Advancing universal health coverage through knowledge translation for healthy ageing

Lessons learnt from the Japan Gerontological Evaluation Study

Edited by Katsunori Kondo and Megumi Rosenberg

National Center for Geriatrics and Gerontology

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Centre for Health Development

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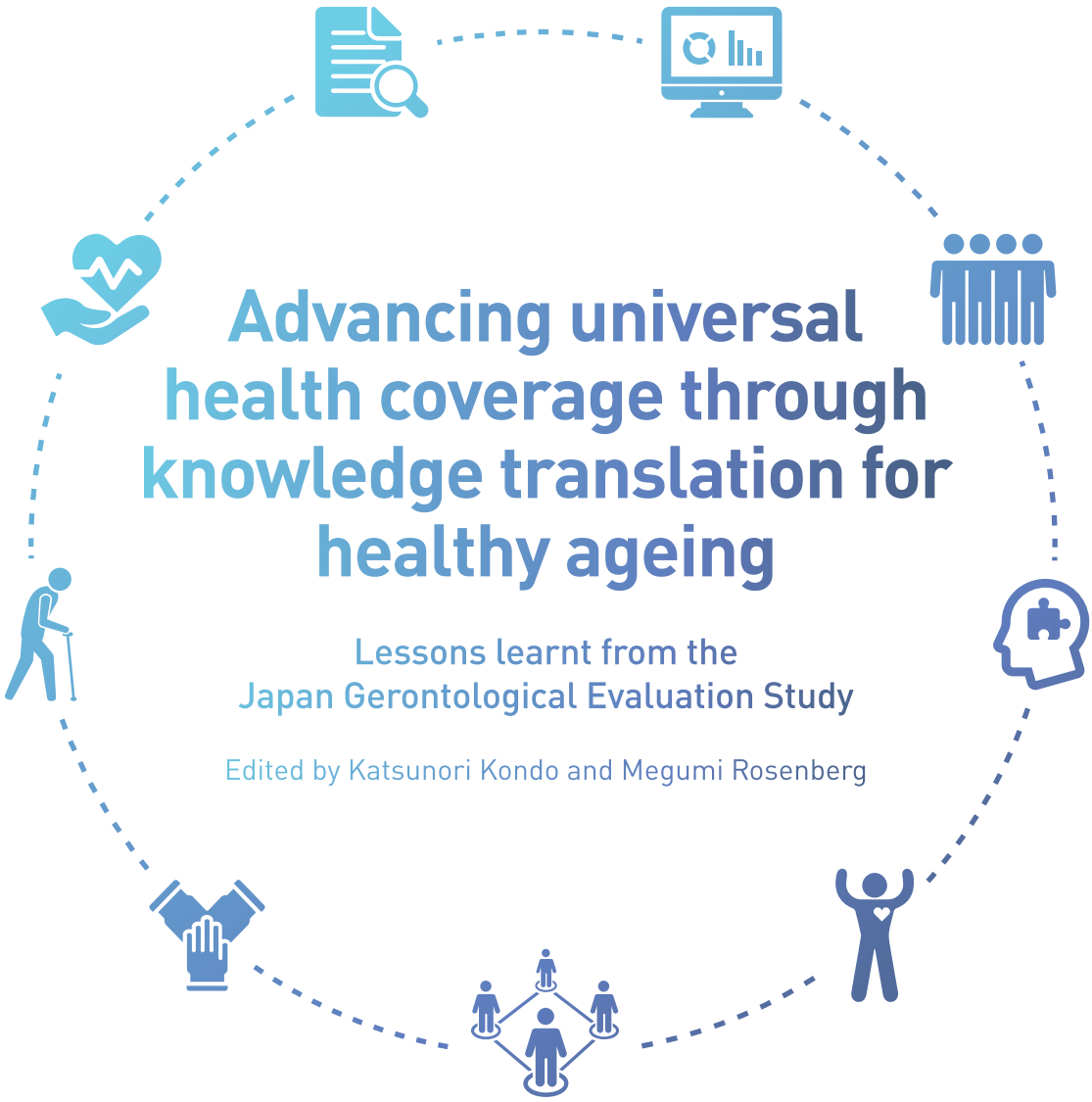

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Foreword

Japan's steadily increasing longevity has long been a global reference point for the highest attainable standard of health. Japan has the highest proportion of older people in the world, including nearly 68 000 centenarians. Countries around the world are keen to learn Japan's approach to ensuring access to affordable, quality health services and extending life expectancy. This knowledge has direct implications for these countries' ability to achieve the Sustainable Development Goals (SDGs), specifically Target 3, to ensure healthy lives and promote well-being for all ages through universal health coverage (UHC).

This monograph not only demonstrates one of the ways that Japan has managed to apply evidence-based policy to extend healthy life expectancy, but also shows that even one of longevity's success stories still has work to do. Specifically, it describes a major initiative where researchers generate scientific evidence of the determinants of health, well-being and equity in older age, which they then interpret and apply towards co-designing interventions and evaluating these interventions with community stakeholders. This collaborative process of knowledge generation and translation is one of the keys to developing policies, systems and programmes that are relevant, effective, acceptable and sustainable for ensuring UHC and healthy lives for all.

The Japan Gerontological Evaluation Study (JAGES) provides an illustrative example for other countries that are seeking to build national capacity for research, evidence-informed planning and intervention design for healthy ageing. This case study describes the evolution of this cutting-edge research initiative, which involves both basic epidemiological research and implementation research. Its findings underscore the importance of prevention and health promotion for healthy ageing, as well as effective strategies for communication and collaboration between researchers and public officials to facilitate knowledge translation. Elements of the various strategies employed by the JAGES team are adaptable to different health issues as well as to diverse resource environments including low- and middle-income contexts.

This document is a resource for the global community as it seeks new insights and innovative approaches that can catapult countries towards UHC and the SDGs.

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Foreword

The Japan Gerontological Evaluation Study (JAGES) is a longitudinal cohort study about ageing established in 2010, following its antecedent, the Aichi Gerontological Evaluation Study (AGES), which started in 1999. Its aim is to build a scientific backbone illustrating the role of preventive medicine in a healthy ageing society. Since 2017, we have been collaborating with more than 40 municipalities all over Japan to investigate the living conditions of approximately 300 000 adults aged 65 and above. More than 30 researchers from colleges, universities and national institutions in Japan are currently conducting a wide variety of studies using our data.

JAGES has been collaborating with the WHO Kobe Centre (WKC) since 2011 to improve metrics for evidence-based policy-making on ageing and health in Japan. The Ministry of Health, Labour and Welfare, Japan, funded us to develop a benchmark system to evaluate the long-term care insurance policy. As part of this project, WKC provided technical support to develop a tool with which policy-makers can assess and take actions against health inequalities, especially among older people, and which can be harmonized with the WHO Urban Health Equity Assessment and Response Tool (Urban HEART).

Most epidemiological research, in general, collects a large amount of data and presents scientific evidence. It is less likely, however, that those findings have been applied to policies and practices. One of the most outstanding achievements of JAGES is that we have been successful at translating research findings into action, especially policy reform. This monograph, which is the result of another collaboration with the WKC, features good practices from JAGES in knowledge translation for healthy ageing so that other countries, especially those in the Asia Pacific region that face population ageing in the near future, can strengthen their own practices in data collection and knowledge translation towards healthy ageing and sustainable universal health coverage.

We hope that we can make a great contribution to the rest of the world in addressing the health challenges of population ageing through our knowledge and good practices accumulated over two decades of research in Japan.

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List of abbreviations

ADL	activities of daily living
AGES	Aichi Gerontological Evaluation Study
AMED	Japan Agency for Medical Research and Development
CCP	Community Care Project
FTE	full-time equivalent
GIS	geographical information system
JAGES	Japan Gerontological Evaluation Study
JAGES-HEART	JAGES-Health Equity Assessment and Response Tool
KT	knowledge translation
LMICs	low- and middle-income countries
MEXT	Ministry of Education, Culture, Sports, Science and Technology
MHLW	Ministry of Health, Labour and Welfare
NCDs	noncommunicable diseases
NCGG	National Center for Geriatrics and Gerontology
NIH	National Institutes of Health [USA]
NPO	non-profit organizations
PDCA	'plan–do–check–act'
PTSD	post-traumatic stress disorder
RPCCC	Research Promotion Center for Community Care
SDGs	Sustainable Development Goals
SES	socioeconomic status
UHC	universal health coverage
Urban HEART	Urban Health Equity Assessment and Response Tool
WHO	World Health Organization
WKC	WHO Kobe Centre

Executive summary

Effective strategies to promote knowledge translation about healthy ageing

Population ageing is a global demographic trend that has significantly impacted high-income countries and is now increasingly affecting low- and middle-income countries *(1,2)*. Without well-informed planning and responsive actions, it will strain existing resources and undermine countries' efforts to achieve universal health coverage (UHC).

Knowledge translation (KT) involves interpreting research evidence and applying it to practice. It is fundamental to ensuring that health system responses to population ageing are evidence-based and appropriate to the specific context. The framework for KT on ageing and health *(3)* stipulates that a key enabling factor is a 'context and climate' that recognizes ageing and health as a priority issue and that it is receptive to the use of evidence in policy-making. Important prerequisites for KT are linkage and exchange efforts to build positive relationships between researchers and knowledge users, and knowledge creation that is timely and relevant. The actual process of translating knowledge into practice must involve 'push' efforts to disseminate information to various stakeholders, facilitating 'pull' efforts to enable policy-makers to identify relevant research, and 'pull' efforts by knowledge users to ensure the proper use of evidence for decision-making. Finally, monitoring and evaluating these efforts are needed to improve the process and impact of KT.

The Japan Gerontological Evaluation Study (JAGES) offers a model of KT for healthy ageing in Japan, a high-income country at an advanced stage of health development and population ageing. JAGES collects longitudinal, social epidemiological data on representative samples of community-dwelling, independent older people aged 65 years and older through a self-administered mail survey *(4)*. Data have been collected every three to four years since 1999. The latest survey conducted in 2016–17 yielded responses from about 200 000 older people from 41 municipalities across the country. The data enable researchers to generate high-quality evidence on the determinants of healthy ageing and health inequalities. The research has highlighted the importance of addressing the social determinants of health through a population-based approach in order to address health inequalities and the risk of becoming dependent on long-term care among older populations. This evidence has contributed to the reform of national policies on the provision of long-term care. The researchers also conduct implementation research, which is the scientific inquiry into questions concerning the implementation of policies and practices *(5)*, working closely with municipal officials to use the data and research evidence for priority-setting processes and for developing and evaluating programmes.

There are seven main facilitating factors that underlie JAGES' KT. These are: (a) win–win relationships that are established among the various stakeholders, in which everyone has something to gain; (b) multisectoral collaborations that enrich both research and practice; (c) the production of quality evidence based on large-scale survey data that can be linked to relevant administrative data; (d) a community-based participatory research approach to co-produce locally relevant knowledge and solutions with stakeholders; (e) the creation of data visualization and management tools to facilitate the uptake of evidence by stakeholders; (f) advocacy achieved through diverse media channels to reach different stakeholder groups; and (g) strategic financing to obtain the resources necessary to sustain this initiative. These key factors are also likely to be important in other countries because of their direct relevance to the framework for KT on ageing and health.

Some of the methods and approaches used by JAGES to conduct research or to translate the findings into practical solutions are conditional on the context in Japan. At the same time, there are generalizable aspects as well as ways to adapt them to other settings. Some general recommendations about promoting KT on ageing and health in other countries are the following:

Create a climate and context that is favourable towards KT on ageing and health: Take advantage of the global momentum towards improving the lives of older people. A policy climate and context that is favourable towards research on ageing and health and evidence-based policy-making is a key enabler of KT. A global momentum towards improving the lives of older people has been created by recent global commitments to achieve healthy ageing and UHC in light of global population ageing and the increasing importance of noncommunicable diseases *(6)*. This momentum provides an opportunity to raise the issue of population ageing in relation to UHC on the policy agenda in all countries.

Build relationships between knowledge producers and users: Start small, identify mutual interests and be persistent. Building productive relationships between knowledge producers and users is another key enabler of KT. Identifying stakeholder needs before the research starts can help build win–win relationships. Where resources are limited, this relationship-building can start on a small scale and be gradually extended over time through the demonstration of successful research applications. Funders can also facilitate collaborations between knowledge producers and users by making them a condition of their funding *(7)*.

Produce quality, longitudinal data: Adapt survey methods to the local context but keep them consistent within the country and across time. The quality of data is essential for the data to have value for science as well as policy-making. Survey methods should be adapted to the constraints and opportunities in the local context, but should also be kept the same across time and place (especially within a country) in order to ensure consistency and comparability of the data. As much as possible, longitudinal data should be developed over time to enable the

analysis of trends and causal relationships. Allowing open access to the data can help improve the quality through the scrutiny of others and maximize the data's potential for producing useful evidence. If resources are very limited, alternatives to primary data collection may need to be considered.

Produce actionable knowledge: Aim the research towards identifying modifiable problems and potential intervention points. In order to have added value for knowledge users, the research should point to modifiable problems and risk factors, such as socially-determined health inequalities, and illuminate potential entry points for intervention that can be acted upon. Community-based participatory research, with its emphasis on the full and equal participation of community members, is an effective method to facilitate local innovations for problem-solving through the application of research *(8)*.

Get the knowledge into the hands of users: Use data visualization tools and disseminate research strategically. Some creativity is required in communicating research outputs to various audiences in order for the information to be well understood and used. Data visualization and programme management tools that display quantitative information in a meaningful way can be very effective *(9)*. Using a strategic approach to proactively disseminate research outcomes to different audiences in the appropriate format can also enhance the process and impact of KT.

Have a long-term vision and commitment to strengthen research and KT on ageing and health. Investing early in these areas will have the pay-off of having a well-developed system for research and KT that can inform policies on health and UHC well in advance of, or at least in time to address, the challenges of population ageing.

Implementing KT cannot be done with a short-term focus. Continuous and ongoing financial investment has sustained KT as an integral part of JAGES. Long-term investment in creating quality health information systems, building local research capacity, sensitizing policy-makers to the use of research evidence, advocating the adaptation of health systems to population ageing, and nurturing relationships between researchers, policy-makers and community members, will be critical to addressing healthy ageing and achieving UHC worldwide.

References

1. World report on ageing and health. Geneva: World Health Organization; 2015 (http://apps.who.int/iris/bitstream/handle/10665/186463/9789240694811_eng.pdf?sequence=1, accessed 17 April 2018).

2. World population ageing 2017. New York: United Nations, Department of Economic and Social Affairs, Population Division; 2017 (http://www.un.org/en/development/desa/population/publications/pdf/ageing/WPA2017_Highlights.pdf, accessed 17 April 2018).

3. Ellen ME, Panisset U, Araujo de Carvalho I, Goodwin J, Beard J. A knowledge translation framework on ageing and health. Health Policy. 2017; 121(3):282–91. doi:10.1016/j.healthpol.2016.12.009.

4. Kondo K. Progress in aging epidemiology in Japan: the JAGES project. J Epidemiol. 2016; 26(7):331–6. doi:10.2188/jea.JE20160093.

5. Implementation research in health: a practical guide. Geneva: World Health Organization, Alliance for Health Policy and Systems Research; 2013 (http://www.who.int/alliance-hpsr/alliancehpsr_irpguide.pdf, accessed 26 August 2018).

6. Multisectoral action for a lifecourse approach to healthy ageing: draft global strategy and plan of action on ageing and health. Sixty-ninth World Health Assembly (Provisional agenda item 13.4). Geneva: World Health Organization; 2016 (http://apps.who.int/gb/ebwha/pdf_files/WHA69/A69_17-en.pdf, accessed 14 April 2018).

7. Lyall C, Bruce A, Marsden W, Meagher L. The role of funding agencies in creating interdisciplinary knowledge. Science and Public Policy. 2013; 40:62–71. doi:10.1093/scipol/scs121.

8. Wallerstein N, Duran B. Community-based participatory research contributions to intervention research: the intersection of science and practice to improve health equity. Am J Public Health. 2010; 100:S40–6. doi:10.2105/AJPH.2009.184036.

9. Shneiderman B, Plaisant C, Hesse BW. Improving healthcare with interactive visualization. Computer. 2013; 46(5):58–66.

Introduction

This monograph aims to support Member States in generating evidence on ageing and health and translating it into improvements in policy and health systems, in order to progress toward the achievement of universal health coverage (UHC). It presents a case study from Japan of a research and knowledge translation (KT) initiative that has been helping national and local governments deal with the health and social challenges brought on by population ageing. Specifically, it describes how the Japan Gerontological Evaluation Study (JAGES) initiative has identified pathways to healthy ageing through scientific evidence and established strategic partnerships with government agencies to facilitate the translation of that knowledge into better policies and programmes.

UHC is essential for ensuring that all people and communities can receive a full range of the quality health services they need, from health promotion to prevention, treatment, rehabilitation and palliative care, without suffering financial hardship *(1).* It is central to the Sustainable Development Goals (SDGs), as it is not only a target of the goal for health (SDG 3), but also the platform through which interventions to achieve all of the health-related targets can be delivered *(2).* It is the primary means by which the health system ensures that no one will be left behind from the benefits of the health system and sustainable development.

However, the road to achievement of UHC remains complicated. Among the many challenges to countries' efforts to achieve UHC is a global demographic transition that will require all countries to progressively adapt their systems to the needs of ageing populations *(3,4).* In Japan, the focus of the health system response to population ageing began with medical care, then shifted to rehabilitation and palliative care, and finally to long-term care. However, concerns grew that this reactive, medicalized approach to ageing-related health problems would lead to increasing costs without extending healthy life expectancy. Consequently, attention has now been redirected to a more proactive approach of reducing the need for medical and long-term care through health promotion, prevention of disease and healthy ageing. While countries may take different pathways to UHC, the future sustainability of health systems hinges on empowering people to live long and healthy lives, and on adapting service delivery and financing mechanisms in a way that shapes UHC to be suitable for an ageing or aged population.

In order for governments to advance their health systems toward UHC in a changing environment, they must be capable of acquiring relevant information and making appropriate adjustments. In this respect, it is vital for countries to establish the institutional mechanisms for implementation research and KT in order to make continuous progress toward UHC. Implementation research is defined as "the scientific inquiry into questions concerning implementation of

policies and practices" *(5)* while KT is defined as "the synthesis, exchange, and application of knowledge by relevant stakeholders to accelerate the benefits of global and local innovation in strengthening health systems and improving people's health" *(6).* KT encompasses initiatives and activities aimed at increasing the use of research evidence in management, decision- and policy-making, which have been referred to in many different ways such as knowledge or research transfer, research utilization or evidence-based decision-making.

KT, however, is still a relatively new concept. The relevant literature is scattered and difficult to navigate, particularly in relation to ageing and health. In 2012, WHO consolidated the research in this field and developed a *Knowledge Translation Framework on Ageing and Health (7,8)*, but the application of this framework has so far been relatively limited. This monograph will be the first systematic analysis of KT on ageing and health from Japan, based on a case study of the JAGES initiative. It will also offer practical guidance on how countries can strengthen KT to ensure healthy ageing, and advance policy and system development to manage the impacts of population ageing.

The primary audience for this monograph is technical staff in the health and social sectors of government. They will learn about evidence-based determinants of healthy ageing and health equity in older age, and possible interventions to modify and/or influence them. They will find practical examples of implementation research and how it has informed health and social service planning and programme development in Japan. They will also find effective ways of working with researchers to benefit more from research and the expertise of academics.

A secondary target audience is higher-level decision-makers in Member State governments. They will learn how governments in Japan have incorporated research evidence from JAGES into their policy-making processes, and the kinds of policy responses they have actually developed based on these inputs. They will also gain insights into how to facilitate KT on ageing and health in their own countries. Given the applicability of the KT mechanisms presented in this report to other areas of public health, knowledge of these can be important even in countries for which population ageing is not yet a priority concern.

Thirdly, researchers will find the evidence and strategies presented in this monograph useful for developing their own research topics and methods, including potentially analysing JAGES data or collaborating with JAGES researchers. They will also find examples of data visualization tools and effective ways to engage with government officials and the mass media to enhance the policy influence of their research outputs.

This monograph is structured into three chapters. Chapter 1 provides an overview of JAGES research and its survey, which forms the foundation of the broader JAGES initiative *(9).* It describes the study methods, including the critical collaboration with municipal governments, the main research findings on health inequalities

among older people in Japan and the key individual- and community- or societal-level determinants of healthy ageing. It also explains how the research findings have informed the reorientation of national policies towards the reduction of health inequalities and population-based prevention of the risk for needing long-term care, including through interventions in the social environment.

Chapter 2 explains the driving factors behind JAGES' KT, including the development of a high-quality epidemiological survey that is responsive to municipal governments' needs, the win–win relationships established with multiple stakeholders, and the creation of a range of tools to facilitate the application of evidence to local practices. This chapter includes case examples from three municipalities – one rural town, one mid-sized city and one large city – to illustrate how KT worked in practice in very different contexts within the country.

Chapter 3 considers the generalizability of the key factors of JAGES' KT presented in Chapter 2 to other countries through the lens of the *Knowledge Translation Framework on Ageing and Health (7,8)*. It also provides an in-depth discussion of the applicability and adaptability of specific methods and approaches used by JAGES. Finally, it offers general conclusions and recommendations for promoting KT on ageing and health in other countries towards the advancement of healthy ageing and UHC in the broader context of the Sustainable Development Agenda.

The Annexes contain additional details about the health system and policy context in Japan and the evolution of the JAGES initiative.

References

1. Tracking universal health coverage: 2017 global monitoring report. Geneva: World Health Organization and International Bank for Reconstruction and Development/The World Bank; 2017 (http://www.who.int/healthinfo/universal_health_coverage/report/2017/en/, accessed 17 April 2018).

2. Kieny MP, Bekedam H, Dovlo D, Fitzgerald J, Habicht J, Harrison G et al. Strengthening health systems for universal health coverage and sustainable development. Bull World Health Organ. 2017; 95:537–9. doi:10.2471/BLT.16.187476.

3. World report on ageing and health. Geneva: World Health Organization; 2015 (http://apps.who.int/iris/bitstream/handle/10665/186463/9789240694811_eng.pdf?sequence=1, accessed 17 April 2018).

4. World population ageing 2017. New York: United Nations, Department of Economic and Social Affairs, Population Division; 2017 (http://www.un.org/en/development/desa/population/publications/pdf/ageing/WPA2017_Highlights.pdf, accessed 17 April 2018).

5. Implementation research in health: a practical guide. Geneva: World Health Organization, Alliance for Health Policy and Systems Research; 2013 (http://www.who.int/alliance-hpsr/alliancehpsr_irpguide.pdf, accessed 26 August 2018).

6. Pablos-Mendez A, Shademani R. Knowledge translation in global health. J Contin Educ Health Prof. 2006; 26(1):81–6.

7. Knowledge translation on ageing and health: a framework for policy development. Geneva: World Health Organization; 2012 (http://www.who.int/ageing/publications/knowledge_translation_en.pdf, accessed 17 April 2018).

8. Ellen ME, Panisset U, Araujo de Carvalho I, Goodwin J, Beard J. A knowledge translation framework on ageing and health. Health Policy. 2017; 121:282–91. doi:10.1016/j.healthpol.2016.12.009.

9. Kondo K. Progress in aging epidemiology in Japan: the JAGES project. J Epidemiol. 2016; 26(7):331–6. doi:10.2188/jea.JE20160093.

Chapter 1: What is JAGES?

1.1 Overview of the JAGES initiative

The Japan Gerontological Evaluation Study (JAGES) has been producing scientific evidence of health inequalities, how these inequalities prevent access to community resources, including health and medical services, and the process of development of health inequalities in older people in Japan. JAGES uses high-quality, large-scale data mainly collected through self-administered mail surveys conducted under the auspices of municipal governments that are the public insurers of long-term care insurance. Extraordinary effort is made to expand the national network of stakeholders involved in the initiative, and to apply the outcomes of this research to improve policies and programmes in local and national governments and communities. Numerous evidence-based recommendations have been made for promoting health and reducing health inequalities among older people based on this research. The 20 years of experience of JAGES offers many valuable lessons that can contribute to the WHO goal to achieve UHC, especially in times of a global demographic transition to an older population. This publication focuses on the lessons learnt in knowledge creation and translation for healthy ageing.

