.59	0.3057	accept	14.08%	0.27%	0.23	0.1777	accept	0.12%	1.35%	0.52	0.0002	reject	0.37%	9.19%	1.29	0.0001	reject	5.47%
	55-59	18.13%	1.72	0.1397	accept	16.35%	0.23%	0.21	0.3501	accept	0.16%	0.92%	0.43	0.0784	accept	0.48%	3.21%	0.79	0.0000	reject	9.17%
	60-64	11.86%	1.45	0.0024	reject	8.36%	0.18%	0.19	0.3447	accept	0.12%	0.36%	0.27	0.3814	accept	0.29%	5.66%	1.03	0.0000	reject	11.49%
	65-69	5.15%	0.99	0.1370	accept	4.17%	0.00%	0.00	0.2595	accept	0.08%	0.00%	0.00	0.2561	accept	0.09%	6.67%	1.12	0.0001	reject	12.15%
	70-74	3.87%	0.86	0.0097	reject	2.30%	0.00%	0.00	0.2761	accept	0.07%	0.00%	0.00	0.3620	accept	0.02%	14.01%	1.55	0.4067	accept	13.64%
Takikawa																					
Male	50-54	18.77%	2.31	0.3993	accept	18.19%	0.00%	0.00	0.2215	accept	0.21%	0.00%	0.00	0.0370	reject	1.11%	1.88%	0.80	0.0876	accept	1.06%
	55-59	23.17%	2.50	0.2050	accept	21.18%	0.59%	0.46	0.0616	accept	0.19%	0.59%	0.46	0.1494	accept	1.29%	0.00%	0.00	0.0161	reject	1.58%
	60-64	14.99%	2.11	0.0783	accept	12.24%	0.55%	0.44	0.0734	accept	0.18%	2.18%	0.87	0.0341	reject	1.07%	1.64%	0.75	0.0013	reject	5.80%
	65-69	8.61%	1.66	0.2002	accept	7.32%	0.00%	0.00	0.2938	accept	0.10%	0.98%	0.58	0.1943	accept	0.59%	8.86%	1.68	0.1632	accept	10.65%
	70-74	4.73%	1.26	0.2065	accept	3.80%	0.00%	0.00	0.2826	accept	0.12%	0.98%	0.58	0.0028	reject	0.22%	11.23%	1.87	0.2219	accept	12.74%
Female	50-54	16.27%	2.38	0.0958	accept	13.40%	0.00%	0.00	0.3027	accept	0.11%	1.63%	0.81	0.0064	reject	0.50%	3.25%	1.14	0.0101	reject	7.09%
	55-59	18.14%	2.48	0.0076	reject	12.89%	0.00%	0.00	0.3328	accept	0.08%	0.00%	0.00	0.1851	accept	0.33%	5.18%	1.43	0.0066	reject	9.96%
	60-64	10.86%	2.00	0.0077	reject	6.91%	0.00%	0.00	0.3575	accept	0.06%	0.00%	0.00	0.2939	accept	0.12%	8.41%	1.79	0.0369	reject	12.17%
	65-69	5.16%	1.43	0.0883	accept	3.55%	0.30%	0.35	0.0000	reject	0.01%	1.21%	0.71	0.0000	reject	0.03%	13.06%	2.17	0.0995	accept	16.10%
	70-74	3.44%	1.17	0.0116	reject	1.60%	0.23%	0.31	0.0152	reject	0.02%	0.00%	0.00			0.00%	12.85%	2.16	0.1888	accept	14.87%
Shirakawa																					
Male	50-54	21.84%	2.12	0.2284	accept	20.31%	0.00%	0.00	0.1171	accept	0.37%	0.00%	0.00	0.0773	accept	0.53%	0.00%	0.00	0.0594	accept	0.63%
	55-59	22.41%	2.14	0.2494	accept	20.99%	0.22%	0.24	0.2027	accept	0.53%	0.00%	0.00	0.0459	reject	0.74%	0.22%	0.24	0.1764	accept	0.58%