The objective of JAGES has been to delineate the health status of older people in Japan – who enjoy the world's longest life expectancy – and factors that inhibit or promote the physical, psychological and social aspects of health in a multidimensional

manner. In 1999, a project started in two municipalities in Aichi prefecture, called the Aichi Gerontological Evaluation Study project (AGES), with the aim of realizing a society with healthy ageing and in which there are no health inequalities. Its main objectives were: (i) to conduct empirical gerontological studies exploring the physical, psychological and social factors of health; (ii) to conduct a social epidemiological study focusing on the social determinants of health; (iii) to develop a benchmarking system for local governments in the area of ageing and health; and (iv) to evaluate the impact of interventions on older people's health. JAGES has conducted joint surveys with municipalities every 3–4 years until now. In 2003, the number of participant municipalities increased to 15, followed by the 2006 surveys in 10 municipalities mainly in Aichi prefecture. Its scale increased to 30 municipalites in 2010, which led to the renaming of the initiative to JAGES to reflect its broadened geographic scope across Japan. The latest survey was conducted in the Japanese fiscal year of 2016–17 in 41 municipalities across the country, with a total of approximately 200 000 respondents for an average response rate of 71.1% among the municipalities (*see* Fig. 1.1) The survey also includes prospective cohort data that can be used to understand subsequent respondent outcomes (e.g. death and functional disability level) based on information in public long-term care insurance records. At the same time, the survey is also notable for simultaneously collecting panel data that allows repeated cross-sectional analysis. Research is also conducted jointly with municipalities using the survey data to make use of the results for formulating and evaluating the municipal business plan for long-term care insurance. *See* Annex 2 for further information regarding the progressive stages of development of JAGES.

From its beginnings with a few joint projects with municipalities, JAGES has now developed into a programme that operates projects in many areas across the country, involving researchers, government, community members and other stakeholders in diverse fields who share the common objective of improving health and social sytems to enhance well-being for all people throughout their life course. Through the various projects, a wide range of good practices were accumulated, which enabled feedback to both participating and non-participating municipalities of JAGES and to the national government. Specifically, JAGES has: (i) carried out joint surveys with many municipalities to support planning and evaluation of their long-term care insurance business plans; (ii) developed a common survey database that enables cross-sectional and longitudinal studies, and produced new scientific knowledge that has resulted in the publication of eight books and more than 300 academic papers (including more than 100 peer-reviewed original papers in English language journals, *see* Table 1.1 and Annex 3); and (iii) informed the reviews and revisions of the national government's preventive care policies for older people and a national health promotion policy, known as 'Health Japan 21', through its research outputs including new epidemiological evidence, case studies and a prototype data visualization system that enables benchmarking of municipalities. Further details of JAGES are available on the JAGES website.[1]

1 Japan Gerontological Evaluation Study (JAGES) [website]. Chiba: Japan Gerontological Evaluation Study; 2014 (https://www.jages.net/, accessed 18 May 2018).

Fig. 1.1 The JAGES survey field 2010–16

JAGES 2010/11
Participating municipalities: 31
Sent to: approx. 170 000 people
Responses: approx. 110 000 people
Response rate: approx. 66.3%

JAGES 2013/14
Participating municipalities: 30
Sent to: approx. 195 000 people
Responses: approx. 138 000 people
Response rate: approx. 71.1%

JAGES 2016/17
Participating municipalities: 41
Sent to: approx. 300 000 people
Responses: approx. 200 000 people
Response rate: approx. 70.2%

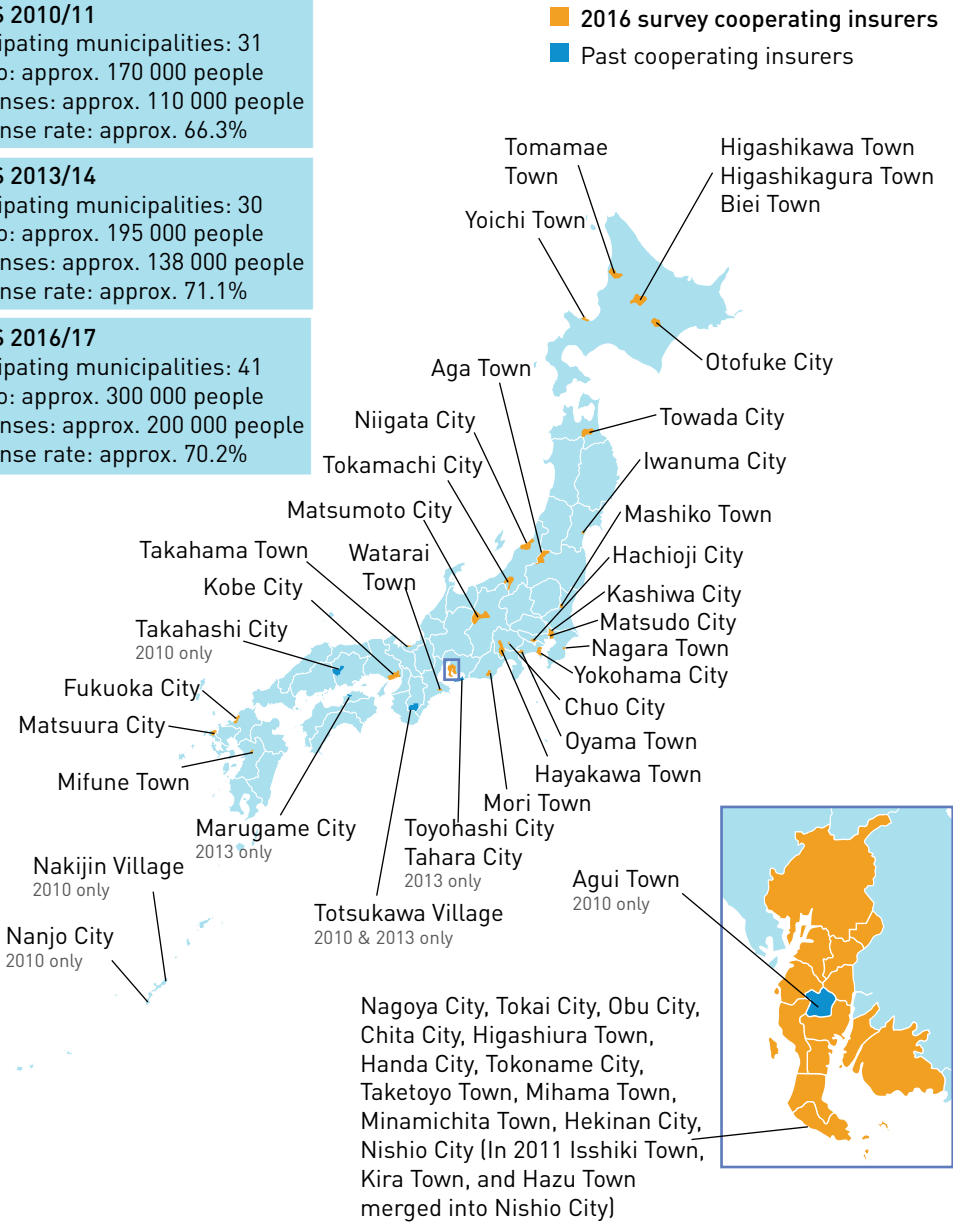


Table 1.1 Research design, perspective and topics

Design	Cross-sectional	Longitudinal (panel, end-point)
	Natural experiment	Community-based participatory research
Analytical perspectives	Lifecourse Neighbourhood and health Health inequalities (between and within municipalities) Social determinants of health Interdisciplinary Gerontology	
Research Topics	Oral health Mental health Diet Health behaviours (physical activities, smoking and alcohol use) Social support and participation Social capital Socioeconomic position Social isolation, eating alone Functional impairment Fall Frailty Built environment	

This chapter discusses the outlines of the following three aspects of the JAGES initiative: (i) collaborative research with municipalities across Japan; (ii) creation and accumulation of scientific knowledge; and (iii) contribution to national health policy reform.

1.2 Collaborative research with municipalities across Japan

1.2.1 Collaboration with municipalities

In the 1999 survey by its predecessor, AGES, JAGES had already intended to conduct scientific evaluation studies to improve the effectiveness, efficiency and equity of existing national policies addressing the health and welfare of older people. Municipalities, which became the insurers of the long-term care insurance system implemented in 2000, are required to formulate business plans for long-term care insurance, including preventive care services, every three years. It was recommended by the national government that a survey should be initiated by each municipality on preventive care and needs in various spheres of daily life among older people (hereinafter 'the needs survey'). The purposes of the survey are to inform the administration and management of the long-term care insurance policy and programme by identifying needs for long-term care and preventive care, and establish the basis for drafting business plans and evaluating performance.

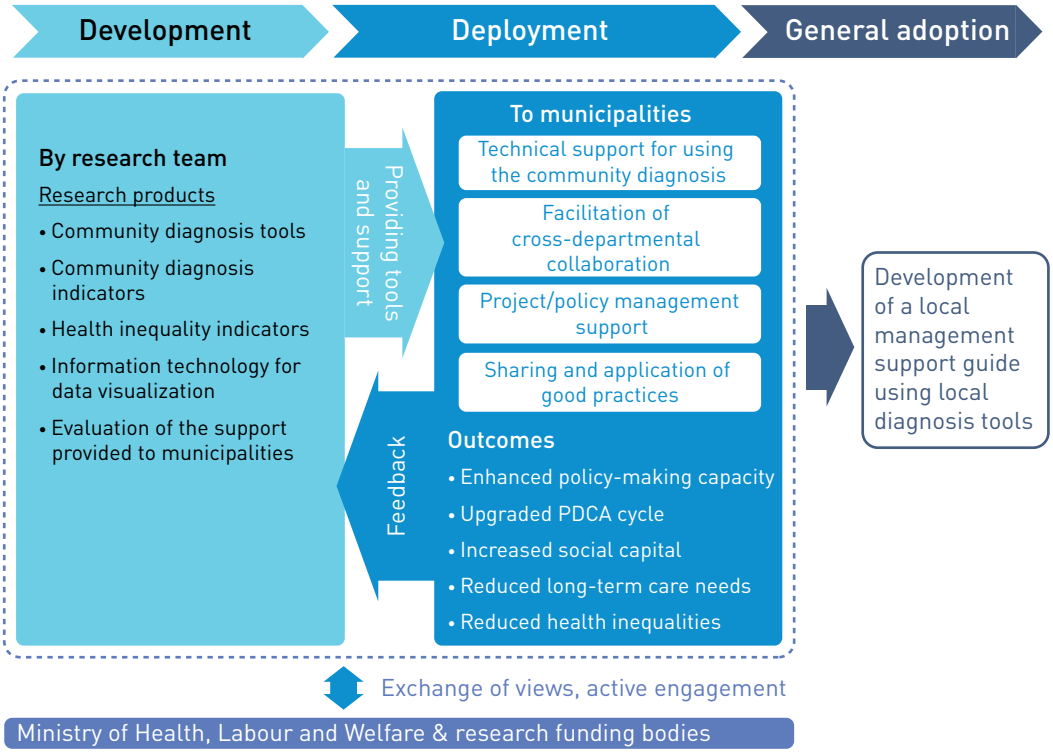
JAGES proposed that surveys be conducted using uniform questionnaires for all municipalities. This allowed comparisons between municipalities, and facilitated situational analyses and problem identification in the municipalities. It also enabled the compilation of large-scale data, which offers greater potential for research. By implementing surveys as joint efforts with municipalities, it became possible to conduct high-quality longitudinal studies using the municipality budget and data. Cross-sectional surveys have been repeated every three years, in alignment with the local government planning cycle for long-term care insurance. JAGES researchers have progressively raised awareness among municipal government officials about the need for longitudinal data to better understand health risk factors. As a result, they have been able to develop panel and cohort data by following up on the baseline surveys conducted every three years.

1.2.2 Technical support for policy-making and evaluation

Basic reports on the survey results are not sufficient to support the municipalities in formulating a business plan for long-term care insurance. They also need scientific evidence of effective measures to prevent older people from becoming dependent on long-term care, a tool for comparing with other municipalities, technical support on how to utilize this information, as well as best practices. Responding to such needs, JAGES has been engaging in the following activities: (i) creating scientific evidence on preventive care policies based on longitudinal research; (ii) developing a suite of data visualization tools, including community diagnosis tools, to support local governments in their management of preventive care policies for older people; and (iii) providing feedback using the knowledge, tools and case examples from JAGES to local government officials. The ultimate goal of

the activities is to ensure that municipality officials will be able to perpetuate the 'plan–do–check–act' (PDCA) cycle for the long-term care insurance and preventive care policy. JAGES is working to establish a model of implementation research that can support municipal governments in their community-based management of preventive long-term care policies (*see* Fig. 1.2).

Fig. 1.2 The JAGES' community-based management support scheme



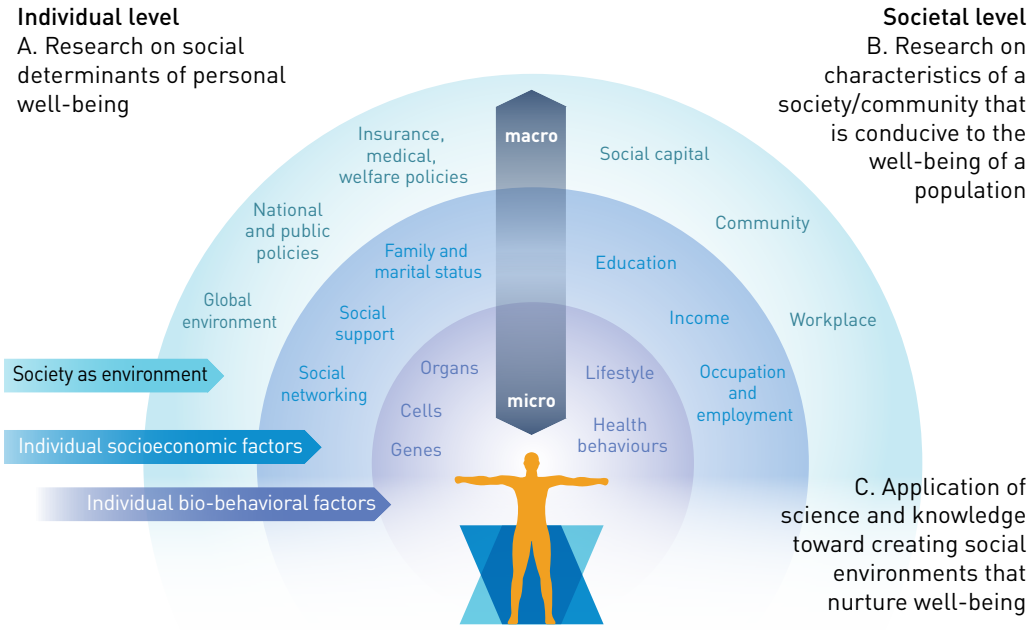
1.3 Creation and accumulation of scientific knowledge

1.3.1 Research questions

JAGES has been conducting studies focusing on the following areas: (i) research for elucidating the social determinants of health for healthy ageing and well-being of older people at the individual level; (ii) research on community/society-level characteristics that contribute to people's well-being; and (iii) applied research for building a society that is conducive to people's well-being. These may be broadly classified as 'gerontological studies' because the subjects are older people, but also as 'social epidemiological studies' because the studies focus on the social determinants of health and the life-course approach to health (*see* Fig. 1.3).

The survey questionnaire consists of core items, which are always included, and three to eight modules consisting of various thematic items, which are added to the core questionnaire based on the interests of the researchers and the municipal government conducting the survey (*see* Fig. 1.4). The core items are those that measure the main health outcomes and determinants of interest to both researchers and government organizations due to the strength of existing evidence and relevance to government policies. The modular items are those that are of greater interest to researchers but may be less so for government organizations, or those that are related to more exploratory research questions. The core items maximize the ability for comparative and confirmatory analysis, while the modular thematic items enable the investigation of a broad range of issues and the generation of new hypotheses.

Fig. 1.3 The JAGES mission



Layered structure of social determinants of health

Fig. 1.4 Content of the JAGES questionnaires

Questions in the 2016 Survey

Part 1. Core questions

Physical and functional status	Morbidity, health behaviour, body mass index (BMI), experience of fall
Psychology	Depression, happiness
Society	Social networks, social supports
Socioeconomic status	Annual household/ family income, size of household, education, employment (longest period of employment), pension, welfare
Participation in social groups	Volunteer activities, sports activities, residential/neighbourhood associations, hobbies
Community environment	Trust, reciprocity, social security, festivities, neighborhood gatherings (in local communities)
Going outside	Frequency of going outside, transportation

Part 2. Modular questions

Module A	Oral health, community environment, habit of drinking green tea, major life events over the past year
Module B	Sleep and diet, major life events in the past
Module C	Health status, participation in social activities, condition of eyes and ears, use of the Internet
Module D	Utilization of healthcare, primary care and preferences for end-of-life care
Module E	Smoking, hobbies, sport activities
Module F	Long-term care, community resources, driver's license
Module G	Functional/health foods, health information
Module H	Community environment, dementia, stress

Source: JAGES (see https://www.jages.net/about_jages/)

1.3.2 Research design and methods

Research designs and methods that were used by JAGES in the past include qualitative descriptive studies of activities undertaken by and with municipalities, cross-sectional exploratory studies, longitudinal studies for hypothesis testing, quasi-experimental, community intervention studies and prototype development research on data visualization systems. The effects of individual-level and community-level factors have been analysed both separately and simultaneously using multi-level analysis. During the phases of research producing a community diagnosis or conducting interventions, local knowledge and qualitative data, which are necessary for correctly interpreting the results of quantitative analysis, have also been collected. Furthermore, a study using a natural experimental design was also made possible because the 2011 Great East Japan Earthquake and Tsunami hit one of the surveyed areas. Pre-disaster data were available for all older populations in Iwanuma city surveyed prior to the disaster and this could be compared with data collected from the same people after the disaster (*see* Box 1.1). The principal investigator of JAGES has also conducted policy research based on an analysis of policy trends in ageing and health and long-term care in Japan and in other countries, to explore ideal future directions *(1,2)*.

Box 1.1 Iwanuma project: a natural experimental study

Natural disasters affect health and the social environment. The Iwanuma project focuses on the older survivors of the 11 March 2011 earthquake and tsunami in north-eastern Japan. It aims to investigate the social factors that mitigated the impact of the disaster and improved health recovery after the disaster using causal inference. It focuses on the trajectories of functional status (activities of daily living, onset of disability, dementia) as well as mental and physical health among the survivors before and after the disaster, and the causal effects of social determinants of health and the changes in them that were triggered by the disaster.

Although natural disasters are increasing in the world, most surveys do not have data obtained before a disaster. The Iwanuma study leverages baseline data that were collected seven months prior to the 11 March 2011 event as part of JAGES from a city named Iwanuma in Miyagi prefecture located in the disaster zone. The baseline data were obtained from 5058 residents of Iwanuma who were 65 years and older. The research team has conducted repeated surveys in 2013 and 2016.

In this study, JAGES examined the impact of exposure to disaster (i.e. loss of loved ones, loss/damage to property, relocation from the affected area, disruptions in access to health services, and other changes in a wider range of social determinants) on the trajectory of functional status among older people. It also investigated the impact of pre-disaster variations in community social cohesion/capital on the trajectory of functional decline and other health outcomes among disaster-exposed residents.

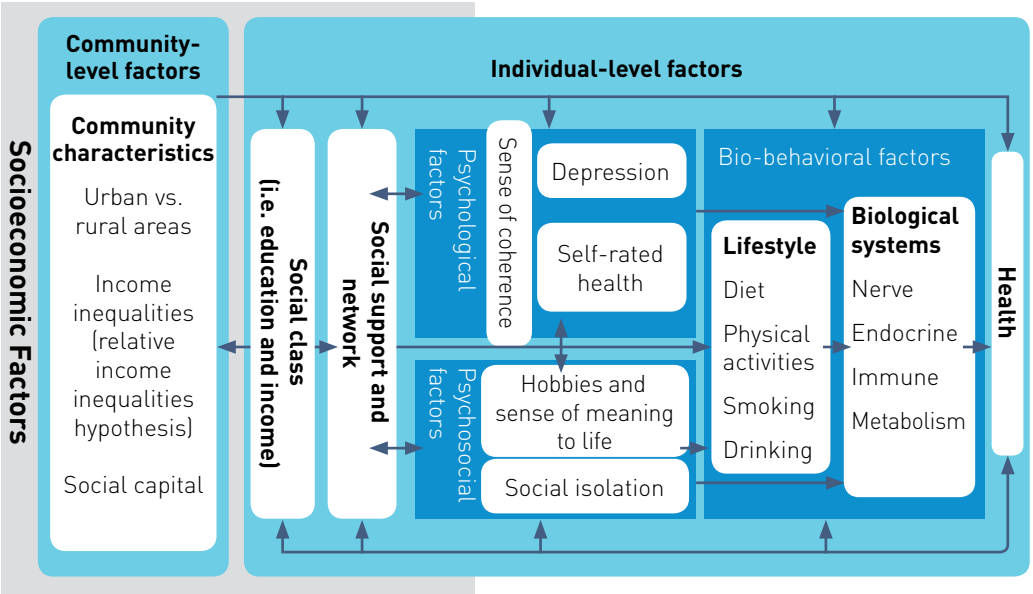
The main findings from this study are that: (a) disasters negatively impact the physical and mental health of older residents in affected areas; and (b) social cohesion/capital in both the pre- and post-disaster phases is a protective factor for older people's health after the disaster *(3–7)*.

1.3.3 Knowledge and achievements

Health inequalities among older people in Japan

JAGES has shown that there are inequalities in health and access to social resources among the older people in Japan. It has also documented the reality of areas where UHC has not been achieved even under the national health insurance system, as well as the relevant factors that cause inequalities and the process by which they occur (*see* Fig. 1.5).

Fig. 1.5 The JAGES' conceptual framework of the social determinants of health



Reprinted from Kondo K, Kenko Kakusa Syakai: Naniga Kokoro to Kenko wo Mushibamunoka [A health gap society: what affects mental and physical health?]. Tokyo, Igakushoin, 2005 (p.28, Fig. 1-11), with permission.

Based on the data on about 33 000 people from the 2013 cross-sectional survey, JAGES reported that there are inequalities in depression, self-rated health, health behaviour, history of falls, oral health, spare time activities, social isolation, social support, employment, financial insecurity and sense of coherence between socioeconomic class and residential communities/areas *(8-10)*. For instance, among men, morbidity due to depression (defined as 10 on the Geriatric Depression Scale 15-items version) is seen in 2.3% of those in the highest income class (4 million Japanese yen or more per year), while it is 15.8% in the lowest income class (less than 1 million Japanese yen per year), which is 6.9 times higher than those in the highest income class.

Social determinants of health at the individual level

JAGES found that not only socioeconomic status (SES) – such as income and education – but also many individual-level psychosocial factors such as social support and participation, are important determinants of health. It reported that factors throughout the life-course relate to or affect healthy ageing and well-being in older people, besides factors that come into effect at old age. Furthermore, JAGES showed that poor individual health and health inequalities can be mitigated by social relationships, such as social support, social networks and social participation *(11)*. For instance, those who participate in sports groups are less

likely to become in need of long-term care than those who exercise on their own *(12)*. Additionally, those who have a specific role in the groups they belong to have lower risk of depression *(13)* and mortality *(14)*. Furthermore, older people who live and eat alone are 2.7 times more likely to suffer from depression than those who do not, and people who lived in households with relatively low income at age 15 subsequently have a 1.27-fold higher risk of depression in their old age *(15)*. After the 2011 Great East Japan Earthquake and Tsunami, JAGES also showed that older people in the following groups were in better health: those who did not live in temporary housing *(3)*; those who lived in temporary housing with their neighbours from the original community, thereby maintaining social support *(4)*; those who visited psychiatrists after the disaster *(5)*; those who participated in group sports activity and those who regularly walked *(6)*.

Social determinants of health at the community and society levels

JAGES also reported that the characteristics of a residential community and society may promote or inhibit healthy ageing and well-being in older people. Examples of social environmental factors that have exhibited positive effects on health include the following: social capital at the community level (i.e. aggregated measures of social participation, social cohesion and reciprocity measured at the individual level) *(16,17)*; less income inequalities *(18,19)*; availability of parks in the neighbourhood *(20,21);* and low financial burden of health care placed on patients *(22)*. JAGES also showed that, after the 2011 Great East Japan Earthquake and Tsunami, social capital in the pre-disaster phase had the effect of reducing the probability of developing post-traumatic stress disorder (PTSD) *(7)*. The protective effect of social capital is likely attributable to reduced psychosocial stress as a result of social support and other resources obtained by social participation *(23,24)*, and to an increase in physical activities also associated with social participation *(20)*.

1.4 Contribution to national health policy reform

1.4.1 Healthy ageing policy

Long-term care insurance system: from a high-risk approach to a population approach

In 2006, the *Long-Term Care Insurance Act* was amended, and a new system focused on preventive care to preserve physical and cognitive functions and prolong independent living was implemented. The preventive care programme was aimed at older people who were not yet certified as needing long-term care, and who were at high risk of requiring long-term care in the near future. The Ministry of Health, Labour and Welfare (MHLW) estimated that about 5% of the total population over 65 years would be in this high-risk group and would participate in the preventive care programme. Those at high risk were identified through screenings during annual health check-ups and mail surveys, and were encouraged to participate in a preventive care programme.

In contrast, based on social epidemiological theory and knowledge gained from JAGES, the limitations of this strategy based on a high-risk approach were clear. The principal investigator of JAGES published a book in 2005, a year before the new preventive care policy was introduced in 2006, to sound the alarm that such a strategy will have to be changed in the near future *(8)*. Subsequently, it was found that the preventive care programmes based on this high-risk approach were not well attended across Japan. Only 0.8% of the target population participated in the programmes, which is far less than the MHLW estimate of 5%. Clear health inequalities were also found whereby a much higher proportion of high-risk people were found among those with lower income and lower educational attainment. There was also a difference in the use of services where older people with lower incomes were less likely to utilize health services such as health check-ups or preventive care programmes. Therefore, efforts to identify high-risk older people through screenings at public health check-ups or through a mail survey and urge them to participate in a preventive care programme were ineffective. High-risk people were less likely to receive the check-ups, respond to surveys or utilize services. Therefore, it was found that a high-risk approach alone is limited in its reach and its effectiveness.

Promoting preventive care through community building – a population approach

Starting in 2006, JAGES began research and development of a preventive care programme based on a population approach as an alternative or complementary measure to programmes based on a high-risk approach. The study found that one in two people who are newly certified as being in need of long-term care had shown no signs of risk for the condition requiring care a year before. Thus, the high-risk approach would have only addressed half of the people who would actually require care a year later, assuming all people identified through the screening would attend preventive care programmes afterwards. Furthermore, it became clear from the longitudinal research that the more older people participate in social activities, the better the health in those communities, and the more older people participated in their communities, the less likely they were to become certified for needing long-term care.

From 2006, the year the new preventive long-term care system was implemented nationwide, JAGES initiated a pilot study to develop and evaluate a preventive care programme for older people based on a population approach in Taketoyo town in Aichi Prefecture. In this project, more than 10% of all older people in the town participated in the preventive care programme, and those who participated in the programme reported increased levels of both receiving and providing social support. Furthermore, by using advanced statistical analysis (i.e. instrumental variable method), the study was able to show that self-rated health improved more among the participants compared to non-participants of the programme *(25)*.

These pieces of evidence contributed to a change in Japanese preventive care policies for healthy ageing from relying on a high-risk approach to combining a high-risk and a population approach. The MHLW introduced these JAGES research outcomes to a

council that eventually adopted a new, transformative preventive care policy focused on developing community environments that promote social participation of older people. Subsequent studies showed that preventive care programmes based on a population approach attracted more people at high risk than those based on a high-risk approach. JAGES has continued to work on developing protocols for creating communities that promote social participation of older people, and evaluation methods for assessing the effectiveness of preventive care programmes for older people.

Introducing the concept of social capital

Since 2004, JAGES has continuously provided theoretical and practical evidence of the positive effects of community-level social capital for health and well-being. Following this, the concept of social capital started to appear in various MHLW documents. For instance, the MHLW introduced the concept of social capital as being of great importance in implementing health measures through a policy document entitled *Basic guidelines on regional health measures* in 2012 *(26,27)* and a white paper of 2014 *(28)*. This provided a good opportunity to raise public awareness about the importance of addressing social environmental factors through a population approach to improve population health.

1.4.2 Addressing health inequalities through the national health promotion policy (Health Japan 21)

Emergence of health inequalities

Japan used to have some of the smallest income inequalities and Gini coefficients among industrialized countries in the 1970s. However, in the early 2000s, as a breakthrough solution to prolonged economic stagnation, policies to reduce the size and influence of government and amend the lifetime employment system were implemented, causing an increase in the percentage of workers with non-regular employment. As a result, the average salary income dropped, and the poverty rate increased. Consequently, wider gaps in SES became apparent.

Against this historical backdrop, AGES' research outcomes were published in *Health gap society: what affects mental and physical health? (8)*, and *Exploring inequalities in health: a large-scale social epidemiological survey toward preventing long-term care dependence (9)*. Using the AGES 2003 survey data, the publications showed that even in Japan – where there is a national health insurance system – health inequality is as much as sevenfold, and social capital tends to be poor in areas where the Gini coefficient is high, which may lead to a deterioration in health. The research warned that if this situation continues, health inequalities are likely to further increase. Together with the effects of the economic crisis brought on by the bankruptcy of Lehman Brothers in 2008, adverse effects, including layoffs of temporary workers, became obvious to the general public. Internationally, an alarming report about

the extent of health inequities was submitted by the WHO Commission on Social Determinants of Health *(29)* and *Reducing health inequalities through action on the social determinants of health* (resolution WHA62.14) was adopted at the World Health Assembly in 2009. In order to inform general readers in Japan about such global trends and send an early warning about the health inequalities in Japan, JAGES produced a publication, *Surviving in a health gap society (10)*.

Minimizing health inequalities as a goal of Health Japan 21 (the second term)

The first term of Health Japan 21 (2000–2010) – the national health promotion strategy established by the MHLW – focused on improving individual lifestyle habits and presented many individual-level targets to be achieved. However, the targets were achieved for only some indicators – 40% resulted in either "no change" or "worsened". The reasons for this were debated and potential new measures were discussed. As a result, new goals for "Reduction of health inequalities" and "Establishment of a social environment that supports and protects health" were added for the second term of Health Japan 21 (2013–2022). To achieve such goals, five numerical targets were added, including "Strengthening of community ties", as measured by the increase in the percentage of individuals who think people help each other out in their community. Part of the scientific basis for these new directions were JAGES publications *(8,9)*, which were cited in *Reference materials for the promotion of Health Japan 21* provided to the Expert Advisory Committee that deliberated the amendment of Health Japan 21 for its second term.

1.4.3 Development of a national data visualization system on ageing and health

Community-based integrated care system

A community-based integrated care system is a concept proposed in Japan in 2008 in which housing, medical care, nursing care, preventive care and social care are provided in an integrated manner so that older people can live in the communities they are accustomed to and according to their own values, even after they become infirm enough to require serious care until the end of life. The national government has set out to establish this system by 2025, when 'baby boomers' will be an average age of 75 years and older. This system is expected to be developed under the leadership of municipalities and prefectures, which are the insurers of the national health insurance and long-term care insurance, based on regional autonomy and independence, and also taking into account characteristics of the local context.

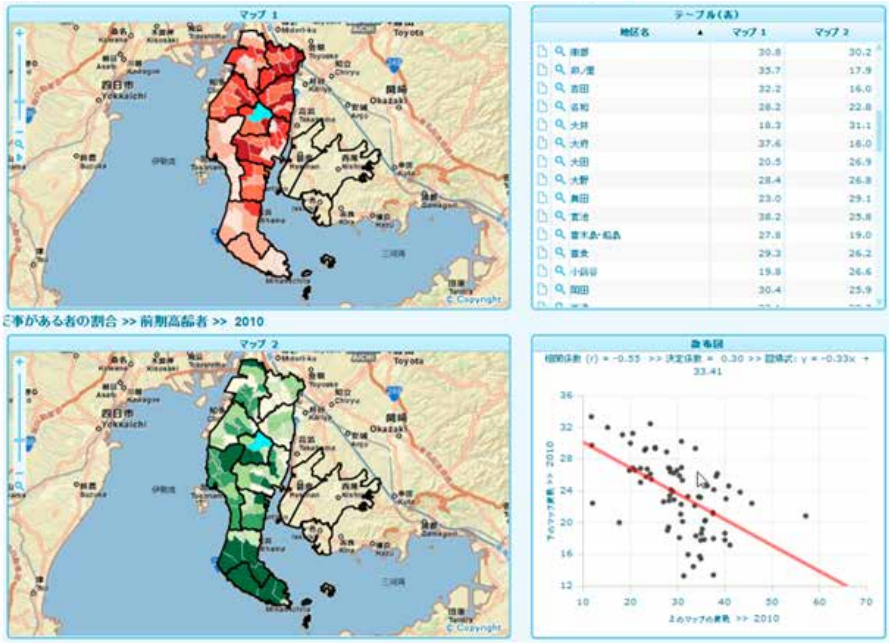
In response to this new development, JAGES has established evidence of the possible positive effect of social participation on the health of community-dwelling older people and has advocated for the importance of promoting social participation to the MHLW. The MHLW is now endorsing social participation as a necessary community

intervention for the prevention of functional decline among older people. At the local level, JAGES provides high-quality data to each municipality and supports the data analysis to assess the performance of their policies and programmes.

Development of a prototype for a community-based integrated care 'visualization tool'

JAGES developed the JAGES-HEART (Health Equity Assessment and Response Tool) in cooperation with the WHO Centre for Health Development (WHO Kobe Centre). This is a data visualization tool that was inspired by the third recommendation of the WHO Commission on Social Determinants of Health (WHO 2008), namely "Measure and understand the problem and assess the impact of the action", and by applications of Instant Atlas™, a popular data visualization software, by governments of the United Kingdom (UK) and Australia. This was developed as a management tool for municipal government officials to visualize health issues and health inequalities between communities, specify problems, discover clues for intervention and evaluate potential interventions. The tool was designed to facilitate information sharing about problems and developing guidance for solving problems between the parties concerned with reducing health inequalities across Japan. This became the prototype for the MHLW community-based integrated care visualization system, which was later developed following a Cabinet decision on "Visualization of long-term care and health care information".

Fig. 1.6 The JAGES-HEART data visualization tool



1.5 Summary

The JAGES initiative is not merely a research project run by researchers, but a collaborative knowledge translation effort that is firmly grounded in numerous public–academic partnerships across the country. Researchers are responsible for collecting high-quality survey data from commuty-dwelling older people and generating knowledge that is valuable for both scientific evidence-building and practical policy-making. They also develop data visualization tools and use community-based participatory research (CBPR) methods to facilitate the uptake of research evidence by decision-makers. Municipal governments are enabled to utilize the scientific knowledge toward improving the lives of older citizens and minimizing health gaps between individuals and communities. National health policy-makers are urged to develop policies that provide universal coverage of preventive long-term care for older people.

References

1. Kondo K. Iryo Kuraisisu wo Koete-Igirisu to Nihon no Iryo: Kaigo no Yukue [Beyond the 'healthcare crisis': the future of healthcare and long-term care in the United Kingdom and Japan]. Tokyo: Igaku-shoin; 2012 (in Japanese).

2. Kondo K. Kenko Kakusa Syakai eno Syoho-sen [Prescription for a health gap society]. Tokyo: Igaku-shoin; 2017 (in Japanese).

3. Sasaki Y, Aida J, Tsuji T, Miyaguni Y, Tani Y, Koyama S et al. Does type of residential housing matter for depressive symptoms in the aftermath of a disaster? Insights from the Great East Japan earthquake and tsunami. Am J Epidemiol. 2018; 187(3):455–64. doi:10.1093/aje/kwx274.

4. Koyama S, Aida J, Kawachi I, Kondo N, Subramanian SV, Ito K et al. Social support improves mental health among the victims relocated to temporary housing following the Great East Japan earthquake and tsunami. Tohoku J Exp Med. 2014; 234(3):241–7.

5. Tsuboya T, Aida J, Hikichi H, Subramanian SV, Kondo K, Osaka K et al. Predictors of depressive symptoms following the Great East Japan earthquake: a prospective study. Soc Sci Med. 2016; 161:47–54.

6. Tsuji T, Sasaki Y, Matsuyama Y, Sato Y, Aida J, Kondo K et al. Reducing depressive symptoms after the Great East Japan earthquake in older survivors through group exercise participation and regular walking: a prospective observational study. BMJ Open. 2017; 7(3):e013706. doi:10.1136/bmjopen-2016–013706.

7. Hikichi H, Aida J, Tsuboya T, Kondo K, Kawachi I. Can community social cohesion prevent posttraumatic stress disorder in the aftermath of a disaster? A natural experiment from the 2011 Tohoku earthquake and tsunami. Am J Epidemiol. 2016; 183(10):902–10. doi:10.1093/aje/kwv335.

8. Kondo K. Kenko Kakusa Syakai: Naniga Kokoro to Kenko wo Mushibamunoka [A health gap society: what affects mental and physical health?]. Tokyo: Igaku-shoin; 2005 (in Japanese).

9. Kondo K ed. Kensho Kenko Kakusa Syakai: Kaigo Yobo ni Muketa Syakaiekigakuteki Daikibochosa [Exploring inequalities in health: a large-scale social epidemiological survey for long-term care prevention in Japan]. Tokyo: Igaku-shoin; 2007 (in Japanese).

10. Kondo K. Kenko Kakusa Syakai wo Ikinuku [Surviving in a health gap society]. Tokyo: Asahi Shimbun Shuppan; 2010 (in Japanese).

11. Berkman LF, Kawachi I, Glymour MM. Social epidemiology. Oxford: Oxford University Press; 2014.

12. Kanamori S, Kai Y, Kondo K, Hirai H, Ichida Y, Suzuki K et al. Participation in sports organizations and the prevention of functional disability in older Japanese: the AGES cohort study. PloS One. 2012; 7(11):e51061. doi:10.1371/journal.pone.0051061.

13. Takagi D, Kondo K, Kawachi I. Social participation and mental health: moderating effects of gender, social role and rurality. BMC Public Health. 2013; 13(1):701. doi:10.1186/1471–2458–13–701.

14. Ishikawa Y, Kondo N, Kondo K, Saito T, Hayashi H, Kawachi I; JAGES group. Social participation and mortality: does social position in civic groups matter? BMC Public Health. 2016; 16(1):394. doi:10.1186/s12889–016–3082–1.

15. Tani Y et al. Childhood socioeconomic status and onset of depression among Japanese older adults: the JAGES prospective cohort study. Am J Geriatr Psychiatry. 2016; 24(9):717–26. doi:10.1016/j.jagp.2016.06.001.

16. Aida J, Hanibuchi T, Nakade M, Hirai H, Osaka K, Kondo K. The different effects of vertical social capital and horizontal social capital on dental status: A multilevel analysis. Soc Sci Med. 2009; 69(4):512–8. doi:10.1016/j.socscimed.2009.06.003.

17. Koyama S, Aida J, Saito M, Kondo N, Sato Y, Matsuyama Y et al. Community social capital and tooth loss in Japanese older people: a longitudinal cohort study. BMJ Open. 2016; 6(4):e010768. doi:10.1136/bmjopen-2015–010768.

18. Ichida Y, Kondo K, Hirai H, Hanibuchi T, Yoshikawa G, Murata C. Social capital, income inequality and self-rated health in Chita peninsula, Japan: a multilevel analysis of older people in 25 communities. Soc Sci Med. 2009; 69(4):489–99.

19. Kondo N, Saito M, Hikichi H, Aida J, Ojima T, Kondo K et al. Relative deprivation in income and mortality by leading causes among older Japanese men and women: AGES cohort study. J Epidemiol Community Health. 2015; 69(7):680–5. doi:10.1136/jech-2014–205103.

20. Hanibuchi T, Kondo K, Nakaya T, Shirai K, Hirai H, Kawachi I. Does walkable mean sociable? Neighborhood determinants of social capital among older adults in Japan. Health Place. 2012; 18(2):229–39. doi:10.1016/j.healthplace.2011.09.015.

21. Hanibuchi T, Kondo K, Nakaya T, Nakade M, Ojima T, Hirai H et al. Neighborhood food environment and body mass index among Japanese older adults: results from the Aichi Gerontological Evaluation Study (AGES). Int J Health Geogr. 2011; 10:43. doi:10.1186/1476–072X-10–43.

22. Murata C, Yamada T, Chen C-C, Ojima T, Hirai H, Kondo K. Barriers to health care among the elderly in Japan. Int J Environ Res Public Health. 2010; 7(4):1330–41. doi:10.3390/ijerph7041330.

23. Murata C, Takeda T, Suzuki K, Kondo K. Positive affect and incident dementia among the old. J Epidemiol Res. 2016; 2(1):118–124. doi:10.5430/jer.v2n1p118.

24. Sasaki Y, Miyaguni Y, Tani Y. Possibility of social supports as indicators for the community diagnosis of a community preventive approach for depression among older people : Japan Gerontological Evaluation Study (JAGES) 2013. Psychogeriatrics. 2015; 26(9):1019–27 (in Japanese).

25. Ichida Y, Hirai H, Kondo K, Kawachi I, Takeda T, Endo H. Does social participation improve self-rated health in the older population? A quasi-experimental intervention study. Soc Sci Med. 2013; 94:83–90.

26. Chiiki-Hoken-Taisaku no Suishin ni Kansuru Kihontekina Shishin no Ichibu Kaisei ni Tsuite [Ammendment to Basic guidelines on regional health measures]; 2012 (in Japanese) (http://www.mhlw.go.jp/file/06-Seisakujouhou-10900000-Kenkoukyoku/0000049512.pdf, accessed 18 May 2018).

27. Chiiki-Hoken-Taisaku no Suishin ni Kansuru Kihontekina Shishin 2015 [Basic guidelines on regional health measures 2015]; 2015 (in Japanese) (http://www.mhlw.go.jp/file/06-Seisakujouhou-10900000-Kenkoukyoku/0000079549.pdf, accessed 18 May 2018).

28. Heisei 26 nendoban Kousei Roudou Hakusyo Kenko-Chouju-Syakai no Jitsugen ni Mukete ~Kenko Yobou Gannen~ [White Paper 2014 – Towards Healthy Ageing Society]; 2015 (in Japanese) (http://www.mhlw.go.jp/wp/hakusyo/kousei/14/, accessed 18 May 2018).

29. Closing the gap in a generation: health equity through action on the social determinants of health. Final report of the Commission on Social Determinants of Health. Geneva: World Health Organization; 2008 (http://apps.who.int/iris/bitstream/10665/43943/1/9789241563703_eng.pdf 14/03/2018, accessed 14 April 2018).

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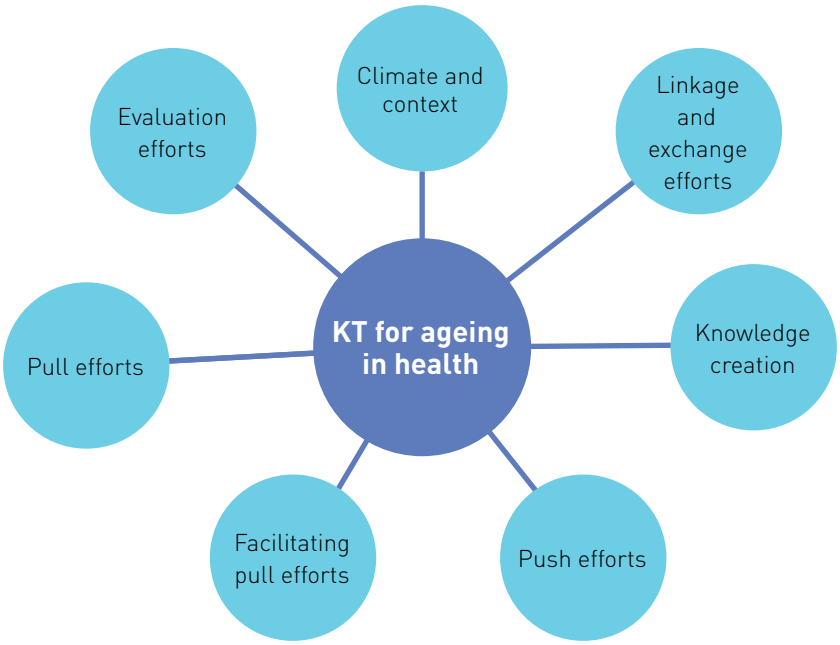
Chapter 2: Knowledge translation in JAGES

2.1 Knowledge translation

Chapter 1 described the ways in which a group of researchers have produced quality evidence using JAGES and made efforts to share and communicate that knowledge with various stakeholders to trigger changes in policies and practices for the betterment of society and particularly older people's health in Japan. This series of activities, which goes beyond simple academic research, is a good example of knowledge translation (KT) through implementation research. KT was developed as a paradigm to identify a wide range of issues and narrow the gap between 'know' and 'do'*(1)*. It is defined as "the synthesis, exchange, and application of knowledge by relevant stakeholders to accelerate the benefits of global and local innovation in strengthening health systems and improving people's health" *(1)*. While KT has been developed and is spreading gradually in the health field, applications of KT to issues of an ageing society are rare, and the need for developing applied models of KT has been pointed out *(2)*. Ellen et al *(2)* have identified obstacles for effective KT on ageing and health and synthesized seven elements of KT based on the results of a review of the existing literature and meeting of experts. These seven elements of KT on ageing and health are: climate/context for research use; linkage and exchange efforts; knowledge creation; push efforts; facilitating pull efforts; pull efforts; and evaluation efforts (*see* Fig. 2.1). This chapter describes the key driving factors for KT in the JAGES initiative, with reference to some of the relevant elements of the conceptual framework of KT on ageing and health *(2)*.

Fig. 2.1 Seven key elements for knowledge translation (KT) on ageing and health



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1. Climate and context

Consideration of the local context and climate (i.e. characteristics, circumstances and conditions), with respect to ageing and health, as well as KT activities

Enthusiasm, readiness and relevant systems are there in the society to address issues in ageing and health. It is also important for the society to understand and promote the use of evidence in policy-making.

2. Linkage and exchange efforts

Building relationships between users and researchers

Stakeholders such as researchers, knowledge users, funders, consumer groups and professional bodies have open and positive relationships.

The health system ensures the capacity to conduct workshops among researchers and users in a deliberative manner.

3. Knowledge creation

Creating new knowledge that is timely and relevant

Health systems ensure that there are research centres for gerontology and geriatrics.

Health systems collect, analyse, and interpret data from older people, which is disaggregated by age, and participate regularly in priority-setting processes.

4. Push efforts

Pushing knowledge out to necessary groups in appropriate formats

Researchers and intermediary organizations package and disseminate information to various relevant user groups.

Researchers and intermediary organizations develop and utilize media releases to disseminate applicable findings.

5. Facilitating pull efforts

Enabling policy-makers to identify relevant research

Health systems ensure connection to a network of experts.

Health systems implement the technical Infrastructure or a "one-stop website" that supports research use and enhances access to online resources and journals, which may have relevant research evidence.