	60-64	12.77%	1.71	0.1500	accept	11.11%	0.20%	0.23	0.3982	accept	0.26%	0.00%	0.00	0.1171	accept	0.37%	1.57%	0.64	0.0728	accept	2.80%
	65-69	12.58%	1.70	0.2287	accept	11.37%	0.29%	0.27	0.3400	accept	0.42%	1.14%	0.54	0.3066	accept	0.90%	5.72%	1.19	0.1576	accept	7.03%
	70-74	11.61%	1.64	0.0438	reject	9.10%	0.00%	0.00	0.0594	accept	0.63%	0.00%	0.00	0.0677	accept	0.58%	9.19%	1.48	0.1654	accept	10.74%
Female	50-54	13.58%	1.91	0.3131	accept	14.54%	0.54%	0.41	0.0835	accept	0.20%	0.00%	0.00	0.2431	accept	0.15%	3.26%	0.99	0.1902	accept	2.50%
	55-59	13.37%	1.89	0.4851	accept	13.44%	0.00%	0.00	0.2431	accept	0.15%	0.98%	0.55	0.0279	reject	0.35%	3.91%	1.08	0.2655	accept	4.65%
	60-64	11.08%	1.75	0.1565	accept	9.44%	0.00%	0.00	0.1843	accept	0.25%	0.71%	0.47	0.0002	reject	0.10%	6.43%	1.37	0.0973	accept	8.44%
	65-69	9.31%	1.62	0.0938	accept	7.39%	0.00%	0.00	0.2849	accept	0.10%	0.28%	0.30	0.1499	accept	0.10%	11.29%	1.76	0.1447	accept	13.29%
	70-74	5.95%	1.32	0.4691	accept	5.84%	0.00%	0.00	0.3439	accept	0.05%	0.23%	0.27			0.00%	18.75%	2.17	0.4490	accept	19.03%
Adachi																					
Male	50-54	18.07%	1.94	0.1095	accept	15.81%	0.00%	0.00	0.1670	accept	0.24%	0.55%	0.37	0.1207	accept	1.19%	0.55%	0.37	0.4507	accept	0.60%
	55-59	21.22%	2.06	0.1459	accept	19.13%	0.31%	0.28	0.4001	accept	0.39%	0.94%	0.49	0.1889	accept	1.47%	1.25%	0.56	0.4341	accept	1.16%
	60-64	20.78%	2.05	0.0007	reject	15.00%	0.00%	0.00	0.0872	accept	0.47%	0.27%	0.26	0.0195	reject	1.56%	0.81%	0.45	0.0014	reject	3.63%
	65-69	13.32%	1.71	0.0071	reject	9.67%	0.00%	0.00	0.1066	accept	0.39%	0.97%	0.49	0.4727	accept	1.00%	4.63%	1.06	0.0244	reject	7.20%
	70-74	7.11%	1.30	0.0445	reject	5.20%	0.00%	0.00	0.1292	accept	0.32%	0.32%	0.28	0.3461	accept	0.45%	8.37%	1.40	0.2974	accept	9.14%
Female	50-54	12.94%	1.66	0.1154	accept	11.08%	0.00%	0.00	0.2323	accept	0.13%	0.45%	0.33	0.4512	accept	0.49%	3.57%	0.92	0.0511	accept	5.40%
	55-59	15.78%	1.80	0.0647	accept	13.24%	0.28%	0.26	0.2566	accept	0.15%	1.66%	0.63	0.0008	reject	0.53%	4.71%	1.05	0.0051	reject	8.20%
	60-64	14.43%	1.74	0.0016	reject	10.04%	0.00%	0.00	0.2135	accept	0.15%	1.60%	0.62	0.0001	reject	0.41%	6.41%	1.21	0.0006	reject	11.55%
	65-69	9.79%	1.47	0.0002	reject	5.71%	0.00%	0.00	0.2503	accept	0.11%	1.34%	0.57	0.0000	reject	0.21%	9.60%	1.46	0.0028	reject	14.41%
	70-74	4.91%	1.07	0.0008	reject	2.47%	0.00%	0.00	0.2739	accept	0.09%	0.70%	0.41	0.0000	reject	0.08%	11.39%	1.57	0.0583	accept	14.09%