6. Pull efforts

Pulling the relevant evidence into policy-making by user

Health systems establish a national policy to ensure the use of evidence in policy-making.

Health systems develop and use response units that have connection with experts, and also provide timely summaries of the research findings.

Health systems engage knowledge brokers to assist in the use of evidence for decision-making.

7. Evaluation efforts

Monitoring and evaluating KT efforts

Health systems allocate resources and funding to monitor implementation and evaluate the impact of evidence-informed decision-making.

Funders, researchers and intermediary organizations collaborate to identify criteria for success and conduct rigorous evaluation of efforts to link research to action.

2.2 Ageing in Japan: background and context

First, it is important to understand the background and context for the KT in the JAGES initiative. Key trends that work in favor of JAGES' KT is the rapid growth in the population of older people in Japan, and a worldwide momentum toward reducing health inequity, which was also affecting Japan. Given this political climate, awareness has increased in Japan about the importance of effective and evidence-based policies and appropriate management of those policies to ensure quality preventive care for all older people, in order to maintain their health and functional ability. This context presented JAGES with the opportunity to contribute to policy development and management through KT. The two-tiered administrative structure in Japan, in which the national government formulates the broad framework of preventive care policies and local/municipal governments are responsible for policy implementation, also worked favorably for JAGES as it provided a clear structure that would guide and support the KT. (*See* Annex 1 for more details on the background and context and Annex 2 for further information on the progressive development of JAGES).

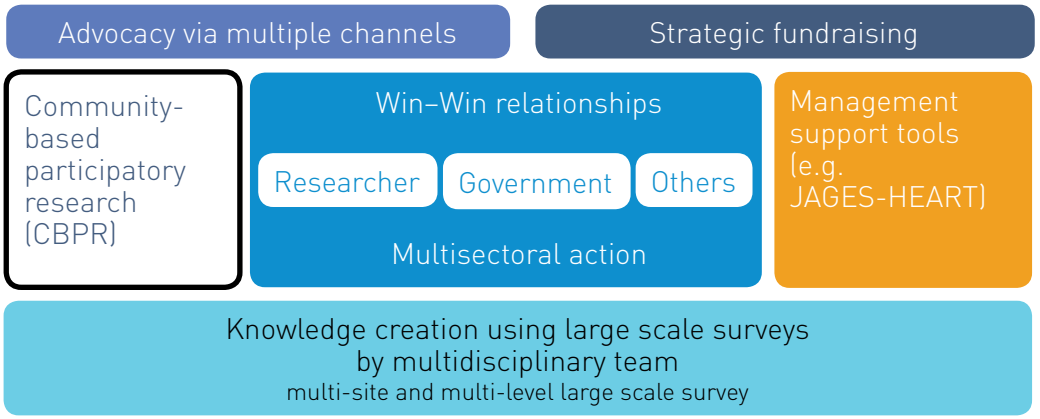
In Japan, the total population has been gradually declining since 2010, while the proportion of older people has been increasing. There are large regional differences in this demographic transition, where the population of older people is beginning to dwindle in some rural areas while this population group is expected to greatly increase in urban areas in the near future. Accordingly, the government has implemented the approach that each municipality analyses its local problems and formulates a local plan to manage the long-term care insurance system, including the provision of services to prevent functional decline and the eventual dependence on long-term care.

The Cabinet Office of Japan clearly stated its direction toward optimizing health care and long-term care delivery systems in its *Basic Policy on Economic and Fiscal Management and Reform 2015*. It emphasized the need for a 'plan–do–check–act' (PDCA) cycle approach to management of relevant care plans and analyses of regional differences, for example, in the proportions of older people with functional disability (or those who are certified to be beneficiaries for long-term care insurance). Meanwhile, the municipalities are obliged to formulate an action plan for the provision of long-term care services on a three-year cycle. To meet these requirements from the national government, many municipalities are in need of external technical support. The implementation of KT by JAGES started as a response to this need for support and consultation to municipal governments.

2.3 Key driving factors for JAGES' KT

JAGES steering committee members have critically analysed JAGES' organizational structure, activities and history, and have identified seven key driving factors for KT (*see* Fig. 2.2). Each factor is described below in terms of its characteristics and relation to the KT framework on ageing and health (*see* Fig. 2.1).

Fig. 2.2 Key driving factors for JAGES' KT



2.3.1 'Win–win' relationships between stakeholders and researchers

Creating 'win–win' relationships with their stakeholders is a working principle of JAGES. The stakeholders include local/municipal governments, the Japanese national government and researchers. Municipal governments commission JAGES to conduct surveys to inform the development and management of their long-term care insurance system. The survey data from each participating municipality are fed back to the municipalities using various data visualization tools developed by JAGES. The municipalities can then use the data to grasp their current situation, including strengths and challeges, and formulate action plans for their long-term care services.

Municipal goverments use scientific evidence yielded from JAGES to develop an evidence-based healthy ageing policy. The governments and JAGES researchers also sometimes jointly formulate and evaluate community intervention measures (e.g. community salon activities) *(3)*. On the one hand, municipalities can obtain scientific evidence in a timely manner, which might be difficult to do otherwise. On the other hand, through collaborations with municipalities, researchers can benefit from having detailed survey data with a high survey response rate. The collaboration makes it possible for researchers to obtain accurate data on health outcomes through the surveys, and to also link the survey data to municipal mortality registries and public long-term care insurance services systems data, which include information on the onset of mortality and functional disability.

JAGES holds joint meetings between researchers and officers from participating municipalities approximately twice a year, which is another good opportunity for building win–win relationships (*see* Box 2.1). Initially during these meetings, much time was spent on lecture-style presentations from researchers about their work and progress. In response to feedback from participants from municipalities, the

structure has since changed towards allocating more time to group work than on research reports. Generally, meetings start with researchers' presentations on the results of community diagnoses and survey data analyses. After that, municipal officers share their experiences in applying JAGES' evidence to practice, and implementing community development projects. This is followed by constructive discussion among all participants. These meetings help the municipal administrators comprehend scientific evidence and serve as a platform for peer education and network building. Additionally, these meetings provide opportunities for officials to get acquainted with researchers, who can then be invited to provide seminars to municipal government staff or to local residents. For researchers, these meetings enable them to identify research questions that are of high priority to local governments, generate new hypotheses, and find new fields for their research.

Box 2.1 Joint meetings between participating municipalities and researchers

What are the objectives?

Meetings are delivered in a workshop style. The primary objective of the workshops is to discuss the results from the JAGES survey with administrators from the participating municipalities. They elaborate on the implications of the survey findings and share good practices in community-building in order to improve health and health equity.

In addition, meetings are held to provide opportunities to extend peer networks among municipal administrators across the country.

What is the structure?

The workshop is one day long and the general format is as follows.

- Presentation on an overview of policy changes related to the provision of long-term care and the role of municipalities.
- Demonstration of the data visualization tools (Fig. 2.4, 2.5 and 2.6).
- Group work to identify risks and protective factors within the municipalities by using the visualization system.
- Group work to develop long-term care plans for the municipalities.
- Discussion.

JAGES has made an intense effort to build a win–win relationship with the central government as well. Similar to the benefits to municipal goverments, JAGES offers the national government evidence that contributes to formulating relevant policies

and implementing projects. For researchers, close discussions with specialists in the ministries are good opportunities to learn about latest policy trends, which is useful to developing research agendas and seeking public research funds.

JAGES researchers benefit from affiliating with JAGES as they can gain access to high quality data, rich with contextual information, which enables them to study complex multi-level social determinants of health. JAGES, in turn, is able to tap into the pooled resources of the affiliated researchers to continue expanding its large-scale data collection efforts. JAGES researchers are from local institutions across the country and have a close supportive relationship with their local governments. This incentivizes municipalities to join the JAGES initiative, creating a platform for continuous mutual support.

Importantly, monthly research meetings hosted by JAGES are open to researchers, local or national government administrators, and members of the private sector. These monthly meetings are the gateway to the JAGES initiative for anyone who is interested. At the same time, these meetings are a platform to develop mutual understanding of the differences in goals and objectives between each stakeholder, and to extend their networks. It is notable that these meetings, attended by people with various disciplinary backgrounds, effectively expands the research capacity of JAGES by offering a wide range of expertise. These win–win relationships, which underpin the KT process of JAGES, are illustrated in Table 2.1.

A win–win relationship is also established between JAGES, municipalities, and the national government through cost-sharing of research expenses. Municipalities commission JAGES to carry out research and provide consultations on how to formulate policies and evaluate related programmes and activities. In return, JAGES covers a part of the research costs by allocating some of its research funds obtained from the national government and other funding bodies to conduct the municipal surveys. In this way, JAGES, municipalities and the national government have been able to save on spending for the implementation of large-scale, high-quality surveys.

This win–win relationship between stakeholders of JAGES mainly corresponds to the concept of 'linkage and exchange efforts' of the KT framework on ageing and health *(2)*. JAGES stakeholder relationships facilitate the use of research evidence for local and central policy development, and at the same time help to create a greater demand for such evidence. In this way, actively managing these stakeholder relationships can be considered 'push and pull efforts' and 'facilitating pull efforts' for KT as well.

Table 2.1 Examples of the benefits to JAGES' stakeholders: a win–win relationship

Municipalities	Researchers	National government, research funding bodies
Are able to: – obtain results of research and analyses that can inform the formulation of municipal 'business plans' for long-term care insurance services and evaluation of the plans; – use data visualization tools (e.g. JAGES–HEART) for managing their long-term care insurance plan; – receive technical support from JAGES researchers.	Are able to: – collect high-quality longitudinal data (with high response and follow-up rates); – analyse large-scale data with rich contextual information; – obtain information on policy priorities and identify research themes.	Are able to: – obtain scientific evidence based on high-quality data that inform and support policies relevant to healthy ageing; – make their research funds go further through cost-sharing with JAGES and local governments.

2.3.2 Multisectoral action

JAGES' vision to understand population health and healthy ageing is founded in the framework of the social determinants of health and a multi-level perspective of the determinants that comprise the individual, community and more macro-level social contexts (*see* Fig. 1.3). For example, JAGES targets communities (rather than individuals) to promote individual social participation, by creating community environments that provide more opportunities for participation.

JAGES' KT also influences multiple levels of government. Its research findings are used by the prefectural and national governments, who are obliged to support municipal governments. Because the policies established by the national government have strong influences on the policies and activities of municipal governments, the positive relationship between JAGES and the national government attracts the municipalities' interest in collaborating with JAGES.

Although JAGES' main research partners are the administrators from the long-term care sectors in municpal governments and the MHLW, JAGES has intensively sought wider relationships with other sectors. For example, besides the MHLW, JAGES has so far collaborated with the Ministry of Land, Infrastructure, Transport and Tourism; Japan Sports Agency; Ministry of Economy, Trade and Industry; and Ministry of Internal Affairs and Communications. Moreover, collaborations with private entities, such as research companies and system developers are essential

to structure JAGES' database and develop data visualization tools. Furthermore, when implementing the community-development projects, JAGES has worked closely with non-profit organizations (NPOs) and community volunteers.

This multisectoral collaboration also mainly corresponds to the 'linkage and exchange efforts' of the KT framework *(2)*. The direction of linkage is both vertical, involving administrators in charge of long-term care insurance across the different levels of government, and horizontal, engaging other government sectors, NPOs, community volunteers and private entities.

2.3.3 Knowledge creation by a multidisciplinary team

Two notable outputs of JAGES' knowledge creation function are the large-scale, high-quality survey dataset, and the research evidence based on analyses of that data. The survey dataset allows comparisons between municipalities and small areas such as school districts, between gender, age and socioeonomic groups, and over time. It also enables multilevel analyses that can account for both individual- and community-level factors in relation to health outcomes. The survey dataset can also be linked to data from the municipal mortality registry and public long-term care insurance systems, which enhances the potential for epidemiologic research.

A main contributing factor to this knowledge creation process is the involvement of many researchers from various disciplines. Social epidemiologic studies and community development activities require highly advanced, multidisciplinary methods and expertise. Since the time of its foundation, JAGES has followed the principle of inclusivity, welcoming any interested researcher to get involved in their research initiative. This has made JAGES a large and diverse team, which is a great advantage in implementing KT. Many researchers from various disciplines such as public health, social epidemiology, health sociology, oral health, nutrition, psychology, social welfare, occupational therapy, economics, city planning, geography and social policies collaborate as part of JAGES. They engage in research with municipalities, and contribute to designing survey questionnaires and analysing the data that are obtained through the surveys. This has also provided great opportunities for mutual learning and consultations on research methods among the researchers involved.

JAGES' inclusivity and openness has attracted many researchers from across the country, including those in their early career to leading experts in relevant fields. One of the reasons that JAGES has been successful in attracting many researchers from various discplines is that JAGES allows semi-open access to its data. Even if researchers or graduate students have not been directly involved in the design of the JAGES survey, they can access and use the data after they satisfy certain requirements. Researchers are also welcome to suggest survey items to be included in future waves of data collection. This approach has made it possible to generate large-scale longitudinal data with rich contextual information,

and maximise the data usage. Active communication among the researchers is encouraged through regular research meetings. These meetings facilitate collaboration among the researchers to develop new studies and write papers together. The extensive network of collaborating researchers is key to maintaining a strong track record of producing research publications and obtaining research funding, which are necessary for the JAGES initiative to be sustainable. All of this would be very difficult to achieve by an individual researcher. In that sense, it could be said that these processes nurture social capital among the researchers of JAGES.

The concept of 'knowledge creation' is integral to the KT framework on ageing and health *(2)*. JAGES' knowledge creation process is also made possible by the 'linkage and exchange efforts' among researchers in the group. By ensuring that the knowledge created by JAGES is relevant and of high quality, this process can make 'push efforts' to communicate the research evidence more convincing. It can also increase the interests of policy-makers, or 'pull efforts' to use the research evidence for policy and practice.

2.3.4 Community-based participatory research (CBPR)

In some of the municipalities participating in JAGES, community-based participatory research (CBPR) is carried out to encourage local innovations in promoting social participation and preventing functional disability of older people, using the JAGES survey data as a resource. Highlights from case studies of such CBPR projects are shared later in this chapter (*see* 2.4 Case studies).

Box 2.2 What is the Taketoyo salon?

Based on research findings that social participation has a protective effect on the health of older people, several community meeting places called 'salons' have been established around Taketoyo town (Aichi Prefecture) within walking distance of older people's homes, in order to provide them with a place to regularly go and interact with others. The target population for the salons are all older people, not just those at high risk of needing care.

In launching the salons, volunteers were recruited from residents for opening and running the salons. Volunteers were not restricted to older people, but most of them also happened to be aged over 65 years and older. Among residents who showed an interest in participating, eight people were selected to be members of a preparatory committee to create specific proposals for the initial establishment of the salons. After multiple meetings, they decided to initially set up three salons in different places.

Common rules for operating salons were determined by the residents themselves: participants and volunteers could go to any salon without making a reservation in advance, and that they should pay participation fees of 100 Japanese yen per visit (US$ 1 equivalent to 108.8 Japanese yen on average in 2016). Salon events were held once or twice a month, and the volunteers at each one would organize a wide variety of programmes such as healthy exercises, handicrafts, music, games, tea parties, interactions with local nursery school children, and so on.

For the first year, town officials were involved in running the salons, and recruiting and training volunteers. From the second year, volunteers were entrusted by the town administration with the entire process, from planning and operation to budget management. One or two new salons have been added each year, and by the end of March 2017, 13 salons were established throughout the town, with 1063 participants (equivalent to 11.7% of all older people who are not yet dependent on long-term care) and 328 volunteers supporting the salon operation in 2017 alone.

In several of these CBPR projects, the communities decided to create a salon (or *kayoi-no-ba*, in Japanese, meaning a place for regular visits) to encourage older people's social participation. JAGES researchers would participate in establishing, managing and scaling up these social gathering places for older people in equal partnership with the municipal governments, local businesses and community residents. JAGES would also conduct evaluations of the intervention's effectiveness.

In Taketoyo town (Aichi Prefecture), for example, where the salon intervention was commenced in 2006, the proportion of older people who newly developed functional disability (i.e. incident functional disability, defined as receiving first-time certification of the need for long-term health care services) was 50% lower in the intervention group compared to that in the control group in the five years since the salon was introduced *(3)*. Moreover, the likelihood of cognitive decline was 30% less among those in the intervention group than among those in the control group after seven years since the start of intervention *(4)*. These analyses were performed using robust, bias-eliminating analytical techniques (such as propensity score matching and instrumental variable analysis). Surprisingly, in the Taketoyo project (*see* Box 2.2), more older people from low-income groups participated in the salon events than did those from higher-income groups, suggesting the intervention's potential impact on reducing health inequalities as well.

JAGES has also been conducting studies to evaluate the varying levels of researcher engagement with the municipalities and their impact on the way the municipalities work. Specifically, since 2015, JAGES has been evaluating the changes in the levels of cross-sectoral collaboration among administrators and health professionals working in municipal government, comparing those in the intervention group, who are provided with active support and a high level of engagement from JAGES researchers (including through CBPR), and the control group, who are only provided with access to JAGES' data visualization tools with which they can interact with the survey data. The preliminary results showed that those in the intervention group increased their levels of cross-sectoral collaborations.

While CBPR is not performed in all municipalities where JAGES conducts surveys, it is something that JAGES very much values as an approach for KT. It helps to build stronger relationships between the researchers and the research users ('linkage and exchange efforts') and also facilitates the application of local knowledge and innovation to improving people's health. It has also contributed to 'evaluation efforts' of KT which revealed that the active engagement and support by researchers in the KT process contributes to municipal government staff getting out of their silos and working more collaboratively across different sectors.

2.3.5 Data visualization tools to support policy implementation and programme management

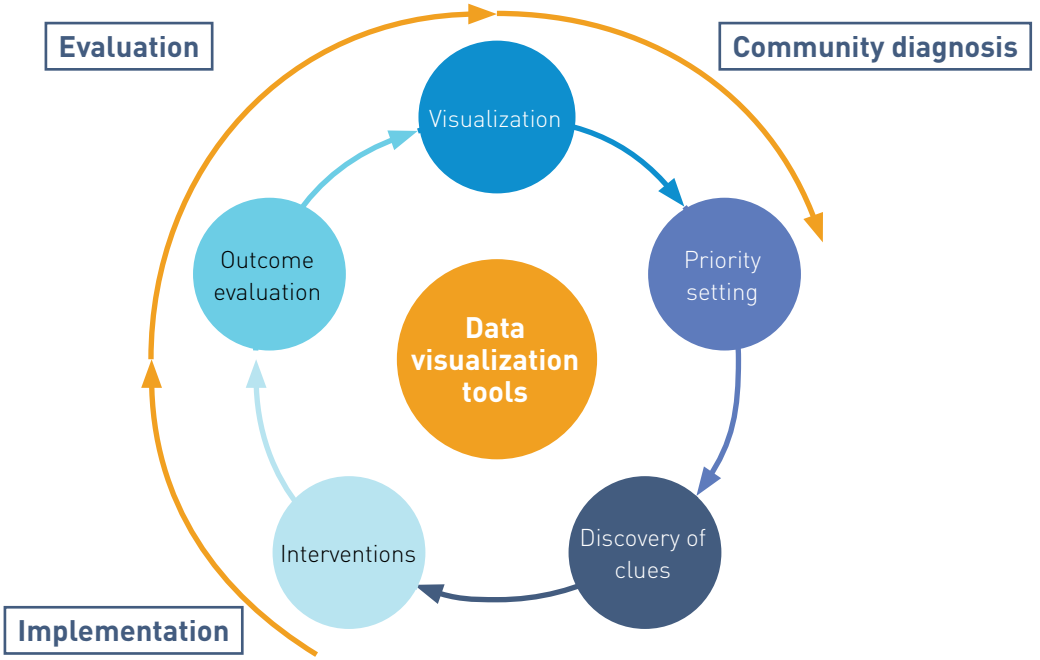
In addition to producing data and analysis, JAGES also develops a range of data visualization tools and products to faciliate administrators in municipal and national governments accessing their data and applying it towards formulating policies and managing related programmes. These data visualization tools are described below.

The JAGES Health Equity Assessment and Response Tool (JAGES–HEART): The basic concept of JAGES–HEART, which focuses on facilitating assessments of

health equity among older populations, was taken from the Urban Health Equity Assessment and Response Tool (Urban HEART) developed by the WHO Centre for Health Development (Kobe, Japan). JAGES–HEART is an online system that visualizes data on indicators that are relevant to managing long-term care services by municipal governments, such as the proportion of older residents at high risk of functional disability or of those already certified as needing long-term care. With a simple operation, the user can display the results of comparisons of these indicators across municipalities or across small areas within a municipality, such as school districts. Those results can also be projected onto maps, which provide an easy, intuitive reference for local administrators and residents when they discuss priority issues or areas to be addressed.

Through developing JAGES–HEART and other data visualization tools described hereafter, JAGES aims to facilitate the integration of research evidence and its application into the policy management cycle at the municipal government level (*see* Fig. 2.3).

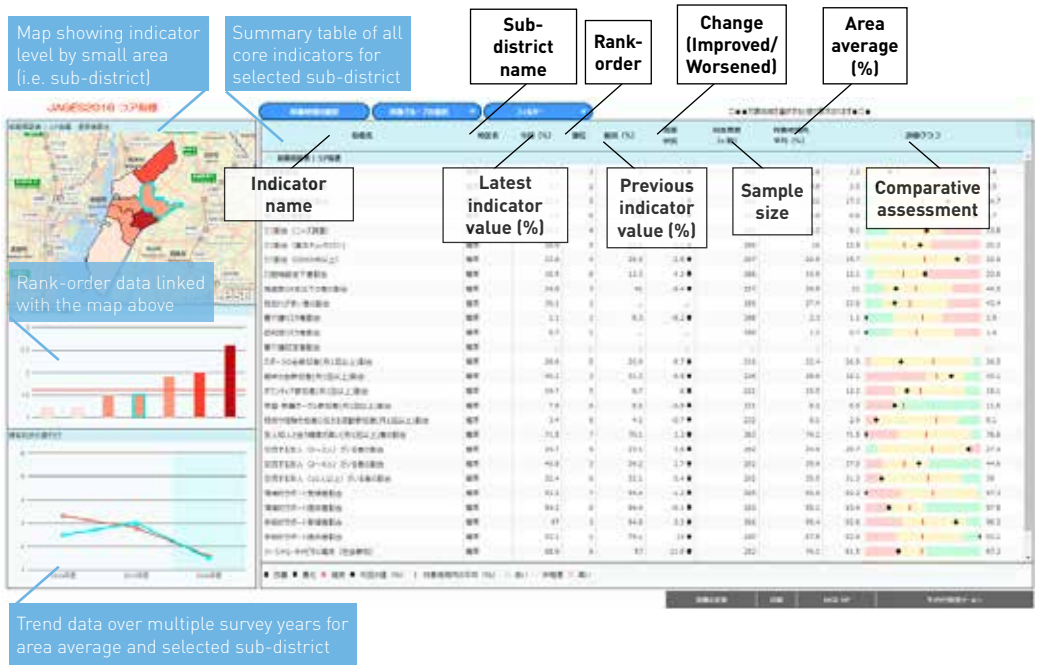
Fig. 2.3 Supporting the policy management cycle with data visualization tools



Community diagnosis (*see* Fig. 2.4): This is a multi-paneled data visualization tool that offers a snapshot of the population's health in a particular community described by various indicators, such as the proportion of older residents at risk of needing long-term care and the availability of social resources for health.