(4) Educational status

		Elementary / junior high school					Senior high school					Two-year college / training school					University or more				
		JSTAR	SE	p-value	5% significance	CENSUS	JSTAR	SE	p-value	5% significance	CENSUS	JSTAR	SE	p-value	5% significance	CENSUS	JSTAR	SE	p-value	5% significance	CENSUS
Sendai																					
Male	50-54	0.00%	0.00	0.0001	reject	3.16%	10.39%	1.46	0.0719	accept	12.72%	0.94%	0.46	0.4628	accept	0.99%	12.75%	1.59	0.0006	reject	8.46%
	55-59	3.34%	0.86	0.3839	accept	3.60%	10.02%	1.43	0.4314	accept	10.27%	3.34%	0.86	0.0000	reject	0.61%	8.73%	1.35	0.0007	reject	5.30%
	60-64	1.66%	0.61	0.0110	reject	3.73%	10.88%	1.49	0.0171	reject	8.12%	0.55%	0.35	0.4187	accept	0.63%	7.01%	1.22	0.0003	reject	3.88%
	65-69	3.21%	0.84	0.1666	accept	4.13%	8.20%	1.31	0.0705	accept	6.47%	0.53%	0.35	0.4185	accept	0.61%	4.10%	0.95	0.0846	accept	2.98%
	70-74	3.31%	0.85	0.4435	accept	3.43%	6.31%	1.16	0.1190	accept	5.07%	0.95%	0.46	0.2364	accept	1.34%	3.00%	0.81	0.0038	reject	1.47%
Female	50-54	0.93%	0.47	0.0096	reject	2.85%	9.80%	1.46	0.0009	reject	15.34%	7.00%	1.25	0.0001	reject	3.66%	5.60%	1.13	0.0000	reject	2.03%
	55-59	1.84%	0.66	0.0227	reject	3.69%	14.39%	1.72	0.0699	accept	12.03%	5.51%	1.12	0.0000	reject	1.97%	2.75%	0.80	0.0005	reject	1.08%
	60-64	2.87%	0.82	0.0584	accept	4.47%	10.47%	1.50	0.3043	accept	9.72%	4.72%	1.04	0.0000	reject	1.56%	1.23%	0.54	0.0640	accept	0.64%
	65-69	2.90%	0.82	0.0241	reject	5.02%	9.67%	1.45	0.2321	accept	8.65%	3.22%	0.87	0.0000	reject	1.14%	0.97%	0.48	0.0667	accept	0.46%
	70-74	3.16%	0.86	0.0889	accept	4.54%	8.00%	1.33	0.1648	accept	6.80%	3.91%	0.95	0.0000	reject	1.04%	0.37%	0.30	0.2479	accept	0.22%
Kanazawa																					
Male	50-54	0.48%	0.33	0.0000	reject	5.50%	7.70%	1.28	0.0001	reject	13.84%	3.37%	0.86	0.0000	reject	1.10%	10.11%	1.44	0.0172	reject	7.45%
	55-59	2.88%	0.80	0.0023	reject	6.15%	12.12%	1.56	0.0859	accept	10.14%	4.04%	0.94	0.0000	reject	0.57%	8.65%	1.35	0.0000	reject	4.05%
	60-64	5.22%	1.07	0.3911	accept	5.52%	8.70%	1.35	0.1902	accept	7.59%	1.42%	0.57	0.0000	reject	0.28%	5.53%	1.10	0.0000	reject	2.46%
	65-69	5.70%	1.11	0.4995	accept	5.70%	7.49%	1.26	0.3096	accept	6.88%	0.18%	0.20	0.3644	accept	0.26%	2.32%	0.72	0.2964	accept	1.96%
	70-74	6.01%	1.14	0.0694	accept	4.53%	6.01%	1.14	0.3602	accept	5.61%	0.19%	0.21	0.0379	reject	1.06%	1.88%	0.65	0.0523	accept	1.08%
Female	50-54	0.81%	0.40	0.0000	reject	4.99%	11.63%	1.43	0.0030	reject	16.15%	6.22%	1.08	0.0001	reject	3.26%	1.62%	0.56	0.3691	accept	1.44%
	55-59	1.84%	0.60	0.0000	reject	6.70%	14.46%	1.57	0.0080	reject	11.08%	8.03%	1.22	0.0000	reject	1.39%	2.07%	0.64	0.0003	reject	0.74%
	60-64	3.10%	0.78	0.0003	reject	7.02%	12.59%	1.48	0.0001	reject	8.01%	3.28%	0.80	0.0000	reject	0.85%	1.28%	0.50	0.0026	reject	0.45%
	65-69	6.36%	1.09	0.1678	accept	7.50%	7.12%	1.15	0.2772	accept	7.83%	2.12%	0.64	0.0001	reject	0.70%	0.91%	0.42	0.0025	reject	0.26%
	70-74	7.00%	1.14	0.4575	accept	6.88%	6.45%	1.10	0.3829	accept	6.79%	1.47%	0.54	0.0013	reject	0.51%	1.11%	0.47	0.0000	reject	0.13%
Takikawa																					
Male	50-54	3.75%	1.13			0.00%	9.39%	1.73			0.00%	1.88%	0.80			0.00%	5.63%	1.37			0.00%
	55-59	3.56%	1.10			0.00%	13.07%	2.00			0.00%	1.19%	0.64			0.00%	6.54%	1.46			0.00%
	60-64	4.09%	1.17			0.00%	11.72%	1.91			0.00%	1.36%	0.69			0.00%	2.18%	0.87			0.00%
	65-69	4.92%	1.28			0.00%	9.11%	1.70			0.00%	1.23%	0.65			0.00%	3.45%	1.08			0.00%
	70-74	7.48%	1.56			0.00%	6.30%	1.44			0.00%	1.58%	0.74			0.00%	1.58%	0.74			0.00%
Female	50-54	3.25%	1.14			0.00%	6.51%	1.59			0.00%	8.13%	1.76			0.00%	3.25%	1.14			0.00%
	55-59	2.59%	1.02			0.00%	14.25%	2.25			0.00%	6.48%	1.59			0.00%	0.00%	0.00			0.00%
	60-64	4.55%	1.34			0.00%	11.91%	2.09			0.00%	2.45%	1.00			0.00%	0.35%	0.38			0.00%
	65-69	11.54%	2.06			0.00%	5.47%	1.46			0.00%	2.13%	0.93			0.00%	0.30%	0.35			0.00%
	70-74	9.87%	1.92			0.00%	5.97%	1.53			0.00%	0.69%	0.53			0.00%	0.00%	0.00			0.00%
Shirakawa																					
Male	50-54	6.04%	1.22			0.00%	5.58%	1.18			0.00%	5.11%	1.13			0.00%	5.11%	1.13			0.00%
	55-59	8.79%	1.45			0.00%	10.76%	1.59			0.00%	1.10%	0.53			0.00%	2.20%	0.75			0.00%
	60-64	9.24%	1.48			0.00%	3.93%	1.00			0.00%	0.98%	0.51			0.00%	0.39%	0.32			0.00%
	65-69	14.29%	1.79			0.00%	4.57%	1.07			0.00%	0.29%	0.27			0.00%	0.57%	0.39			0.00%
	70-74	16.69%	1.91			0.00%	3.63%	0.96			0.00%	0.48%	0.36			0.00%	0.00%	0.00			0.00%
Female	50-54	5.43%	1.26			0.00%	7.06%	1.43			0.00%	4.89%	1.20			0.00%	0.00%	0.00			0.00%
	55-59	5.22%	1.24			0.00%	9.45%	1.63			0.00%	3.26%	0.99			0.00%	0.33%	0.32			0.00%
	60-64	11.08%	1.75			0.00%	5.00%	1.21			0.00%	1.79%	0.74			0.00%	0.36%	0.33			0.00%
	65-69	15.24%	2.00			0.00%	4.23%	1.12			0.00%	1.41%	0.66			0.00%	0.00%	0.00			0.00%
	70-74	21.72%	2.29			0.00%	2.74%	0.91			0.00%	0.46%	0.38			0.00%	0.00%	0.00			0.00%
Adachi																					
Male	50-54	2.19%	0.74	0.0034	reject	5.22%	6.57%	1.25	0.0025	reject	11.01%	0.55%	0.37	0.1938	accept	0.98%	9.86%	1.50	0.0000	reject	4.60%
	55-59	3.43%	0.92	0.0011	reject	7.49%	10.61%	1.55	0.1998	accept	9.37%	1.56%	0.63	0.0070	reject	0.60%	8.11%	1.38	0.0000	reject	2.90%
	60-64	5.13%	1.11	0.0152	reject	8.11%	10.26%	1.53	0.0653	accept	8.17%	1.89%	0.69	0.0000	reject	0.42%	4.59%	1.06	0.0003	reject	2.09%
	65-69	8.50%	1.41	0.1492	accept	7.15%	7.92%	1.36	0.1938	accept	6.82%	0.77%	0.44	0.0494	reject	0.31%	2.12%	0.73	0.3618	accept	1.88%
	70-74	8.68%	1.42	0.0000	reject	4.24%	4.89%	1.09	0.2529	accept	4.22%	0.47%	0.35	0.4753	accept	0.50%	1.89%	0.69	0.0834	accept	1.15%
Female	50-54	1.34%	0.57	0.0004	reject	4.95%	7.58%	1.31	0.0009	reject	12.71%	6.69%	1.24	0.0000	reject	2.50%	1.34%	0.57	0.2474	accept	1.00%
	55-59	3.32%	0.89	0.0002	reject	8.01%	9.14%	1.42	0.0830	accept	11.31%	7.75%	1.32	0.0000	reject	1.34%	2.21%	0.73	0.0000	reject	0.53%
	60-64	7.75%	1.32	0.1879	accept	9.00%	12.29%	1.62	0.0317	reject	9.59%	1.87%	0.67	0.0175	reject	0.89%	0.53%	0.36	0.2642	accept	0.35%
	65-69	9.21%	1.43	0.1711	accept	7.94%	8.25%	1.36	0.3502	accept	7.75%	2.69%	0.80	0.0000	reject	0.57%	0.58%	0.37	0.0800	accept	0.24%
	70-74	8.41%	1.37	0.0107	reject	5.76%	6.66%	1.23	0.0955	accept	5.22%	1.58%	0.62	0.0009	reject	0.50%	0.00%	0.00	0.2156	accept	0.15%