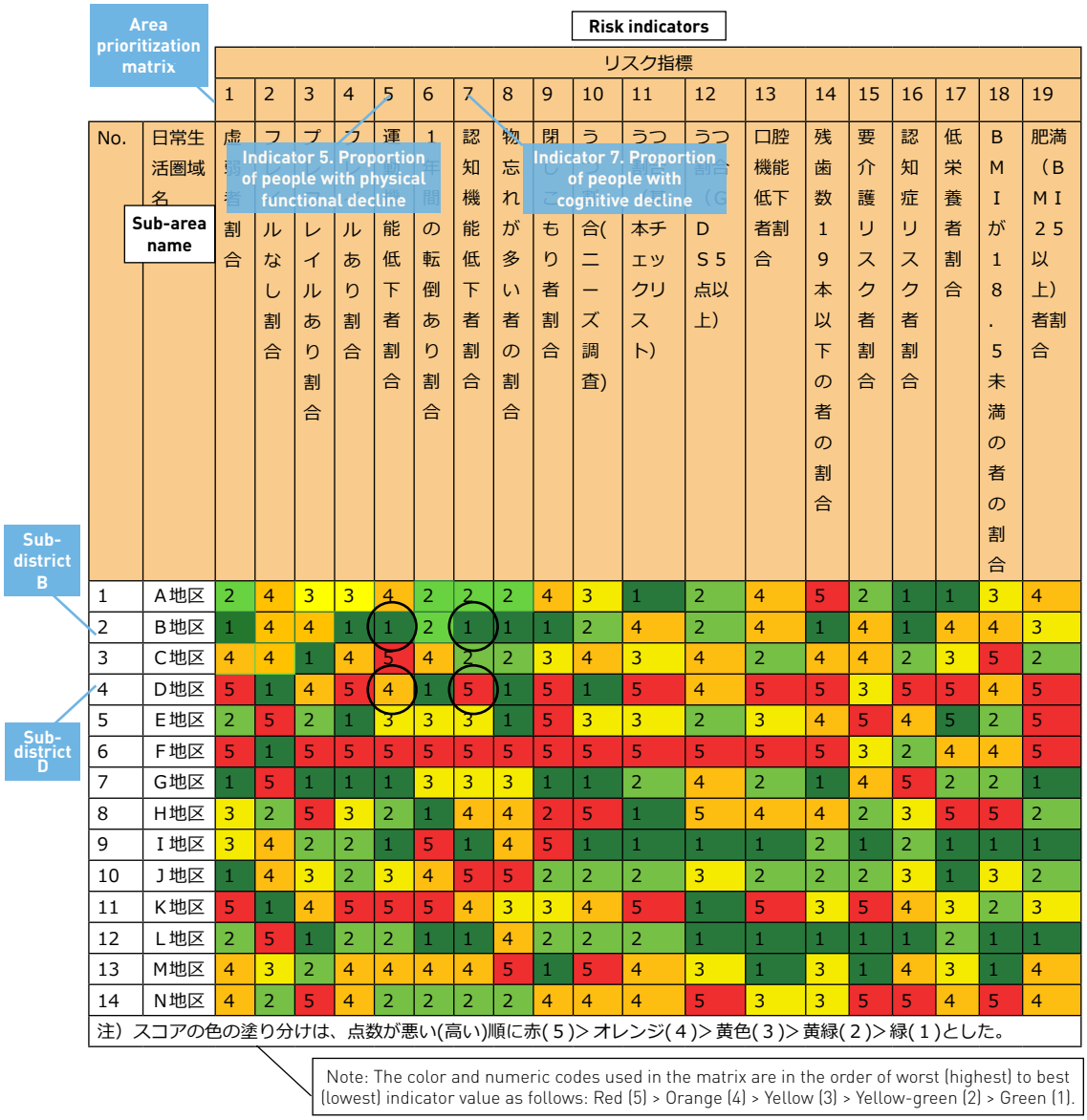
First, users can obtain an overview of the diagnosis from the on-screen display of summary statistics and figures of the core indicators. This diagnostic report presents the results of comparative analysis of the indicators between and within municipalities, as well as the changes in indicators over time. Then users can focus on certain problematic indicators, examine their relationships with other factors, such as possible determinants or interim outcome indicators, and prioritize actions to address the problem.

Fig. 2.4 JAGES data visualization tool: community diagnosis



Priority area selection sheet (*see* Fig. 2.5): This is a spreadsheet that displays the relative status of small areas within a municipality based on a variety of indicators, including risk factors for needing long-term care and community resources for health-promoting activities, using a five-colour coding system ranging from red (very poor status) to green (very good status) based on quintiles of the indicator values. While the community diagnostic report gives a snapshot of one area, this spreadsheet offers a snapshot capturing small areas within a municipality. This is a tool that can facilitate the selection of priority areas for intervention or resource allocation within a municipality, by graphically representing areas where risks or resources cluster together and where coverage gaps exist.

Fig. 2.5 JAGES data visualization tool: priority area selection sheet



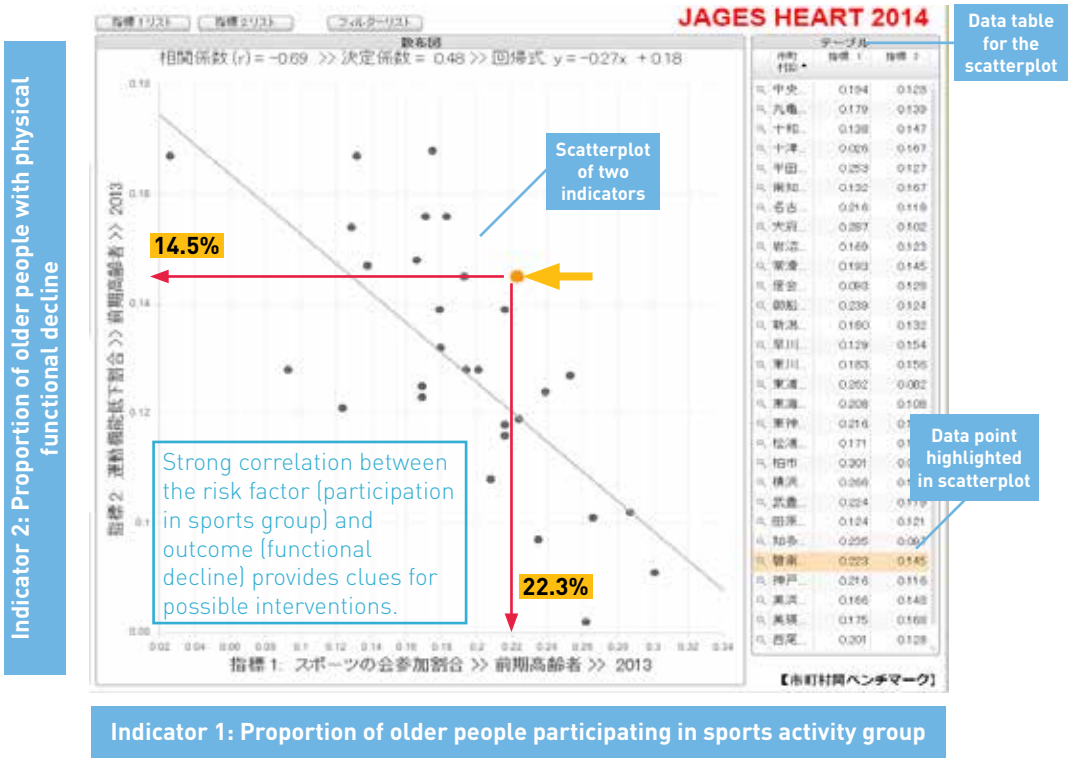
No.	日常生活圏域名	リスク指標 1 虚弱高齢者割合	2 フレイルなし割合	3 プレフレイルあり割合	4 フレイルあり割合	5 運動能低下者割合	6 1年間の転倒あり割合	7 認知機能低下者割合	8 物忘れが多い者の割合	9 閉じこもり者割合	10 うつ合(ニーズ調査)	11 うつ本チェックリスト)	12 うつDS5点以上)	13 口腔機能低下者割合	14 残歯数19本以下の者の割合	15 要介護リスク者割合	16 認知症リスク者割合	17 低栄養者割合	18 BMIが18.5未満の者の割合	19 肥満(BMI25以上)者割合
1	A地区	2	4	3	3	4	2	2	2	4	3	1	2	4	5	2	1	1	3	4
2	B地区	1	4	4	1	1	2	1	1	1	2	4	2	4	1	4	1	4	4	3
3	C地区	4	4	1	4	5	4	2	2	3	4	3	4	2	4	4	2	3	5	2
4	D地区	5	1	4	5	4	1	5	1	5	1	5	4	5	5	3	5	5	4	5
5	E地区	2	5	2	1	3	3	3	1	5	3	3	2	3	4	5	4	5	2	5
6	F地区	5	1	5	5	5	5	5	5	5	5	5	5	5	5	3	2	4	4	5
7	G地区	1	5	1	1	1	3	3	3	1	1	2	4	2	1	4	5	2	2	1
8	H地区	3	2	5	3	2	1	4	4	2	5	1	5	4	4	2	3	5	5	2
9	I地区	3	4	2	2	1	5	1	4	5	1	1	1	1	2	1	2	1	1	1
10	J地区	1	4	3	2	3	4	5	5	2	2	2	3	2	2	2	3	1	3	2
11	K地区	5	1	4	5	5	5	4	3	3	4	5	1	5	3	5	4	3	2	3
12	L地区	2	5	1	2	2	1	1	4	2	2	2	1	1	1	1	1	2	1	1
13	M地区	4	3	2	4	4	4	4	5	1	5	4	3	1	3	1	4	3	1	4
14	N地区	4	2	5	4	2	2	2	2	4	4	4	5	3	3	5	5	4	5	4

注）スコアの色の塗り分けは、点数が悪い(高い)順に赤(５)＞オレンジ(４)＞黄色(３)＞黄緑(２)＞緑(１)とした。

Note: The color and numeric codes used in the matrix are in the order of worst (highest) to best (lowest) indicator value as follows: Red (5) > Orange (4) > Yellow (3) > Yellow-green (2) > Green (1).

Intervention clue finder (*see* Fig. 2.6): This is a tool that allows the user to create a scatter plot of any combination of an indicator of social participation and an indicator of a risk factor for needing long-term care, using the data obtained from the community, and perform a simple bivariate correlation analysis. This tool can be used to explore social factors that may be correlated with risk factors in order to gain some insight into how the risk might be reduced in the community through social interventions.

Fig. 2.6 JAGES data visualization tool: intervention clue finder



While the outputs of these data visualisation tools have limitations from a scientific point of view, such as the inability to produce multivariate analyses that can provide stronger evidence of causal relationships, they have an advantage for KT. These outputs are much more conducive to having discussions with municipal officials and community residents about locally relevant issues and their related factors. The evidence published in peer-reviewed academic publications generally cannot be used directly by municipal officials and residents. The engagement of researchers in the discussions can help avoid any misinterpretations or erroneous conclusions from the data.

These data visualization tools and their application within the JAGES initiative exemplify the 'push efforts' and 'facilitating pull efforts' of the KT framework *(2)* in that they effectively push knowledge out to policy-makers and programme administrators in a user-friendly format, and also enable them to access data that are relevant for their work.

2.3.6 Advocacy via multiple media channels

To make the outcomes of its research known, JAGES has published academic papers and made presentations at conferences, symposia and seminars, maintained a public website and mailing list, and published books for the general reader. Furthermore, JAGES understands that use of the mass media is vital in promoting KT. Accordingly,

it publishes press releases and holds press conferences every two months. This generates extensive exposure through popular media outlets, including newspaper articles, TV/radio spots and interviews in well-known magazines, promoting dissemination of knowledge generated through JAGES back to society. Using this strategy, information on current health inequalities and countermeasures to overcome them are communicated not only to the MHLW and stakeholders of public health problems but also to the general public. This likely contributed to JAGES' research outcomes being included in the discussions of the Diet (or national legislature of Japan), which led to strengthening of policies to protect socially vulnerable people.

This strategic public communication and advocacy is also part of JAGES' deliberate 'push efforts' to promote KT. By increasing public exposure of its research findings, it also increases awareness about the potential utility of this knowledge for policy and programmes, and can act to facilitate pull efforts. The reaction of the media, the public and policy-makers to the dissemination and advocacy efforts can also serve as important feedback for evaluating the effectiveness of KT.

Box 2.3 It began with a lecture...

There is an anecdote from JAGES about how a small effort to communicate research results triggered a cascading effect and led to significant development. Around 2008, Katsunori Kondo, the principal investigator of what was still AGES at the time, gave a lecture on some of the research findings to a group of experts. A city medical official, who attended that lecture and was intrigued by the research, was then temporarily transferred as a deputy director to the Health and Welfare Bureau for the Elderly of the MHLW. At that time, the Ministry was facing two policy challenges: (a) formulating an effective evidence-based policy to prevent functional disability and the consequent need for long-term care; and (b) evaluating the quality of long-term care. The then deputy director remembered the lecture that he had attended and introduced Kondo's work on AGES and quality assessments of long-term care to key people in the Bureau and Ministry. It is believed that this subsequently helped Kondo receive a research grant award from the MHLW for 'Developing a benchmark system for a comprehensive evaluation of the long-term care insurance policy'. The three-year research project (2010–12) was designed to assess the quality of care for both those in need of preventive care as well as those already in need of long-term care. In turn, the project opened the way to expanding the network of participating municipalities throughout the country and scaling up AGES to JAGES.

2.3.7 Strategic fundraising

Strategic fundraising is another key factor that drives and sustains JAGES and its KT. The main financial resources for JAGES are research grants from the national government, commission fees paid by municipalities participating in the survey effort, and small research grants and voluntary contributions from private foundations to support the academic work (*see* Fig. A2.1 in Annex 2).

Municipalities generally have a budget for conducting local needs surveys to inform their long-term care insurance programme. JAGES can tap into this municipal budget by receiving a commission from the municipal goverment to implement the needs survey on their behalf. To sustain funding from municipalities, it is not enough to conduct pure academic research. It is necessary to provide feedback that the local officials need to assess their long-term care insurance programme. In other words, if the knowledge translation is not performed, the municipalities may view JAGES to be useless for their purposes, and decide to drop out of the study.

Large public research grants awarded for 3–5 years' duration by the national government and public research funding bodies are also important financial resources for the sustainability of JAGES. Continuously receiving public funds has enabled JAGES to be recognized as a publicly-funded, long-term research project, which is important for gaining the trust and cooperation from municipalities and residents.

One of the reasons for JAGES' strong track record of obtaining public research funds is that it has successfully identified and addressed policy issues and research themes that would emerge as public priorities in few or several years' time, and has steadily accumulated a body of relevant research evidence. For example, since 1999, JAGES has academic publications and books presenting evidence and theories of health inequalities that arise due to differences in income and education levels, at a time when the term 'health inequality' was not yet common in Japan. It also highlighted the importance of social factors, such as social capital, that determine the health condition of individuals, and contributed to the dissemination of these concepts.

JAGES also revealed the limitation of using a secondary prevention approach in long-term care policies, even before the introduction of the present system in 2006, which adopts a high-risk strategy based on conventional screening of frail older people and providing individual support. JAGES researchers started advocating for the importance of an alternative, population-based primary prevention approach and began conducting CBPR to explore the effectiveness of such an approach in 2006. Moreover, three years before the Act to safeguard older people against abuse was introduced (through the Act on the Prevention of Elder Abuse, Support for Caregivers of Elderly Persons and Other Related Matters, 2006) , it ascertained the actual situation of abuse against older people through its surveys and pointed out

the need for support to the caregivers. It also clarified the importance of objectively measuring and visualizing data on health inequalities and social determinants of health, and developed a prototype data visualization system.

JAGES researchers had the foresight to begin the research on these issues several years – even up to 10 years – in advance of the MHLW putting them on its policy agenda. JAGES planned and implemented its research activities in a sequence of phases to maximize impact on the policy process, starting with the conceptual development, then generating cross-sectional epidemiological research to describe the problems, followed by longitudinal empirical research to reveal causal associations and evaluate the effectiveness of interventions, then developing data visualization tools and benchmarks to be applied to the policy and management cycle, and parallel activities to disseminate the knowledge and tools that were produced.

These achievements have become known to municipalities, the MHLW and other governmental organizations, which partly explains why JAGES has successfully continued to obtain research grants. In other words, the fact that JAGES gained recognition as a successful translational research group has made it possible for it to obtain successive research grants. Efforts to review and refine research plans to enhance their scientific and public value, and the resultant outcomes in terms of obtaining competitive funds is indicative of 'evaluation efforts' of the KT *(2)*. The monitoring of sustained participation and funding from municipalities and related efforts to tailor JAGES' KT to increase policy relevance and uptake also serve the function of evaluating the KT.

2.4 Case studies

In some municipalities, JAGES is conducting CBPR whereby the researchers, the municipal administration, and residents work together on planning preventive care programmes, implementing community interventions and evaluating the impacts. Highlights from case studies of this kind of work in three municipalities in diverse contexts are briefly described below to illustrate JAGES' KT from the perspective of the municipal government officials. Information on the cases were obtained through interviews with the respective municipal government officials.

Case study 1: Taketoyo town, Aichi Prefecture (small local authority)

The town of Taketoyo is 26 km^2 in area with a population of 43 000, of which 23.7% are aged 65 or older (as of 2015). Starting in 2006, officials of Taketoyo town worked with JAGES researchers to develop the concept for a community salon as a primary prevention intervention to reduce the need for long-term care. They jointly carried out workshops and other activities with residents in preparation for the opening of

the salons in 2007. The basis for this local intervention was the central government's preventive care programme, which had just been introduced in 2006. At that time, interventions to reduce the need for long-term care were mostly focused on high-risk approaches, and the preventive effects of social participation and having a social role or responsibility were not well recognized. Thus, the researchers had to explain the importance of the population approach to town hall officials and residents, presenting them with previous case studies from municipalities in the Republic of Korea and Japan that demonstrated the preventive effects of social engagement. This was followed by CBPR, which involved a mix of a top–down method, whereby the town administration presented the outline of their plan to open salons in the community as a preventive care programme, and a bottom–up method, whereby the details of the salon activities were determined by the residents. As a result, the salon project started with two areas of focus: (i) create places for older people to go to within walking distance from their homes; and (ii) carry out the project with the residents as the principal actors (resident-centred).

This project was run by the Welfare Section and Health Section of the town administration, and a social welfare council (a formal NPO that trained volunteers among other things) with expert knowledge of the town and its residents. According to a person in charge in the town administration: "The Welfare Department [now the Health & Welfare Department] manager was in charge of both departments, so while these departments were separate at the time, there were no major issues with communication and decision-making between them".

During the first year after the launch of the salon project, Taketoyo town officials were involved in the salon operations and recruitment and training of volunteers. From the second year onwards, all operations, from planning and operation of the salon project to budget management, were entrusted to volunteers. The only involvement of the government was that officials from the Community General Support Centre attended the Salon Operation Council held every month with the participation of the head volunteer from each salon, to provide support such as consultations regarding the selection of new venues and operations. Furthermore, public health nurses traveled around to each salon, two or three times a year, to give the participants health consultations and health lectures. The Taketoyo town administration provided public facilities to be used as venues for the salon, publicity in the town's public relations magazines, and fiscal support such as operation outsourcing fees, etc. The town administration also organized project meetings where JAGES researchers, officials of the town's Welfare Division, public health nurses, and officials of the Community General Support Centre discuss progress once every three months.

The person responsible for this project within the town administration stated: "We had some anxiety, as this was a radically new method for the town administration to work *with* the residents compared to the conventional style in which the administration would simply provide services *to* the residents. But once we actually started it, we were surprised to learn how much energy the residents infused into the project."

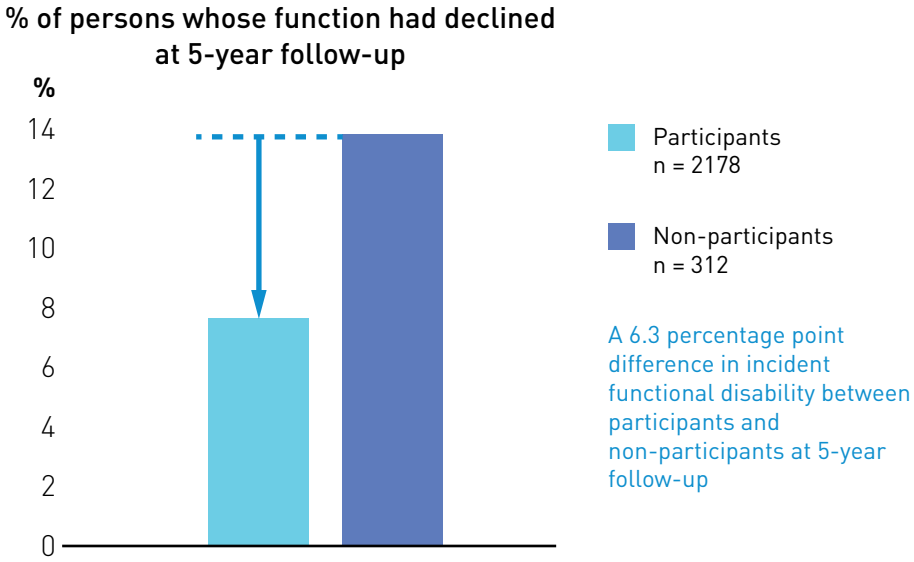
In order to evaluate the intervention effects, researchers requested the municipalities to record individual identifying information of salon participants, and the local Community General Support Centre was responsible for the management of these data. Questionnaire surveys were administered to the salon participants before and after the first salons were established. These questionnaire data were linked to their health and social data that the town administration routinely collects, such as their certification status for needing long-term care or support, health exam results as well as income status. Using these data, the researchers evaluated the effect of salon participation on health. According to officials, initially they did not realize the importance of creating this database and it felt like an extra burden to record individual identifying information of salon participants. However, when the researchers provided the administration and the residents with feedback on the positive health effects of the salon project, they understood the importance of acquiring and storing these data for longitudinal analysis.

The researchers implemented a questionnaire survey not only among the salon participants but also among the volunteers about the instrumental activities of daily living, their psychosocial health, cognitive functions and physical health. The results were promising. For example, among the volunteers who helped organize the salons, 46% reported going out more often due to their involvement in the salon operation, and this figure was 25% among those who only participated in the salon events. Regarding psychosocial aspects, 80% or more of both volunteers and participants aged 65+ reported, "I began to feel happy" and "I had the feeling that people help each other in my community", regardless of differences in the duration of participation, showing that the project fostered well-being and a sense of social support.

Awareness of the the salons also increased in the town, attracting the participation of about 10% of all older people who were not yet certified as requiring care. This project became one of the main pillars of the town's programme to prevent the need for long-term care. Over time, salon participants were able to keep their certification rates for requiring long-term care to about half that of non-participants, with the risk of developing dementia also being lower by 30% in comparison to non-participants (*see* Fig. 2.7). These results were published in academic journals and in the mass media, which helped disseminate knowledge about the effectiveness of such community salons in preventing functional decline. In addition, these results were presented to the MHLW, suggesting that the salon project may be an effective policy measure to decrease older people's need for long-term care. The creation of neighbourhood gathering places for older people, like the salons, are now officially recognized as a viable preventive intervention for older people. Media coverage increased awareness of the town's project nationwide. The town has hosted many visitors from the MHLW, other ministries and agencies, and other local bodies who come to observe and gather information. All this has given the town administration and residents confidence in the programme.

Even now, after 12 years, regular meetings are still held between JAGES researchers and local stakeholders every three months, where they share and discuss progress. Researchers in various fields have been a part of this project since the start, and have contributed to problem solving. The person in charge in the town administration said: "It is very rare for an administration to carry out ongoing research in conjunction with researchers. For the researchers, our town offers a model case for research, and for our town, the researchers bring their own funds and carry out surveys and data analyses that our administrative functions don't allow. We've forged a win–win relationship." However, there are also issues: "In order to advance the community-based integrated care system, we need to increase awareness about the salons among all residents and engage those who have not participated so far."