health—is slightly different (the surveys were not interviewed but mailed), most of the major items we wish to examine are very similar. Using micro-level data from these surveys, we plan to investigate if there is a reasonable weighting scheme reflecting the age and gender and other variables with which the JSTAR data can be used to reproduce the official statistics results at the national level.

Lastly, we should mention the "oldest-old" in SHARE who are defined as those aged 80 and over. Since the age range in JSTAR is between 50 and 75, the oldest-old is currently out of scope of JSTAR. However, we will pursue tracking the same individuals who were surveyed in the first wave. This means that we will have a chance to explore those oldest-old people's lives in the future. We realize that this is particularly important for Japanese people who are enjoying the longest life expectancy in the world.

1.5.7 Conclusions

• JSTAR collects comprehensive information on living circumstances of people aged between 50 and 75 living in five municipalities. Our sampling design is to select several municipalities with diversity and to choose randomly the individuals in the corresponding age group, a selection process that has merits in homogenous policy circumstances, response rate, and links to official records on medical and long-term case use.

• JSTAR enjoys a response rate of 60%, which is much higher in terms of the recent Japanese standard and is comparable with "family" surveys like SHARE. The Census comparison shows that JSTAR succeeded in representing the population of each municipality for the marital status in the given ages and many of the work statuses for males in the given ages. But JSTAR does not represent the population of each municipality in terms of educational attainment nor does it sufficiently represent the work status of females.

• We plan to rearrange the individuals in the JSTAR sample to make a national representative sample using several key variables in the future.

1.6 The Main Messages of JSTAR

This subsection highlights the main messages of the first wave of JSTAR below. The findings are descriptive and substantially diverse. Readers will realize that most of them transcend borders of each academic discipline. While some facts were known to specialists in each academic field, we aim to put them in a broader context. We wish to emphasize that even the baseline data, which is cross-sectional, uncovers a large volume of insights and new scientific discoveries. At the same time, we note the limitation and restriction of those results. One limitation comes from the cross-sectional characteristics of the first wave, which does not allow us to examine the direction of causality. Another limitation is that most of those findings are preliminary in that most of them are based on simple summary statistics and do not control for a variety of factors.

However, those limitations are easily to be overcome. The second wave is planned to be performed in 2008-2009 for the respondents who were interviewed in the first wave, which enables us to construct a longitudinal data. Moreover, in-depth analyses are possible before constructing the second wave. After the data is cleaned, micro-level data from JSTAR will be available for researchers all over the world. More researchers examine the data, more fruitful and excellent outputs are to come. By doing so, we strongly hope that JSTAR will contribute to discovery of new scientific knowledge and to more effective policymaking to enhance the well-being of people on the earth.

As emphasized in the introduction of this chapter, we mainly focus on comparison between JSTAR and SHARE and this is also the case for what are presented below.

The most important message of the first wave of JSTAR is the similarity and diversity of life circumstances for middle-aged and older people across both individuals and municipalities within Japan. Of particular interest is the substantial variation in many life aspects of middle-aged and elderly across individuals in terms of health, family and socioeconomic status, which echoes the SHARE book finding. Furthermore, JSTAR's unique features are derived from its sampling strategy: it took the municipality as a cluster of sampling, instead of adopting nationwide probabilistic sampling. The municipality is a regional, cultural, historical, and political unit of people's life that is shared by regional residents. By comparing across and within municipalities with adjustment for individual characteristics, JSTAR could provide a unique opportunity to see what is shared in common and what is diverse in the lives of middle-aged and elderly people in this country, making an unusually large potential to extract new scientific findings and policy implications for population aging.