Fig. 2.7 Result of the salon project in Taketoyo town: Participants maintained their function



Source: Hikichi, H, Kondo, N, Kondo, K et al. Effect of community intervention program promoting social interactions on functional disability prevention for older adults: propensity score matching and instrumental variable analyses, JAGES Taketoyo study. Journal of Epidemiology and Community Health
doi: 10.1136/jech-2014-205345

Case study 2: Kobe city, Hyogo Prefecture (large-scale city)

Kobe is a city with an area of 557 km^2 and a population of 1 540 000, of which 26.8% are aged 65 or older (as of 2015). Kobe city joined JAGES in 2011 recognizing the need to develop evidence-based strategies for preventive care in order to extend healthy life expectancy. They were also specifically interested in evaluating the effectiveness of interventions to prevent the need for long-term care through

promoting community participation. The city has clearly indicated in its municipal action plan for long-term care insurance that it will utilize JAGES survey data for its planning, and has actually been using the various data visualization tools developed by JAGES for managing their preventive care services for older people.

In 2013, the JAGES research team held two workshops in Kobe with city officials, including those responsible for the long-term care insurance programme and for community health services, with a total of 55 participants. The researchers gave lectures on the revisions of the national policy on long-term care insurance as well as the use of JAGES–HEART and other data visualization tools (*see* section 2.3.5). In turn, the city officials reported on the challenges in implementing the preventive care policy. The city officials used JAGES–HEART to identify areas within the city that had a larger number of at-risk older people and jointly discuss the possible causes, which motivated them to perform a community diagnosis and apply the results to programme management. When selecting a few priority areas out of the total of 78 administrative districts within the city to focus their intial efforts on, the city officials requested multifaceted assessments of the districts in terms of not just the health of older people but also their social activities and the existing resources for health and social activities in each district. Taking these requests on board, JAGES developed the priority area selection sheet (*see* Fig. 2.5), which was in fact used as the basis for selecting priority areas for intervention in Kobe city. The person in charge in Kobe commented: "The risk levels of each district are mapped, making them easy to understand, which facilitates our communication with senior city officials and residents". After these initial workshops with JAGES researchers, the city began to frequently organize such staff trainings with researchers from JAGES and elsewhere, which helped facilitate intersectoral collaboration within the city administration.

In 2014, the city launched a salon project as a preventive care strategy in collaboration with the Community General Support Centres and the ward administrations, initially in a few selected priority areas within the city. By 2017, salons had been opened in 10 districts across the city, catering to the diverse needs of older people through a variety of programmes including tea parties, exercises, hobbies, and so on. These salon events were held once or twice a month, each for 1 to 1.5 hours long, and were attended by about 20–50 people each time.

Starting in 2015, the JAGES team expanded its work with Kobe city to help construct a database that merged medical care, long-term care and general health check-up data, along with information on local resources and assets managed by the various departments of the city administration. In addition, personal health data were obtained from salon participants before and after participation in the salon events through objective measurements of their physical strength and activity levels and through questionnaire surveys. An analysis of these data found that salon participants had worse self-rated health and shorter daily walking time compared to non-participants at baseline, but after salon participation, these health indicators had improved and become even better than those among non-participants. Trends were also found

whereby people at higher levels of risk of becoming dependent on personal support or long-term care would participate in salons more frequently, and those who participated more frequently experienced a greater reduction in their risk. The city officials and JAGES researchers discussed how these evaluation results can be best presented and how they should be applied to programme planning and policy-making.

The person in charge at the city administration stated: "JAGES researchers understand how the administrative system works, so they have been able to give us advice about how best to apply the data analysis results to improve our policy measures, and on occasion, will also directly explain to our Public Health and Welfare Bureau chief. We also use JAGES data to provide policy briefings to the mayor and to prepare statements to the city council. In future, we will need estimations of how much local government expenditure on long-term care benefits can be reduced by lowering the population risk of needing long-term care. Also, by participating in the JAGES initiative, we have been able to build networks with researchers in a wide range of fields beyond public health, such as dentistry. The meetings of all the participating municipalities also give us an opportunity to learn what is happening in other ordinance-designated cities like ours, and discuss common issues."

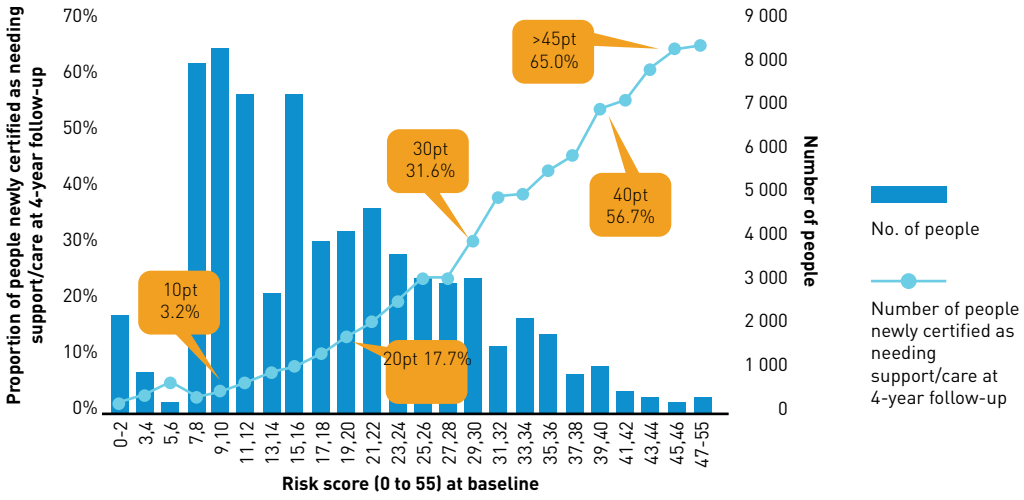
The longitudinal research in Kobe has produced some insightful data. It was found that an older person's risk of becoming functionally disabled (as defined by receiving an official certification of the need for long-term care) can be predicted based on their self-reported answers to a set of 10 basic questions about their health and function *(5)*, their age and sex. A risk score was calculated from these weighted items, and it was found that, for example, of those who had scored 45 points or higher on a scale ranging from 0 to 55 at baseline, 65% of them had become functionally disabled by the end of a 4-year follow-up (*see* Fig. 2.8) *(6)*. In 2017, the city launched a new initiative on "Health-Creating City Kobe," a joint effort by residents, local businesses and the city administration to promote health and reduce health inequalities. The city's Public Health and Welfare Bureau's chief has declared that this initiative will utilize evidence and information such as this from JAGES.

Fig. 2.8 Development of a risk assessment scale predicting incident functional disability among the older population in Kobe

Calculated with Cox proportional hazard model, N = 72,127

		Score
Selected items from the Kihon Checklist 2011		
1. Do you go out by bus or train by yourself?	No	3
2. Do you go shopping to buy daily necessities by yourself?	No	1
3. Do you manage your own deposits and savings at the bank?	No	2
4. Do you normally climb stairs without using handrail or wall for support?	No	5
5. Do you normally stand up from a chair without any aids?	No	3
6. Do you normally walk continuously for 15 min?	No	3
7. Have you experienced a fall in the past year?	Yes	3
8. Do you have a fear of falling while walking?	Yes	3
9. Height: cm, weight: kg, BMI (Body Mass Index): kg/m2		
If BMI is less than 18.5, this item is scored.	Yes	3
10. Do you go out less frequently compared to last year?	Yes	3
Age/Sex		
65 - 69 years old		0
70 - 74 years old		8
75 - 79 years old		15
80 - 84 years old		21
85 years old and older		25
Women		1
Range of total score		0~55

Distribution of risk score and proportion of incident functional disability at 4-year follow-up



Source: Tsuji T, Takagi D, Kondo N, Kondo K: Development of risk assessment scales for Needed Support/Long-Term Care certification: A longitudinal study using the Kihon Checklist and medical assessment data. Nihon Koshu Eisei Zasshi 2017;64:246-257.

Case study 3: Matsudo city, Chiba Prefecture (medium-scale city)

Matsudo is a city with an area of 61 km^2 and a population of 480 000, of whom 25.2% are aged 65 or older (as of 2015). Matsudo city and Chiba University launched a joint research project in November 2016 aimed at developing a resident-centred urban model for preventive care over the course of three years and five months with a vision toward disseminating the model across the nation.

A major feature of this project is to investigate, using a CBPR method, whether it is possible to reduce the need for long-term care through increasing the number of locations for social participation, even in urban areas where social relationships tend to be weaker, by utilizing resources that are unique to urban areas. The number of older people in Japan is starting to decline in rural areas, but will drastically increase in urban areas in the future. The researchers and city officials recognized that it would take too long to open the target number of 500 of these special gathering places for older people if they only relied on the city staff and resident volunteers for the operation. Thus, it was decided to make use of the urban advantage of having access to local residents and businesses with a wide range of specialist skills and experiences. Information sessions were offered to local residents and enterprises to explain the project, followed by workshops to recruit volunteer leaders, and calls for *pro bono* work (i.e. professional work undertaken for the public good without charge) to establish the management body for the project.

In November 2016, a baseline survey was conducted with a representative sample of older people living in Matsudo. The data was used to produce a detailed community diagnosis and to consider ways in which the city could provide support to older residents. A follow-up survey was carried out in November 2017. Additional surveys are carried out with project partners, people who run the gathering places, workshop participants, *pro bono* workers/volunteers, and participants at the gathering places, both before the project started, or at the start of the project, and six months to a year afterwards, to conduct a comprehensive evaluation of this project.

The person responsible within the city administration shared the following view: "As the city administration is a vertically structured organization, it is difficult to communicate with other departments. But by participating in JAGES, we have been able to share the common goal of preventing the need for long-term care among the older residents of this city. The collaboration between academia, industry and municipal government has broadened the city administration's perspective, and has allowed us to offer new proposals to residents. The administration's main concern is what we can do for the residents, but researchers have a strong interest in the effects of the intervention. I feel that the administration and researchers have different ultimate goals, but JAGES researchers listen to us well and they are easy to consult. We will be looking to these researchers to support us in performing outcome evaluations of the interventions."

2.5 Summary

With the background in Japan of the rapid growth in the population of older people and the worldwide climate to reduce health inequity, JAGES gradually developed an effective KT process in the field. This chapter illustrated the seven key drivers of this KT function of JAGES: (a) Establishing win–win relationships with key stakeholders through identifying mutual benefits of collaboration has provided the foundation for the KT. (b) These relationships, which involve multidisciplinary researchers and multisectoral partners, has contributed to the knowledge creation process of JAGES. (c) These relationships sustain the ongoing development of a large-scale, high-quality database and a high level of research outputs. (d) In some cases, CBPR is used to further strengthen these stakeholder relationships and to facilitate the integration of JAGES research findings with local knowledge and assets to co-design innovative, community-based solutions with local partners. (e) Various data visualization tools are developed and continuously improved to facilitate the communication of research findings and their application to local policy development and programme management. (f) Dissemination of the research and related advocacy through multiple channels and formats is key to reach different audiences. This, in turn, can increase the demand for the knowledge and evidence produced by JAGES, and can also enhance its public recognition. (g) Finally, strategic funding has been essential to obtain the financial resources and legitimacy necessary to continue and expand JAGES. Each of these factors corresponds to one or more aspects of the conceptual framework of KT on ageing and health *(2)*. Doing all of these activities well has important implications for the ability of JAGES to sustain itself.

References

1. Pablos-Mendez A, Shademani R. Knowledge translation in global health. J Contin Educ Health Prof. 2006; 26(1):81–6.

2. Ellen ME, Panisset U, Araujo de Carvalho I, Goodwin J, Beard J. A Knowledge translation framework on ageing and health. Health Policy. 2017; 121(3):282–91. doi:10.1016/j.healthpol.2016.12.009.

3. Hikichi H, Kondo N, Kondo K, Aida J, Takeda T, Kawachi I. Effect of a community intervention programme promoting social interactions on functional disability prevention for older adults: propensity score matching and instrumental variable analyses, JAGES Taketoyo study. J Epidemiol Community Health. 2015; 69(9):905–10. doi:ttp://dx.doi.org/10.1136/jech-2014–205345.

4. Hikichi H, Kondo K, Takeda T, Kawachi I. Social interaction and cognitive decline: Results of a 7-year community intervention. Alzheimers Dement. 2017; 3(1):23–32.

5. Satake S et al. Validity of the Kihon Checklist for assessing frailty status. Geriatr Gerontol Int. 2016; 16(6):709–15.

6. Tsuji T, Takagi D, Kondo N, Kondo K. Development of risk assessment scales for Needed Support/Long-Term Care certification: A longitudinal study using the Kihon Checklist and medical assessment data. Nihon Koshu Eisei Zasshi 2017; 64:246–257.

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Chapter 3: Implementing knowledge translation for healthy ageing and UHC

This chapter will discuss implications for other countries based on JAGES' experience described in the preceding two chapters. Chapter 1 described JAGES and its main achievements. Some of the highlights included: (a) building a large-scale, high-quality survey database that allows the use of cross-sectional, longitudinal, and even natural experimental designs to conduct research on a wide range of issues related to ageing and health; (b) producing a high volume of research outputs that offer insights into the causes of health inequalities and functional decline in older age, and effective strategies for prevention; (c) establishing partnerships with a growing number of municipalities across the country to apply the evidence toward the management of local policies and programmes on long-term care; and (d) contributing to national-level policy development and reform. Through these accomplishments, in effect, JAGES has been performing the very important function of KT on ageing and health in Japan for nearly two decades.

In chapter 2, seven key driving factors of JAGES' KT were presented. These are: (a) the win–win relationships that are established among the various stakeholders, in which everyone has something to gain; (b) the multisectoral collaborations that enrich both research and practice; (c) the production of quality evidence based on large-scale survey data that can be linked to relevant administrative data; (d) the CBPR approach to co-produce locally relevant knowledge and solutions with stakeholders; (e) the creation of data visualization and programme management

tools to facilitate the uptake of evidence by stakeholders; (f) the advocacy efforts through diverse media channels to reach different stakeholder groups; and (g) strategic financing to obtain the resources necessary to sustain this initiative. The links between these key driving factors and the conceptual framework of KT on ageing and health *(1)* were briefly mentioned to offer some preliminary theoretical insights into how these factors contribute to KT.

In this final chapter, the generalizability of the JAGES experience to other countries will be discussed. This will be done on two levels. First, the generalizability of the notion that the seven driving factors of JAGES' KT would also promote KT in other contexts will be examined. This will be done by considering the relationship between the seven factors and the conceptual framework of KT on ageing and health *(1)*. Secondly, the applicability of the specific approaches or methods used by JAGES to create knowledge and push it out to potential users will be discussed, bearing in mind the differences in context. Potential barriers or problems in replicating the methods in other contexts will be identified, and where possible, suggestions will be made for adapting JAGES' approach to overcome those challenges. This final chapter will also provide recommendations for both knowledge producers and knowledge users on what can be done to facilitate KT on ageing and health especially in low-resource settings.

3.1 JAGES' driving factors for KT on ageing and health can also be key to realizing KT in other countries

The first question about the generalizability of JAGES' experience is whether the seven factors that drove its KT function in Japan would also be important to make KT happen in other contexts. One way to address this question is by qualitatively assessing whether the seven factors directly contribute to the constructs that comprise the conceptual framework of KT on ageing and health *(1)*. In other words, the KT framework can be used as the theoretical underpinning for generalizing JAGES' driving factors for KT. The KT framework was developed with consideration for developing country contexts. It builds upon existing frameworks and tools on KT that have been applied in countries in Africa, Asia, the Middle East and Latin America to ensure its generalizability *(1,2)*. Therefore, if it can be established that JAGES' seven driving factors directly relate to the constructs in the KT framework, it would lend support to their generalizability to other country contexts.

As already mentioned in Chapter 2, each of the seven driving factors of JAGES' KT do appear to have logical links to most of the key constructs of KT, namely: climate and context; linkage and exchange efforts; knowledge creation; push efforts; facilitating pull efforts; pull efforts; and monitoring and evaluation efforts (*see* Table. 3.1). The win–win relationships (i.e. driving factor no. 1 of JAGES' KT) established between JAGES researchers, national and municipal governments,

funders and community members are essential to the concept of 'linkage and exchange efforts', which is about building relationships between the researchers and knowledge users. The multisectoral and multi-level collaborations (driving factor no. 2) that JAGES builds to both produce and apply knowledge are also an important aspect of this relationship building. These 'linkage and exchange efforts', in turn, are fundamental to all other aspects of the KT framework as an enabler of 'knowledge creation', 'push efforts', 'facilitating pull efforts', etc. The feedback received from stakeholders is also essential to 'monitoring and evaluation efforts'.

Table 3.1 Conceptual mapping between the framework for KT on ageing and health and the driving factors of JAGES' KT

		Driving factors of the JAGES' knowledge translation						
		Win–win relationships	Multisectoral/level collaboration	Production of quality evidence	Community-based participatory research approach	Data visualization and programme management tools	Advocacy	Strategic financing
Concepts in the framework for knowledge translation on ageing and health	Climate and context						◉	○
	Linkage and exchange efforts	◉	◉	○	◉	○	○	○
	Knowledge creation	○	○	◉	◉	◉	○	◉
	Push efforts	○	○	○	◉	◉	◉	◉
	Facilitating pull efforts	○	○	○	◉	◉	◉	
	Pull efforts	○	○		◉			○
	Monitoring and evaluation efforts	○	○				○	○

Notes: Double circle indicates direct correspondence/linkage, while single circle indicates indirect correspondence/linkage.

JAGES' development of quality data and the production of research evidence (driving factor no. 3) that is timely to inform decisions are synonymous with the concept of 'knowledge creation'. The use of a CBPR approach (driving factor no. 4) further enhances the relevance of the knowledge to specific local contexts. These knowledge creation activities are at the core of KT. Without the consistent production of high-quality knowledge that is timely and relevant, the other aspects of KT such as the 'linkage and exchange efforts' and 'push and pull efforts' cannot be successful nor sustained, and the desired outcomes of KT would not be achieved.

Both the use of data visualization tools to make research data more accessible and understandable by lay audiences (driving factor no. 5) and the proactive efforts to disseminate the research to advocate policy change (driving factor no. 6) clearly correspond to the concept of 'push efforts', that is, pushing knowledge out to necessary groups in appropriate formats. CBPR (driving factor no. 4) is also a way to get research evidence into the hands of knowledge users and translate it into practical solutions to real-world problems. These 'push efforts' also facilitate 'pull efforts' by enabling policy-makers and other knowledge users to identify and access research evidence that can be used for decision-making.

Finally, strategic financing (driving factor no. 7) is essential to obtain the resources necessary to initiate, scale-up and sustain all of the activities required for KT. It is a critical enabling factor for most aspects of KT, and particularly for the 'knowledge creation' and 'push efforts'. It can also help facilitate 'linkage and exchange efforts' between the researchers and knowledge users, as the financial resources of the researchers can often benefit other stakeholders. The availability of funding, or the willingness to fund the research, is also an indicator of 'pull efforts' from knowledge users, as well as of the overall 'context and climate' for research and KT. This, in turn, can be used as a form of 'monitoring and evaluation efforts' of KT, where new or continued funding would be an indicator of successful KT (i.e. as a result of the KT, knowledge users appreciated the value of the research and decide to provide funding for the research).

In sum, it can be said that the seven driving factors of KT identified in the case of JAGES would likely apply to other countries because of their direct relevance to the KT framework on ageing and health, whose generalizability including to low- and middle-income countries (LMICs) has already been established. Thus, these can be viewed as useful guidance to promote KT on ageing and health in countries other than Japan. The next section will take a closer look at the specific methods and approaches used by JAGES for KT, and discuss the implications and recommendations for application to other countries with special consideration for LMICs.

3.2 Lessons learnt from the JAGES case study: promoting KT on ageing and health in other countries

3.2.1 Create a climate and context that is favourable towards KT on ageing and health: Take advantage of the global momentum

A key enabler of KT for JAGES is that ageing and health has been a high-priority policy agenda in Japan due to the sharp rise in the ageing population in recent decades and the growing costs of providing health and social care *(3,4)*. This means

that there is interest and motivation among both researchers and government officials to address this issue. Research funding is also available (though not necessarily always adequate or sustainable). This favourable policy climate may be limited in its generalizability to other countries, especially to LMICs. In fact, ageing and health is unlikely to be a prioritized policy area in many LMICs because the impacts of population ageing are not yet felt. In these contexts, old age may be viewed as an indication of good health rather than a concern for health.

However, population ageing is a global trend that is becoming increasingly apparent in LMICs. The number of adults aged 60 and over is expected to double by 2050, reaching nearly 2.1 billion worldwide *(5,6)*. Currently two thirds of old people are living in the developing regions; by 2050, it is expected that nearly 8 out of 10 old people will be living in those regions. The pace of population ageing is also faster in many LMICs than it has been in more developed countries, even faster than that in Japan. Thus, these countries have less time to prepare and respond to the impacts of population ageing.

In view of the challenges and opportunities presented by this global demographic transition, WHO Member States adopted the *Global strategy and action plan on ageing and health 2016–2020* (WHA69.3), which committed every country to act on healthy ageing, and to improve measurement, monitoring and research in order to support a 'Decade of healthy ageing' in 2020–30. The commitment to improve older people's lives is also reflected in the Sustainable Development Goals, which includes the goal to ensure healthy lives and promote well-being for all people *at all ages*, fundamentally through achieving UHC *(7)*. Thus, a global momentum has been created toward achieving healthy ageing and UHC, supported by quality research. Furthermore, LMICs are known to face the double burden of infectious diseases and noncommunicable diseases (NCDs) due to the epidemiological transition *(8)*. As NCDs are associated with age, strategies to ensure healthy ageing can also contribute to NCD prevention and control. These arguments can be used by both knowledge producers and knowledge users in LMICs to create greater demand and support for placing ageing and health on the policy agenda and for conducting and using research to inform relevant policies.

3.2.2 Build relationships between knowledge producers and users: Start small, identify mutual interests and be persistent

Establishing win–win partnerships between knowledge producers (i.e. the researchers) and knowledge users (i.e. mainly municipal governments) has been one of the critical enablers of JAGES' KT. It is due to these collaborative relationships that JAGES is able to conduct large-scale, high-quality, longitudinal population surveys, link the survey dataset to relevant administrative datasets, produce results that are relevant to local policy agenda, and directly inform the local administration with their research. JAGES is fortunate that the climate for

research on ageing and health is relatively favourable in Japan. Still, JAGES faced challenges. JAGES' forward-looking research agenda was not always appreciated by government officals or funders. Research funding from one funder was often insufficient and unsustainable. Vertical, hierarchical relationships were dominant within and between stakeholder organizations, hindering horizontal, multisecotral collaborations. However, JAGES gradually built up their relationships by starting on a small scale, identifying mutual interests with stakeholders to create win–win situations, and being persistent in their efforts over a period of nearly two decades.

Researchers in LMICs may face similar challenges in building effective relationships with multi-level, multisectoral stakeholders. They may face additional challenges, such as low public interest in the topic of ageing and health, lack of a mandate for local governments to conduct population surveys of older people, and insufficient research capacity and funding in the country. However, it is possible to start this relationship-building on a small scale with just a few capable researchers with some resources who can demonstrate the value of research to policy-makers and other knowledge users. The key is to communicate with potential knowledge users (e.g. policy-makers, programme administrators) at an early stage to identify their needs for knowledge and information, and to demonstrate how the research collaboration can fulfill that need. In addition to simply producing data and information, researchers can also offer other benefits to knowledge users, such as technical assistance to analyse and interpret the data and translate them into policy options, which is essentially the function of KT. Once a successful demonstration can be made even on a small scale, it can create trust and buy-in from partners, which can then lead to continued support and possibly scale-up. Wide dissemination of successful cases (such as with the example of Taketoyo town in JAGES) can attract more attention, which can lead to increased support and investment in the research. As greater trust is developed with the partners, the researchers can also have more flexibility to address research questions that are of greater academic/scientific interest.

JAGES also showed that building a network of researchers who can contribute to the implementation research and KT effort is essential for the scale-up and sustainability of the KT initiative over time. In LMICs, the research capacity may still be lacking in areas of ageing and health, public health policy, applied research, and other related fields. Public investment should be made in research capacity building in these areas through education and research funding, as it will have many returns for public policy that are needed to address the impacts of population ageing. In this regard, funders can play an important role in facilitating relationships between knowledge producers and users *(9,10)*. Collaborative partnerships involving researchers and municipal government(s) could be made a condition for funding. This can promote research that inherently involves KT. It can also help build the capacity of researchers to conduct implementation research, as well as the capacity of public officials to use research. Funders can also urge researchers to make the research data public or open access to make it a public

good. Increased funding for research on ageing and health can also help build domestic research capacity in this area, and eventually realize the kind of large-scale research collaboration that JAGES was able to achieve.

3.2.3 Produce quality, longitudinal data: Adapt survey methods to the local context but keep them consistent within the country and across time

Timely, relevant and quality knowledge is essential to KT. Aggregate data for general health and social indicators at the population level, including on older people, are available for most countries from global data sources, such as the WHO Global Health Observatory and other UN initiatives, as well as from national government sources. In LMICs, special surveys of older people may be conducted by international development agencies, such as the WHO Study on Global Ageing and Adult Health. However, in many LMICs, timely and policy-relevant information on ageing and health that are locally managed are not yet available *(6)*. In the long run, countries should aim to conduct nationally representative surveys on a regular basis to build a body of locally-derived evidence on ageing and health, which is something even JAGES has not yet been able to achieve. Ideally, the surveys would be integrated into routine administrative data collection. In the short term, data collection efforts can be started on a smaller scale by limiting the geographic scope of the survey and adapting the method to the local context.

The JAGES survey is a postal survey, and it enjoys a high response rate of about 70%. This is due to several favourable conditions, such as a high-quality household registration system, a well-functioning postal service, a highly literate older population, and a social norm to respond to government-sponsored surveys. JAGES is also able to target their survey to functional older people by using administrative data to screen for those who have not yet been certified as needing long-term care. Many of these conditions may not apply in LMICs. In any case, the data collection method should be adapted to local norms, constraints and opportunities. Where a mail survey is not feasible, face-to-face interviews can be an alternative and effective way to collect survey data. It is less burdensome on the respondent than a self-administered survey, especially on an older person or someone with low literacy *(11)*. The quality of data collected by a trained interviewer can be higher than that of a self-administered survey as the interviewer can assist the respondent in answering the questions, probe for responses and clarify ambiguous responses. Interviews done through home visits also offer the opportunity to establish multiple contacts, such as family, friends and neighbours, for potential follow-up with the older person later on, which can help minimize attrition. Due to the proliferation of mobile phone ownership and network coverage in LMICs, multiple modes of remote data collection are increasingly used for population surveys, including computer-assisted telephone interviews, short message service, web surveys

and others *(12)*. When possible, the choice of data collection method should be informed by the preferences of local partners and potential research participants.

As an example of an effort to adapt JAGES' survey method to other country contexts, there is currently an ongoing project to adapt it to two countries: Malaysia, an upper middle-income country; and Myanmar, a lower middle-income country. This research is being led by researchers in Malaysia and Myanmar, respectively, in collaboration with researchers in Japan, including those involved in JAGES, with co-funding from WHO and the Japan Agency for Medical Research and Development (AMED). In both Malaysia and Myanmar, the survey questionnaires will be adapted to the local cultural context and translated into the local language(s). For example, the description of typical social activities of older adults will differ in each country. These adapted questionnaires will then be pilot-tested and validated in each country before full-scale implementation. The survey will be administered not by mail but by trained interviewers through home visits. For the initial data collection, the survey will only be implemented in a few areas of the country. The plan is to feedback the results to local officials to inform their health and social care policies and planning. The aim is to demonstrate the feasibility and value of conducting such research in order to obtain additional funding to repeat the survey, and possibly expand the survey to other parts of the country.

As a survey database is developed over time, an important principle is to keep the survey method consistent as much as possible (e.g. questionnaire items, question wording, response options, etc.) within the country and over time to ensure comparability. This is especially important when gradually developing a large database so that the data can allow for comparisons and analyses at the sub-national level and across time. The quality and comparability of data are important in order to have value for science, policy and practice. It is also important to develop longitudinal datasets by repeating the survey on the same individuals over time. While collecting personally identifiable data must be done with care to protect the individual's privacy, this allows follow-up with the same respondent. Compared with cross-sectional data, longitudinal data produce stronger evidence of causality and trends, which are essential to policy and programme evaluations. Allowing open access to the data can also help improve the quality of data through the scrutiny of others, and maximize its potential for producing useful evidence. This is particularly the case for data collected in LMICs where domestic capacity for data management and analysis may be limited.

If resources are very limited, alternatives to primary data collection through surveys will need to be considered. Although the analysis of qualitative data is complex and time-consuming, data collected through a relatively small number of key informant interviews and focus groups might be more feasible and still offer deep insights. CBPR is also time-consuming for all those involved but can be conducted on a smaller, more restricted scale than population surveys, and is very effective at closing the gaps that often lie between research and practice,

or between researchers and beneficiaries *(13)*. Other alternatives to primary data collection through surveys include secondary analysis of existing data, such as the harmonized datasets in the Gateway to Global Aging Data[2] or the international datasets archived in the National Archive of Computerized Data on Aging (USA)[3]. Researchers and government bodies can also work together to modify the design of administrative data collection to be more fit for research purposes. For any of these options, there may be a need to strengthen education and training of researchers with the relevant skills as well as raising awareness and building capacity among government officials.

3.2.4 Produce actionable knowledge: Aim the research towards identifying modifiable problems and potential intervention points

In order to inform the development of multisectoral policies that promote healthy ageing and UHC, the survey content should ideally be based on a multidisciplinary, life-course perspective. The life-course approach accounts for individual development across the life span such as individual choices and behaviours, along with contextual factors such as the timing of events and social relationships *(14,15)*. By emphasizing the continuity between earlier and later life stages, this perspective will be useful for making the issue of ageing more relevant to countries with younger populations such as LMICs, and can also provide the basis for health promotion and primary prevention policies that can contribute to healthy ageing and UHC *(16,17)*.

While early phase research tends to focus on understanding the problem, JAGES has shown that in order to have added value for knowledge users, the research should not only identify problems – particularly unmodifiable problems and risk factors (such as biologically determined health inequalities) – but should also point to modifiable problems and risk factors (such as socially-determined health inequalities) and potential entry points for intervention that can be acted upon. In LMICs, where resources for health are already stretched thin, it would be strategic to direct more attention to primary prevention of functional decline in older age rather than to secondary and tertiary prevention strategies that can be more resource intensive. The content of the survey should also be locally relevant and appropriate. Many survey instruments and measures related to ageing and health have initially been developed in high-income countries. Therefore, they would need to be adapted and validated before use in another context.

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2 Gateway to global aging data [website]. Los Angeles: The Center for Economic and Social Research; 2015 (https://g2aging.org/, accessed 18 May 2018).

3 National Archive of Computerized Data on Aging [website]. Ann Arbor: Inter-university Consortium for Political and Social Research (https://www.icpsr.umich.edu/icpsrweb/NACDA/search/studies, accessed 18 May 2018).

While some clues for intervention can be identified by researchers through analysing the data, local knowledge is critical in order for interventions to be feasible, appropriate, and potentially effective. CBPR is used by JAGES to engage community members, the municipal government and researchers in a joint effort to identify modifiable problems, and co-create innovative solutions that are fit for the local context. CBPR has been a useful method for JAGES to not only conduct implementation research, but to also build trust with their partners as it engages all stakeholders in an equal manner in all stages of the research process. It is often implemented on a relatively small scale and facilitates the bidirectional transfer of knowledge and skills between researchers and stakeholders. It also helps develop capacity for research use by stakeholders. It has proven to be a useful method in other countries to facilitate capacity building and policy change to improve health inequity *(18)*, for instance in the USA *(19)*. CBPR has also been effective in LMICs such as those in sub-Saharan Africa *(20)*. On the other hand, a potential barrier to CBPR in LMICs is the power imbalance between the researchers, municipal government officials and community stakeholders due to large differences in education level and social status *(21)*. The problem may be further exacerbated if the academic partners are from high-income countries. However, this problem can be anticipated and mitigated through advance planning to ensure the principle of equitable engagement of all parties. Sensitization workshops about the CBPR method can be held with each stakeholder group in advance to consider how the power imbalances might be mitigated *(22)*.

3.2.5 Get the knowledge into the hands of users: Use data visualization tools and disseminate research strategically

The preceding steps of producing timely, policy-relevant and quality information through research is an essential precondition for pushing the knowledge out to users. However, some creativity is required in communicating the research outputs to lay audiences in order for the information to be actually understood and used. Based on JAGES' experience and other studies *(23–25)*, data visualization – that is, the visual representation of data and information through charts, graphs, pictures, etc. – that allows users to interact with the data can be recommended as a way to facilitate the uptake of research evidence to support public health policy-making. It helps make the data more approachable, interesting and understandable especially for people who are not used to processing research data. In most instances, there is a large amount of data to be presented. Simply converting these into numerous charts and images will not achieve the desired effect. Effective data visualization requires a carefully thought-out design that considers how to present the most relevant information in a meaningful way.

To this end, JAGES has created an English language version of their JAGES–HEART, which could be adapted for use in English-speaking contexts with local data sources. The JAGES data visualization tools make it relatively easy for lay

persons to interact with the data, focus on priority indicators, compare results across time, place and sub-groups, and identify potential opportunities for intervention. Alternatively, there are now several user-friendly data visualization software programs that are widely available. Tableau Software, for example, is used by WHO, and includes a free application. Such tools have become increasingly popular and user-friendly with growing awareness that data visualization is a very effective way of 'packaging' quantitative data, making it more accessible and meaningful to decision-makers *(24,25)*. The WHO Global Health Observatory,[4] for instance, presents most of the data using some form of visualization. Data visualization software programs are becoming more available and affordable to users worldwide, thus making it possible to develop data visualization tools with content that is fit for local purposes.

While computer technology has become widely available throughout the world, there may still be situations in which use of such software is not feasible. Or, for example, the health-related data may not be linked with geographic information data, and thus cannot be layered onto maps using such software. In such cases, paper-based maps and images can be produced manually *(26)*. Allowing users to interact with the data (e.g. having movable parts with stickers or magnets, allowing the user to fill in some parts of the data display) can help facilitate users' engagement with the data.

The gateway to the JAGES data visualization tools is JAGES' website, which is an important communication channel with municipal governments. JAGES' research dissemination and communication is strategic in that it proactively reaches out to different audiences that play a key role in KT. It uses different media channels that are considered to be most appropriate for particular audiences. Academic publications are intended for researchers who may take an interest in the JAGES research initiative and directly or indirectly contribute to the research. Producing a high volume of peer-reviewed publications is essential in building the brand recognition and legitimacy of JAGES in academia. Books and other publications that reach a more general audience help raise public awareness about the issues that JAGES addresses. These can contribute to creating a stronger demand or 'pull' for more research as well as evidence-informed policies on those issues. The mass media, such as TV and newspapers, is also a way to reach the general public and decision-makers to influence public opinion and debates. Rather than passively waiting to be interviewed by journalists, JAGES schedules regular press conferences. Most of these communication channels are available in any country. With the advancement of information and communication technology infrastructure, these channels of communication are increasingly becoming available at cheaper cost around the world. However, the degree to which the dissemination and its desired impact are achieved may depend on several

4 Global Health Observatory (GHO) data [website]. Geneva: World Health Organization (http://www.who.int/gho/en/, accessed 18 May 2018).

contextual factors, such as the extent to which there is free press, the population is literate, information and communication technology is functional, and researchers are skilled communicators. Thus, research dissemination strategies should be appropriate to the context in each country.

Existing relationships between researchers and high-level decision-makers, for example in the national government, can facilitate the process of getting the knowledge into the hands of influential users. In the absence of such relationships, however, the research dissemination activities become very important to increase the visibility and exposure of the research findings among policy-makers and the general public. As the anecdote from JAGES showed, even a seemingly insignificant research dissemination activity like a one-off public lecture has the potential to lead to major developments. While dialogue with high-level policy-makers is important to bring about change in the policy agenda or in actual policies – especially on a national or global level – linkage and exchange efforts with other stakeholders are important in order to influence policy implementation at the local level, as shown in the case of JAGES. This includes relationships with local government authorities, as well as horizontal relationships across government sectors and social sectors (e.g. nongovernmental organizations, private businesses, citizens groups). These relationships can facilitate the KT process to inform policy implementation as well as to enhance the impact of KT. How to develop these kinds of multisectoral relationships was discussed earlier (*see* 3.2.2).

3.2.6 Have a long-term vision and commitment to strengthen research and KT on ageing and health

Common to all of the aforementioned activities is the need for a long-term vision and commitment among stakeholders, whether to recognize population ageing as a priority policy issue before its impacts are felt in the country, or to begin with small-scale, cross-sectional data collection and build a longitudinal database with extended geographic coverage over time. This is all the more important in LMICs where population ageing may still seem like a distant problem and the lack of resources tends to inhibit new or large initiatives. But even JAGES was not built quickly – it started small and gradually developed over nearly two decades to become what it is today. Looked at another way, since these initiatives will take time to develop, it is best to start small and early, and gradually build up those efforts. Then, by the time population ageing becomes a pressing matter in many LMICs, the research and KT processes will be sufficiently developed to effectively inform policies for advancing health and UHC despite the challenges of population ageing.

3.3 Conclusion

The key driving factors for JAGES' KT on ageing and health – from building win–win relationships between knowledge producers and users, to developing quality research evidence and strategically pushing it out to knowledge users – are likely to also be important for enabling KT on ageing and health in other countries. Some of the specific methods and approaches used by JAGES to generate research, or to translate it into practical solutions, are conditional on the particular context in Japan. However, there are generalizable aspects as well as ways to adapt them to different country contexts, and even to different areas of health and social policy, for example, to address NCDs.

Box 3.1 Lessons from JAGES for promoting knowledge translation on ageing and health in other countries

1. Create a climate and context that is favourable towards KT on ageing and health: Take advantage of the global momentum towards improving the lives of older people.
2. Build relationships between knowledge producers and users: Start small, identify mutual interests and be persistent.
3. Produce quality, longitudinal data: Adapt survey methods to the local context but keep them consistent within the country and across time.
4. Produce actionable knowledge: Aim the research towards identifying modifiable problems and potential intervention points.
5. Get the knowledge into the hands of users: Use data visualization tools and disseminate research strategically.
6. Have a long-term vision and commitment to strengthen research and KT on ageing and health.

Based on this reflection, some general conclusions and recommendations could be drawn from JAGES' experience to promote KT on ageing and health in other countries (*see* Box 3.1). First, it is important for the local social and policy climate to be favourable towards research on ageing and health and the use of research for policy-making. In LMICs, both researchers and policy-makers can take advantage of the global momentum toward improving the lives of older people *(16)* and addressing the NCD challenge *(27)* to create a positive climate toward addressing the health system impacts of population ageing. Secondly, building relationships between knowledge producers and users is a critical enabler of KT. Researchers in countries with limited resources can start on a small scale to demonstrate the benefits of collaborative research to stakeholders and gradually build up their network of partners over time. Funders of research can facilitate

such relationships and KT from research to practice by incorporating them into their conditions for funding *(9)*. Thirdly, the quality of data is essential in order for it to have value for science as well as policy-making. Survey methods should be adapted to the constraints and opportunities in the local context but should be kept the same across time and place (especially within a country) to ensure consistency and comparability of the data. As much as possible, longitudinal data should be developed over time to allow for analysis of trends and causal relationships. Allowing open access to the data can help improve the quality of data through the scrutiny of others, and maximize its potential for producing useful evidence. Fourth, the research should not only focus on understanding the problems but should also aim to identify potential solutions, as this adds value for decision-makers. CBPR, with its emphasis on full and equal participation of community members, is an effective method to facilitate local innovations for problem-solving through the application of research *(18)*. Fifth, strategic and creative approaches are important to effectively communicate research outputs to diverse stakeholders to create social change. Data visualization is an increasingly popular tool for communicating quantitative information to broad audiences *(24)*. Strategic use of mass media can increase public exposure of the research and successful examples of KT, which in turn can increase demand for more research and KT. Finally, having a long-term vision and commitment to strengthen research and knowledge translation on ageing and health is important. Investing early in these areas will have the pay-off of having a well-developed system for research and knowledge translation that can inform policies on health and UHC well in advance of, or just in time to address, the challenges of population ageing. This is all the more important in LMICs where population ageing may still seem like a distant problem and the lack of resources tends to inhibit new or large initiatives.

References

1. Ellen ME, Panisset U, Araujo de Carvalho I, Goodwin J, Beard J. A knowledge translation framework on ageing and health. Health Policy. 2017; 121(3):282–91. doi:10.1016/j.healthpol.2016.12.009.

2. Araujo de Carvalho I, Byles J, Aquah C, Amofah G, Biritwum R, Panisset U et al. Informing evidence-based policies for ageing and health in Ghana. Bull World Health Organ. 2015; 93:47–51.

3. Muramatsu N, Akiyama H. Japan: super-aging society preparing for the future. Gerontologist. 2011; 51(4):425–32.

4. Ogawa N. Population aging and policy options for a sustainable future: the case of Japan. Genus. 2005; 62:369–410.

5. World Population Ageing 2017 – Highlights (ST/ESA/SER.A/397). United Nations, Department of Economic and Social Affairs, Population Division; 2017.

6. World report on ageing and health. Geneva: World Health Organization; 2015.

7. UN General Assembly, Transforming our world: the 2030 Agenda for Sustainable Development, 21 October 2015, A/RES/70/1 (http://www.refworld.org/docid/57b6e3e44.html, accessed 17 April 2018).

8. Remais JV, Zeng G, Li G, Tian L, Engelgau M. Convergence of non-communicable and infectious diseases in low- and middle-income countries. Int J Epidemiol. 2013; 42(1):221–7. doi:10.1093/ije/dys135.

9. Lyall C, Bruce A, Marsden W, Meagher L. The role of funding agencies in creating interdisciplinary knowledge. Sci Public Policy. 2013; 40:62–71. doi:10.1093/scipol/scs121.

10. Van Bekkum JE, Fergie GM, Hilton S. Health and medical research funding agencies' promotion of public engagement within research: a qualitative interview study exploring the United Kingdom context. Health Res Policy Syst. 2016; 14:23. doi:10.1186/s12961–016–0093–4.

11. Bowling A. Mode of questionnaire administration can have serious effects on data quality. J Public Health. 2005; 27(3):281–91. doi:https://doi.org/10.1093/pubmed/fdi031.

12. Rosskam E, Hyder A, eds. Johns Hopkins University theme issue (2017): use of mobile technologies for national-scale population surveys. J Med Internet Res. 2017; 19(5).

13. Gibbs L, Gold L, Kulkens M, Riggs E, van Gemert C, Waters E. Are the potential benefits of a community-based participatory approach to public health research worth the potential costs? Just Policy: a journal of Australian social policy. 2008; 47:54–9.

14. Elder GH Jr, Johnson MK, Crosnoe R. The emergence and development of life course theory. In: Mortimer JT, Shanahan MJ, editors. Handbook of life course. New York: Springer; 2003:3–19.

15. Cable N. Life course approach in social epidemiology: an overview, application and future implications. J Epidemiol. 2014; 24(5):347–52.

16. Multisectoral action for a lifecourse approach to healthy ageing: draft global strategy and plan of action on ageing and health. In: Sixty-ninth World Health Assembly. Geneva: World Health Organization; 22 April 2016 (http://apps.who.int/gb/ebwha/pdf_files/WHA69/A69_17-en.pdf, accessed 14 April 2018).

17. Tollman SM, Norris SA, Berkman LF. Commentary: The value of life course epidemiology in low- and middle-income countries: an ageing perspective. International Journal of Epidemiology. 2016; 45(4):997–9. doi:https://doi.org/10.1093/ije/dyw109.

18. Wallerstein N, Duran B. Community-based participatory research contributions to intervention research: the intersection of science and practice to improve health equity. Am J Pub Health. 2010; 100:S40–6. doi:10.2105/AJPH.2009.184036.

19. Israel BA, Coombe CM, Cheezum RR, Shultz AH, McGranaghan RJ, Lichtenstein R et al. Community-based participatory research: a capacity-building approach for policy advocacy aimed at eliminating health disparities. Am J Pub Health. 2010; 100(11):2094–102. doi:10.2105/AJPH.2009.170506.

20. Wilson KD, Wood, SJ, Embry E, Wright KS. Using a community-based participatory research approach to create a competency based health systems strengthening curriculum in a developing country. J Health Adm Educ. 2016; 33(1):121–40.

21. Puffer ES, Pian J, Sikkema KJ, Ogwang-Odhiambo RA, Broverman SA. Developing a family based HIV prevention intervention in rural Kenya: challenges in conducting community-based participatory research. J Empir Res Hum Res Ethics. 2013; 8(2):119–28. doi:10.1525/jer.2013.8.2.119.

22. Freudenberg N, Tsui E. Evidence, power, and policy change in community-based participatory research. Am J Pub Health. 2014; 104(1):11–4.

23. Zakkar M, Sedig K. Interactive visualization of public health indicators to support policymaking: An exploratory study. Online J Public Health Inform. 2017; 9(2):e190. doi:10.5210/ojphi.v9i2.8000.

24. Shneiderman B, Plaisant C, Hesse BW. Improving healthcare with interactive visualization. Computer. 2013; 46(5):58–66.

25. Otten JJ, Cheng K, Drewnowski A. Infographics and public policy: using data visualization to convey complex information. Health Aff. 2015; 34(11):1901–7.

26. Sethi V, Agarwal S. Slum-community federations adapt WHO Urban-HEART to assess and address health inequities at ward-level in Indore, India. Paper presented at the 13th World Congress on Public Health World Health Organization, Addis Ababa, 23–27 April, 2012.

27. Resolution WHA66.10. Follow-up to the Political Declaration of the High-level Meeting of the General Assembly on the Prevention and Control of Non-communicable Diseases. In: Sixty-sixth World Health Assembly, Geneva, 20–27 May 2013. Resolutions and decisions, annexes. Geneva: World Health Organization; 2013:16–21 (WHA66/2013/REC/1; http://apps.who.int/gb/ebwha/pdf_files/WHA66-REC1/A66_REC1-en.pdf, accessed 7 September 2018).

Glossary

Community-based integrated care system *(1)*	A public system implemented in Japan that ensures the provision of integrated health and social care, including prevention, treatment, nursing, housing and livelihood support, with the aim of enabling older people to live as they wish in environments familiar to them as long as possible, even if they become heavily in need of long-term health care.
Gini coefficient *(2)*	An indicator of the extent to which the distribution of income (or, in some cases, consumption expenditure) among individuals or households within an economy deviates from a perfectly equal distribution.
2011 Great East Japan (Tohoku) earthquake and tsunami *(3)*	Japan earthquake and tsunami of 2011, also called Great Sendai Earthquake or Great Tōhoku Earthquake, a severe natural disaster that occurred in northeastern Japan on 11 March 2011. The event began with a powerful earthquake off the northeastern coast of Honshu, Japan's main island, which caused widespread damage on land and initiated a series of large tsunami waves that devastated many coastal areas of the country, most notably in the Tōhoku region (north-eastern Honshu). The tsunami also instigated a major nuclear accident at a power station along the coast.
Health inequality and inequity *(4)*	Health inequalities can be defined as differences in health status or in the distribution of health determinants between different population groups. For example, there are differences in mobility between older people and younger populations or differences in mortality rates between people from different social classes. It is important to distinguish between inequality in health and inequity. Some health inequalities are attributable to biological variations or personal behaviours, while others are attributable to the external environment and conditions mainly outside the control of the individuals concerned. In the first case, it may be impossible or ethically or ideologically unacceptable to change the health determinants and so the health inequalities are unavoidable. In the second, the uneven distribution may be unnecessary and avoidable as well as unjust and unfair, so that the resulting health inequalities also lead to inequity in health.