JSTAR provides some innovative insights on health in this country (Chapter 2). Japan's unique characteristics of health and health care issues, especially the ambiguous combination of the longest average life expectancy and very low GDP ratio of medical expenditure, will have considerable potential to formulate important lessons for health policy in future comparative analysis with data from SHARE countries. But the first report of JSTAR specifically focuses on the health disparity within this country. As in European countries, in Japan the prevalence of physical health problems among the elderly is high, but there is substantial variation among the subjects. Moreover, within Japan, where universal health care insurance covers all residents, there are substantial variations in physical health (subjective health status, prevalence of

specific diseases) and functioning (ADL, IADL) depending on socioeconomic status. As mentioned earlier, since there is an endogenous relation between health and socioeconomic status, we have to wait for future panel data for causal inference. However, it could be safely said that the health disparities seem not to be remedied by a universal health care program alone, and more fundamental social policies should be tailored towards disadvantaged groups.

There is also a disparity in risky health behaviors (smoking, drinking, physical inactivity, and overweight) across gender, age, and municipality within Japan, and like Europe, socioeconomic disparities are also observed. However, the pattern is varied across the types of behavior: smoking was related to lower education and household income, while heavy drinking was reversely related to education and income. Physical inactivity was related to lower education among males, while obesity was related to lower education among females. Socioeconomic gradient was also observed in mental health and cognitive functions. Prevalence of depression depends on gender, marital status, socioeconomic conditions, and physical functions. Although age is the strongest and most consistent predictor of cognitive impairment, which would support the patho-physiological basis of the impairment, education was another significant predictor of cognitive impairment. Socioeconomic disparity was observed even in health check-up and nutrition intake. Japan has started a unique national health check-up program that offers all citizens an annual health check-up since 2008, but there is considerable variation across demographic, socioeconomic, and insurance conditions in the probability of having a health check-up in the past year. Older age, lower education, lower household income, and being not the employed household head were related to higher odds of missing a check-up in the past year, suggesting that better information provision and health education targeted to the socioeconomically deprived, aged, and women in the community would be keys to the effectiveness of the program. JSTAR included a detailed food frequency questionnaire to reveal nutritional intake among the middle-aged and elderly. As revealed, dietary patterns, e.g. intake of vegetables and fruits, are strongly associated with demographic, socioeconomic, and regional environmental conditions.

Turning to health service utilization, even under the Japanese non-selective public health program, we see variations in out-of pocket payment across educational attainment, household income, age, and municipality. Lower education was associated with lower probability to meet out-of-pocket, mainly due to less access to dental and surgical services. The poorest group faced the largest share of out-of-pocket to their equivalent household income, suggesting that the Japanese public health care system is regressive. Japanese elderly, once they made contact with physicians, are more likely to make regular visits each month, which was more often seen among those with lower educational attainment. Contrary to the SHARE results, these associations between education and health service utilization remained significant even after controlling for health conditions. Thus, lower health literacy and consequent lack of skills for self-care among those with lower education may be the culprit for overuse of outpatient service and less use of dental care in Japan.

Construction of longitudinal data after the second wave makes it possible to explore determinants of physical health problems among the elderly, especially to disentangle causal relationship between health and socioeconomic status, and to evaluate

effectiveness of health policy. Further research should examine the relationship between risky health behavior and health outcomes to contribute to more effective health policymaking by targeting specific groups, the segment of population who needs a close attention and intensive health education in new health promotion programs.

Along with health, work, and socioeconomic status, family relationship is an important factor to determine well-being of the middle-aged and older. Even for contemporary elderly Japanese in an urbanized setting, the family has remained a strong provider of institutional and everyday-life integration. The historical decline of marriage has not yet become apparent in the first survey of JSTAR. The marriage bond is fairly strong especially for males, and maintained even into the 70s. The multigenerational structure of the family remains prevalent, but with a large variety across municipalities. The proportion of co-residence of elderly with their adult children is seen as prevalent as in the case in Mediterranean countries. However, the different patterns across municipalities rather suggest that the likelihood of living accommodations and geographical proximity, and subsequent contact frequency are likely to be affected by regional difference in opportunity structures of employment and housing markets, rather than by the strength of traditional family norms.

In contrast to the prototypical view of conventional norms and the seniority culture in Japan, the strength of family ties seems at most to be the same as that of the family in the Continental countries, and cross-regional differences also suggest that Japan is somewhat in transition from a strong family tradition to an individual-centered weak-family culture. Physical limitation is more prevalent for older people and may be an important determinant of housing and living arrangements. But the prevalence of physical limitation and home ownership do not change much across age groups. Another important factor is the number of children. The proportion of the respondents without any children occupies less than 10% in all municipalities. The most dominant number of children is two in all municipalities except Shirakawa where the number is three and the number of natural children is negatively correlated with education.

Non-monetary support exchange takes a variety of forms such as giving personal care, helping instrumental daily activities, or simple contact to share socioemotional support. The pattern of provision of care to fragile parents showed striking differences across age, gender and region, suggesting that the traditional family system and norms that value a lineal relationship are still influential and put the burden of elderly care unevenly on females. In contrast, females are more likely to receive help than males, and are more likely to report ADL limitations, but less likely to receive help for ADL. That females tend to over-report their physical limitation, or females have less access to help for ADL is an interesting topic deserving further investigation on exchange and support within and between households for international social policy discussion.

Monetary transfers across generations that may help the policy and research on risk sharing among/across families. Those in their 50s are most likely to receive monetary transfer from outside of the household, and at the same time most likely to give transfer to outside the household. Thus, those in their 50s are exposed to most financial burden of monetary transfer. Those in rural areas are more likely to receive monetary transfer, and those in rural areas are more likely to give transfer, suggesting that more traditional living accommodation/family structure may shape the pattern of monetary transfer across families. Inheritance transfer is more likely to be reported among males

and those in rural areas with a stronger family tradition. Among those with living parents, the expected inheritance in future may explain wealth formation stratified by socioeconomic status.

In addition to health and family status, job environment and quality of work are strong predictors of a worker's health. Quality of employment in terms of (im)balance between perceived effort and reward was observed as was seen in Northern European countries with "high quality of work." Quality of employment in terms of task control, however, was as poor as that of medium-fair level countries. Quality of employment is strongly associated with socioeconomic status (education) and with self-reported well-being; lower quality of employment goes along with higher prevalence of poor self-rated health and depression.

The Japanese elderly hold a unique position in retirement behavior. They retire later than those in most OECD countries and maintain a high labor force participation rate. We see a large variation in self-reported employment status across municipalities under the same pension program. Other factors might be more responsible for the different retirement behavior. Even among "healthy" persons, we see a large variation in labor force participation. Moreover, public pension programs play a large role in Japan. While the first pillar is mandatory for all residents in Japan, the second pillar is occupation-related and varies across individuals. The replacement ratio for men varies at around 30% to 50%. For women it varies between 10% and 100% uniformly. The participation rate for the third pillar comprising purely private pension is generally much higher at 20% to over 40% for men and women

Examining the variety of transition paths to retirement is especially important in Japan but there is little research on the intermediate period between work and retirement. The patterns in the share of the self-assessed unemployed or the disabled have different shapes between Japan and European countries. This is also the case for people who are "partially retired." Possible factors including institutional arrangements or health status should be examined to account for the difference. In contrast, the disability pension enrollment is very low in Japan at a range of 1-2%, which is lower than the minimum in European countries. There is a very small variation in the enrollment ratio across age, health status, or municipality.

JSTAR reveals non-work activities for the elderly. Activities of those aged 55 to 75 show a remarkably stable relationship among four out of five municipalities. About 20% engage in hobbies, 15% in community activities, 10% in volunteering, 10% in sports, 5%-9% in learning, less than 5% in religious activities, providing help to others, and also politics. The average share of participation in volunteer work in Japan is close to 10%, which is comparable with the middle group in Europe and the volunteer participation rate in Japan is not correlated with age or health status. Market work in Japan is much higher and activities to provide help to others are much lower than in SHARE countries.

Further detailed analysis using longitudinal data is necessary to explore the determinants on late retirement, the dynamic transition process among a variety of transition paths, as well as engagement in unpaid work and what they receive from those activities, and how participation in volunteering activities improves quality of life for the elderly and how policies toward those activities are designed.

Finally, some evidence is obtained on socioeconomic status, which is associated with health and family status. When focusing on net annual household income, we observe systematic difference in the equivalent household income across age, education, household type, as well as municipality. The household income data should be elaborated through imputation and correction of each income item, evaluation in real terms using price difference across municipalities and computation of a point value for the income range based on the unfolding brackets. Imputations are particularly important for some large items like pension income and imputed rents to measure the well-being of middle-aged and older people.

Wealth is a main source for compensating consumption after retirement. There are some differences in the systematic pattern between household income and wealth. The amount of net financial assets (the sum of deposits, bonds and stock minus non-mortgage liabilities) is larger for those aged in their 60s or 70s while household income declined for a household in the 70s. Household income is smaller for the non-married living with a parent/parents and/or a child/children but this is not the case for net financial assets. Household income is significantly smaller in Takikawa while net financial assets are significantly larger in Kanazawa. Both household income and net financial assets are larger for university or more graduates.

The ownership rate for real assets (land and houses) is about 30% with a large variation across municipalities and household demographics. After controlling for a variety of factors, the amount of net total assets (the sum of net financial assets and net real assets) is significantly larger for a household in the 70s, or in Kanazawa, or university or more graduates. We need to elaborate data on each item further to compute household net worth more precisely and examine the relationship between portfolio and fundamental parameters including risk aversion, time patience, and life expectancy.

Turning to consumption measures, which directly stand for well-being, systematic differences across household demographics and municipality are also observed. The equivalent food spending (foods and eating out) is larger in Adachi and smaller in Takikawa and Shirakawa. Food expenditure also differs across management of household expenses, some specific household types, municipalities, as well as educational attainment. While the equivalent monthly total expenditure is smaller in Takikawa and Shirakawa, again, systematic difference across household characteristics including management of household expenses, some specific household types, and educational attainment is found.

In terms of inequality measured by a Gini coefficient, wealth inequality is larger than income inequality and income inequality is larger than consumption inequality. The degree of inequality is comparable with that in Central European countries in terms of income and consumption and with that in Northern European countries in terms of wealth, though there are some variations in inequality across municipalities. Lastly, the male's educational level is higher than that of females and there is a large disparity in educational attainment across municipalities. This pattern is also observed in children's educational level. The strong correlation in educational attainment between husband and wife and between parents and children are confirmed. Further research should examine the determinants of inequality of income, consumption and wealth, which hold important policy implications for distribution policy. In particular, the effect of educational linkage across generations on family relationships and intergenerational transfer should be investigated.

1.7 Where Do We Go from Here?

We believe that some preliminary analysis using the baseline JSTAR data have succeeded in producing innovative results. The success was made possible by the comprehensive data on all domains of daily lives, especially economic, health and social/family networks, for the middle-aged and older people. The high response rate of 60%, which is unusual in recent studies in Japan, and our sampling design focusing on selected municipal residents strengthened our findings. We again emphasize that those results in this book are very preliminary and in-depth analyses are needed for more robust results which will be performed by many researchers inside and outside Japan. JSTAR provides social infrastructure for researchers on the well-being of the middle-aged and older people in many academic fields all over the world.

The most important next step for us is surely to re-interview the respondents in the first wave and to construct a longitudinal dataset for middle-aged and older Japanese people. This is critical for detecting causal relationships among health, economics, and social domains; without this, the impact of JSTAR would be less than expected. All the "family" surveys have the longitudinal characteristics and observe individuals as they age over time. Aging is a process and we must observe a sequence of events controlling for individual innate characteristics, which is indispensable for econometric analyses. In particular, we emphasize that constructing panel data is also critical for policy evaluation. Recently, Japanese government implemented several major reforms on pension, medical and long-term care insurance programs. The eligible age for public pension and mandatory retirement age is in transition from age 60 to 65. Considering those institutional changes as natural experiments, we are able to identify effects of reforms on individual behavior, so that we extract clean policy implications. It is often that policy effect is not necessarily what policy makers presumed and brings some side effects, which sometimes are detrimental to institutions or people. In Japan, quantitative evaluation of change in public policies has been largely ignored and many policy changes have been implemented without empirical evidence, which might have caused large inefficiency. In other words, we need a longitudinal data to explore how public policies are effective in order that we learn a great deal from those reforms which are instructive for Japan and other countries.

At the same time, we need to strengthen our relationship with "family members" of the international consortium. As stated, we learned a lot from preceding surveys, especially HRS and SHARE, and we are very grateful for those teams. Surely, we will continue to keep close communications and cooperation with those surveys. At the same time, we should emphasize that JSTAR is not purely an import product from abroad. We strive to stimulate creative research using JSTAR which is beneficial for the world. As we emphasized in this chapter, Japan is a treasure chest for many aged related topics: the world's highest longevity, the latest retirement age, as well as a lower share of medical expenditure relative to economic size. These casual observations should be explored by firm empirical analyses. Not only Japanese but also any researchers around the world have great potential to learn lessons for scientific research and policymaking. In this sense, we plan to participate in a harmonization project of these family surveys so that any interested researchers can easily make use of JSTAR data.

We hope that this book will be the first opportunity for world researchers to understand the significance and importance of JSTAR and stimulate intellectual interest in the Japanese experience from an international perspective. If our intention succeeds, our effort and input in JSTAR will be well-compensated.

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