Health Japan 21 (the second term) ***(5)***	Japan's current ten-year strategic plan for health promotion, which came into effect in 2013. It is the second term of the "National Health Promotion Movement in the 21st Century (Health Japan 21)". The policies, ideas, and specific goals that form the basis of Health Japan 21 are included in the "Basic Direction for Comprehensive Implementation of National Health Promotion", which was established by the Japanese Minister of Health, Labour, and Welfare in accordance with Article 7 of the Health Promotion Act in 2003, and later significantly amended in 2012.
High-income countries ***(6)***	Countries with a gross national income per capita of US$12 236 or more in 2016, calculated using the World Bank Atlas method.
High-risk approach ***(7)***	The high-risk approach focuses public health interventions on individuals identified to be at high risk of certain conditions through screening tests and other mechanisms. See also *population approach*.
Knowledge translation ***(8)***	The synthesis, exchange and application of knowledge by relevant stakeholders to accelerate the benefits of global and local innovation in strengthening health systems and improving people's health.
Long-term Care Insurance Act ***(9)***	The purposes of this Act are to improve health care services and to enhance the welfare of citizens by establishing a social insurance system for long-term care in order to provide benefits pertaining to the health and welfare services that are necessary for people with long-term care needs to live out their lives with dignity and independence in their daily routines according to each person's level of capacity. The care levels certified by the government in the insurance system are divided into seven; i.e. support level 1–2, care level 1–5. It covers people who are certified with needs for long-term care due to illnesses or other conditions resulting from age-related declines in physical, mental or cognitive health. Long-term care can include personal care for daily activities such as bathing, defaecation/urination and meals, as well as functional training/rehabilitation, nursing, disease management and other medical care provided through either in-home services or facility- based services. Insurers are the municipalities or special departments in the metropolitan area who provide services under the guidance of the central government and prefectural governments.

Low-income countries *(6)*	Countries with a gross national income per capita of US$1005 or less in 2016, calculated using the World Bank Atlas method.
Middle-income countries *(6)*	Countries with a gross national income per capita of between US$1006 and US$12 235 in 2016, calculated using the World Bank Atlas method.
Municipal 'business plan' for long-term care insurance *(10)*	This plan determines the goals for the services of the long-term care insurance programme administered by the individual municipalities (i.e. the insurers), which shapes the services provided to the insured individuals. The prefectures also formulate plans to provide support to the insurers and ensure efficient delivery of insurance benefits for the operation of care facilities in each wide area (comprising multiple municipalities), which is defined by each prefecture.
National health insurance system in Japan *(11)*	Japan has universal health insurance coverage. By law, all residents in Japan are covered by public medical insurance.
Population approach *(7)*	The population approach focuses public health interventions on the underlying causes of poor health across the whole population. See also *high-risk approach*.
Social capital *(12)*	Resources that are accessed by individuals as a result of their membership of a network or a group.
Social determinants of health *(13)*	The conditions in which people are born, grow, work, live and age, and the wider set of forces and systems shaping the conditions of daily life. These forces and systems include economic policies and systems, development agendas, social norms, social policies and political systems.
Socioeconomic position *(12)*	Social standing captured by three dimensions: education, employment and income, which determines the direction of individual health through shaping other social determinants of health.
Universal health coverage *(14)*	All people receive the health services they need, including public health services designed to promote better health (such as anti-tobacco information campaigns and taxes), prevent illness (such as vaccinations), and to provide treatment, rehabilitation and palliative care (such as end-of-life care) of sufficient quality to be effective, while at the same time ensuring that the use of these services does not expose the user to financial hardship.

References

1. Establishing the 'community-based integrated care system'. In: Ministry of Health, Labour and Welfare [website] (http://www.mhlw.go.jp/english/policy/care-welfare/care-welfare-elderly/dl/establish_e.pdf, accessed 12 April 2018).

2. Glossary of statistical terms: Gini coefficient. In: OECD (https://stats.oecd.org/glossary/detail.asp?ID=4842, accessed 12 April 2018).

3. Pletcher K, Rafferty JP. Great East Japan (Tohoku) earthquake and tsunami of 2011. In: Encyclopaedia Britannica (https://www.britannica.com/event/Japan-earthquake-and-tsunami-of-2011, accessed 12 April 2018).

4. Health impact assessment (HIA). Glossary of terms used: health inequality and inequity. In: World Health Organization (http://www.who.int/hia/about/glos/en/index1.html, accessed 12 April 2018).

5. Health Japan 21(the second term) [Website]. Tokyo: Ministry of Health, Labour and Welfare (http://www.mhlw.go.jp/seisakunitsuite/bunya/kenkou_iryou/kenkou/kenkounippon21/en/kenkounippon21/index.html, accessed 12 April 2018).

6. World Bank Country and Lending Groups [website]. Washington DC: The World Bank (https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups, accessed 12 April 2018).

7. Rose G. The strategy of preventive medicine. Oxford: Oxford University Press; 1992.

8. Pablos-Mendez A, Shademani R. Knowledge translation in global health. J Contin Educ Health Prof. 2006; 26(1):81–6.

9. Long-term Care Insurance Act [website]. Tokyo: Ministry of Health, Labour and Welfare (http://www.japaneselawtranslation.go.jp/law/detail_main%3Fvm%3D%26id%3D94, accessed 13 April 2018).

10. Preparing for smooth implementation of the Long-Term Care Insurance System. In: Annual Reports on Health and Welfare 1998–1999. Part 2: Activities of Health and Welfare Administration [website]. Tokyo: Ministry of Health, Labour and Welfare (http://www.mhlw.go.jp/english/wp/wp-hw/vol1/p2c2s1.html, accessed 13 April 2018).

11. Asia Pacific Observatory on Health Systems and Policies. Japan: health system review. Health Systems in Transition. 2018;8(1) (http://apps.who.int/iris/bitstream/10665/259941/1/9789290226260-eng.pdf, accessed 13 April 2018).

12. Berkman LF, Kawachi I, Glymour MM, editors. Social epidemiology, second edition. Oxford: Oxford University Press; 2014.

13. Social determinants of health. In: World Health Organization (http://www.who.int/social_determinants/en/, accessed 13 April 2018).

14. World Health Organization, World Bank. Tracking universal health coverage: first global monitoring report. Geneva: World Health Organization; 2015 (http://apps.who.int/iris/bitstream/10665/174536/1/9789241564977_eng.pdf, accessed 13 April 2018).

Annex 1: Background and context in Japan

In this annex, we discuss the ageing trend in Japan, which was the backdrop to the development of the JAGES initiative, the changes in general health policies and specific policies to prevent the need for long-term care, and the contribution of AGES/JAGES to those policies.

Japan became the country with the world's longest life expectancy in a relatively short period of time. Since the 1990s, the country has been proceeding with policies such as the expansion and review of measures and systems for handling the growth in healthy life expectancy with an increase in older people needing long-term care.

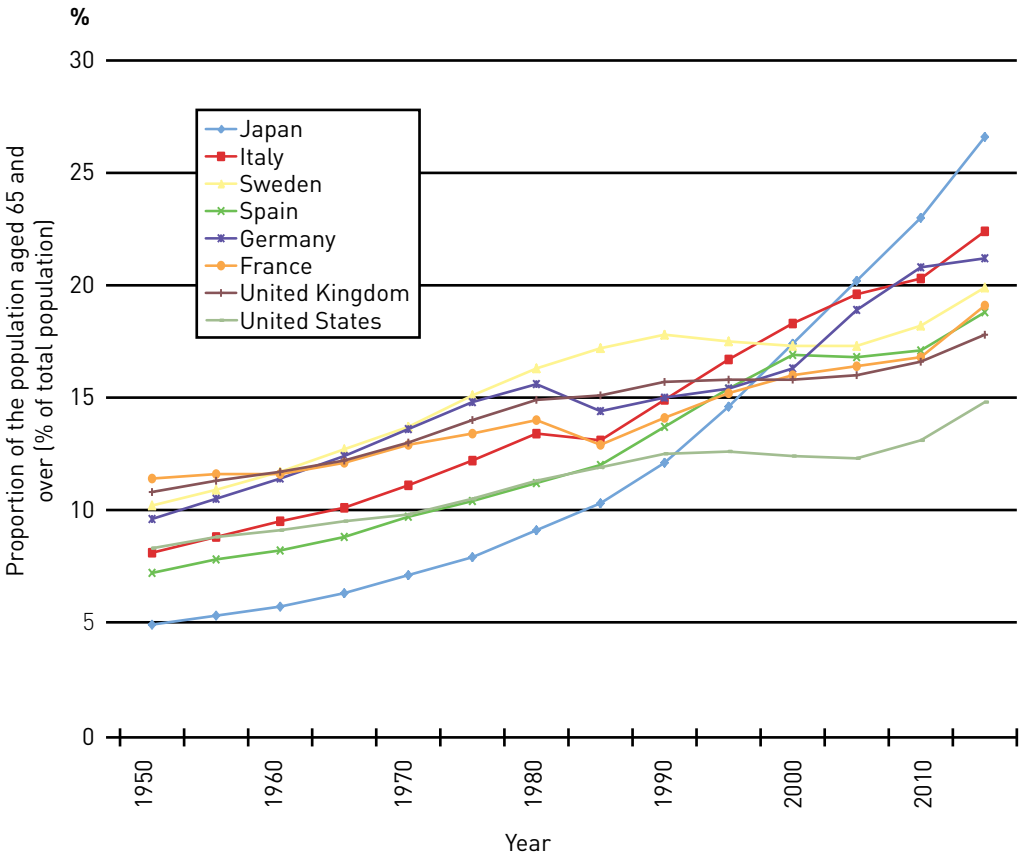
Health Japan 21 (the first term, from 2000 to 2012) aimed to promote healthy behaviours through a strategy that focused on high-risk individuals. However, many of the numerical targets were not achieved. In response to the rising domestic social inequalities and the 2009 World Health Assembly resolution on *Reducing health inequities through action on the social determinants of health* (WHA62.14), Health Japan 21 (the second term) set forth new goals for reducing health inequalities and creating social environments that contribute to health promotion. Health Japan 21 referred to publications from AGES, which had revealed health inequalities in Japan and related social determinants of health.

After the long-term care insurance system was introduced in 2000, municipalities were required to develop, once every three years, a long-term care insurance plan that satisfies local needs. JAGES saw this as an opportunity and began collaborating with municipalities to jointly implement needs surveys. After an initial review of the long-term care insurance policy, a new system was put in place in 2006, which was focused on the prevention of the need for long-term care as a countermeasure for the rapid increase in people who were certified as needing varying levels of long-term care. The proposed prevention strategy was based on a high-risk approach, which involved screening for high-risk people through medical check-ups and recommending them to take classes on preventive care – but this strategy did not achieve the policy objectives. For that reason, in 2014, another review of the policy was carried out and, at that time, the findings of JAGES were taken into consideration. In particular, the evidence that there were fewer people at risk of needing long-term care in areas with greater social participation, and the results from the Taketoyo project (*see* Chapter 2, section 2.4, case study 1) provided the justification for policy-makers to consider a shift in strategy from a high-risk approach to a population approach, and to recognize the importance of community building as a way to prevent the need for long-term care.

Trends in the population structure of Japan[5]

The population structure of Japan has aged as a consequence of extended longevity and a falling birth rate. In 1950, the population of people aged 65 years or older was less than 5% of the total population. By 1970 it had exceeded 7%, and by 1994 it had exceeded 14%. In 2016, the population ageing rate had reached 27.3% (*see* Fig. A1.1).

Fig. A1.1 International comparison of population ageing rates



One factor behind the acceleration of population ageing is the large decline in mortality due to improvements in living conditions, diet and nutrition, and advancements in medical technology. Another reason is that the first generation of 'baby boomers', born between 1947 and 1949 (8 057 054 births), began to transition into older age from around 2012.

The decline in the number of births is another cause for the increase in population ageing. At the time of the first baby boom from 1947 to 1949 the total fertility rate (i.e. average number of children born to a woman over her lifetime) in Japan was

5 The facts indicated in this section are from the Japanese Cabinet Office (2017) unless stated otherwise.

4.32. Subsequently it declined and in 2005, it reached an all-time low of 1.26. Subsequently, there was a slight recovery and in 2015 it reached 1.45.

Since 2005, the population ageing rate in Japan has remained high, even compared to developed countries in Europe and the USA (Fig. A1.1). Until the 1980s, Japan's population ageing rate ranked low compared to other countries, but it rose to reach the median levels by the 1990s, indicating the rapid pace of ageing during those years. Comparing the number of years taken from when the ageing rate reached 7% to when it doubled to 14%, France took 115 years and Sweden took 85 years; however, in Japan it was a mere 24 years.

Social transitions in post-war Japan have played a significant role in causing the falling birth rate and rising ageing rate in Japan. The extent and speed of progression of the decline in fertility and population ageing are unprecedented among developed countries. The development and consequences of the policies that were put in place since the 1990s in response to this demographic transition in Japan can provide important lessons for other countries facing a rapidly falling birth rate and increasingly ageing population.

Policies for health and older people since 1990

The second National Health Promotion Movement, which was implemented in 1988, is also called the Active 80 Health Plan. It aims to enhance the health of older people in their eighties so that "even after people reach 80 they can take care of themselves and engage in social activities".

In the welfare system, enhancements were made to meet the long-term care needs of older people, who were increasing in number as population ageing progressed. At that time, long-term care of older people was provided largely by their families, but due to the ongoing transition to 'nuclear' families, the problem of aged spouses providing long-term care for their older partner began to surface. The media frequently reported cases of an aged caregiver killing the older person/people under their care before committing suicide. Family caregiving was even referred to as "long-term care hell" in mass media. These social phenomena created mounting pressure to strengthen social systems and services to support the long-term care of older people.

In 1990, the 10-year strategy for the promotion of health and welfare for older people (commonly known as the 'Gold Plan') was implemented, which required municipalities to ascertain the needs of older people and then establish a plan for ensuring their health and welfare. These plans were to be aimed at enhancing not only facility-based care but also home-based welfare services.

In 2000, new policies on health care and long-term care, respectively, were introduced to enhance healthy life expectancy and to strengthen the response to the declining fertility rate and population ageing. The former was Health Japan 21 and the latter was the long-term care insurance system.

In this context, the AGES project, which is the predecessor of JAGES, began in 1999 with only two participating municipalities in Aichi Prefecture. Its objective was to understand what changed for older people before and after the introduction of the long-term care insurance system in 2000, in order to carry out a policy evaluation.

National Health Promotion Movement

Health Japan 21

The National Health Promotion Movement, commonly known as Health Japan 21, started in 2000. One of its characteristics was that it set specific numerical targets for a wide range of health risk factors, such as nutrition and diet, physical activity, mental health, smoking, drinking and oral hygiene. In addition, it set targets for specific NCDs such as diabetes, cardiovascular diseases and cancer.

Furthermore, in parallel with the implementation of Health Japan 21, from 2008 onwards, the high-risk approach of detecting metabolic syndrome early through health check-ups and providing health guidance was bolstered.

Expansion and increasing visibility of poverty and inequalities

Japan used to be a country with less income inequality and a smaller Gini coefficient than most other developed countries. However, widening social inequalities, such as in education and income, became more evident in recent decades due to various factors. For example, the central administration during 2001 to 2006 made various attempts to break the country out of its prolonged economic stagnation through policies to make a smaller, more efficient government, and reducing the role of the state. A policy was also introduced to revise the lifetime employment system in companies, which led to the increase in nonregular employment. Meanwhile, the average salary income declined and the poverty rate rose.

Against this historical backdrop, two documents: *A society with health inequalities: what affects mental and physical health? (1);* and *Exploring inequalities in health: a large-scale social epidemiological survey for the prevention of long-term care need in Japan (2, 3)* were published based on the research outcomes of AGES. These publications used the AGES 2003 survey data to highlight striking health inequalities in Japan as large as seven-fold differences in health outcomes between those in the highest and lowest income groups. It was also shown that levels of health may worsen due to social environmental factors, such as in areas with a larger Gini coefficient or lower social capital. These publications sounded the alarm that health inequalities would continue to widen in Japan if current trends continued.

The global economic crisis triggered by the 'Lehman shock' of 2008 further sensitized the general public to growing social inequalities, for example, through witnessing massive lay-offs of nonregular workers. In the 2009 general election, the ruling Liberal

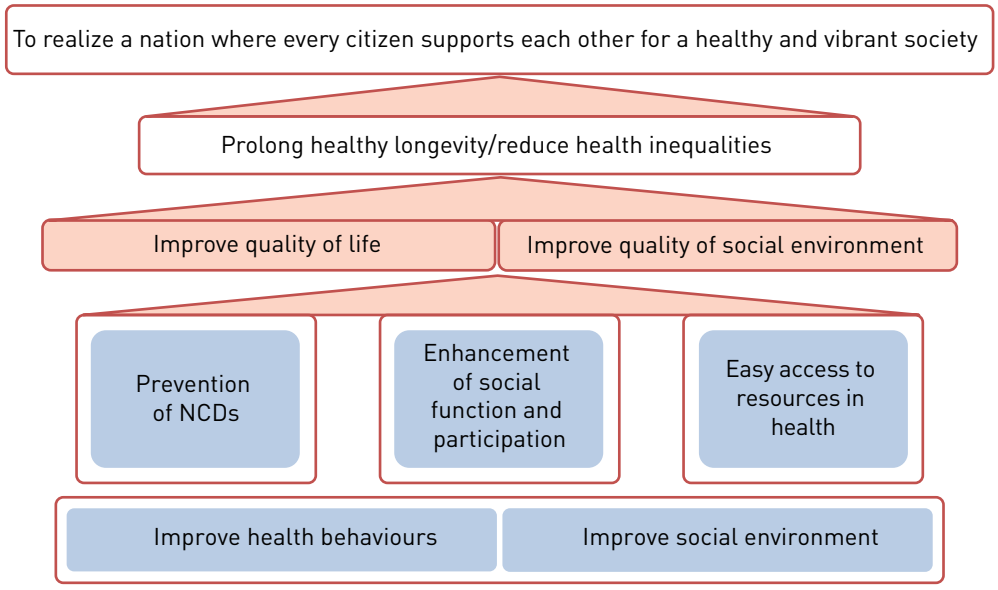
Democratic Party was defeated, making it the first time since World War II that voters mandated a change in control of the government to an opposition party.

Meanwhile, in the global arena, the WHO Commission on Social Determinants of Health published their report on the causes and extent of health inequities globally *(4)* and at the World Health Assembly (2009), a resolution aimed at reducing health inequities (WHA62.14) was adopted. *Surviving a society with health inequalities (5)* was published for the general public in order to raise awareness about these overseas trends and send an early warning regarding health inequalities in Japan based on research findings from AGES.

Health Japan 21 (the second term)

Despite efforts to bolster the high-risk approach of identifying at-risk individuals and providing early intervention, many of the numerical targets of Health Japan 21 (the first term) were not achieved. The basic direction of Health Japan 21 (the second term) (2013–2022) took into account the evaluation of the outcomes from the previous ten years *(6)* and included two new goals: "reducing health inequalities" and "promoting a healthy social environment". In order to achieve these two goals, indicators regarding the reduction in health inequalities and the strengthening of community ties (or 'social capital') were added, neither of which were included among the target indicators for the first term. The findings from AGES informed the decision to include these new goals and numerical targets, as evidenced by the inclusion of AGES research outputs in the official list of *Reference materials for the promotion of Health Japan 21 (the second term)* provided to the Expert Advisory Committee that deliberated the amendment of Health Japan 21 for its second term *(7)* (*see* Fig. A1.2).

Fig. A1.2 Health Japan 21 (the second term)



Source: *(7)*

Long-term care insurance system

Establishing the long-term care insurance system

The long-term care insurance system was introduced in 2000 as a new social insurance system designed to meet the growing needs for long-term care and the financial resources to provide it.

Insurers and insured people

Insurers are municipalities or government unions comprising multiple municipalities. Insured people are adults aged 40 years or older.

Certification for long-term care

In order to receive long-term care insurance benefits, it is necessary to receive certification based on a needs assessment for long-term care. The assessment involves two evaluations. The primary evaluation is based on the results of applying a nationally common algorithm to data obtained through a home-based interview survey conducted by insurers and the written opinion of the primary physician. For the secondary evaluation, a certification committee for long-term care eligibility, which comprises multiple medical and welfare professionals, deliberates over the results of the first evaluation. If it is determined that the person has substantiated the need for long-term care, the insurance benefit is paid out.

The resulting determination of 'need for long-term care' is classified into one of the following categories: "not applicable (independent)", "needing support" or "needing care (levels 1–5)". Since 2006, "needing support" has been further categorized into levels 1 and 2. In the case of older persons with dementia, the home-based survey interviewers and primary physicians assess the decline in their ability to independently perform activities of daily living (ADL) taking into account their level of dementia (*see* Fig. A1.3 and Table A1.1).

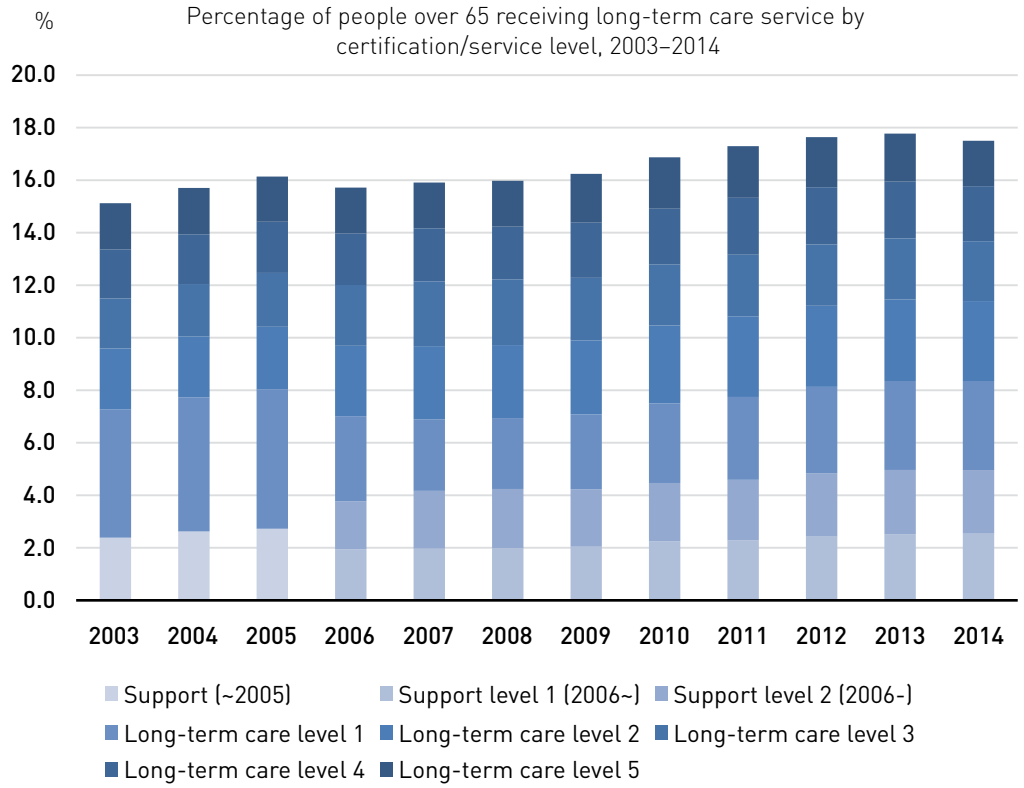
JAGES uses the status of certification for needing long-term care to define the endpoints for epidemiological research, which include being certified as "needing support (light need) or greater", "needing level 2 long-term care (moderate need) or greater", and "declining independence in performing ADL due to dementia (rank 2) or greater".

Establishing a municipal business plan for long-term care insurance

Insurers (municipalities and government unions) are mandated to establish municipal business plans for long-term care insurance on a three-year basis. This

is essentially the local action plan for implementing the national policy on long-term care. Thus, nationwide, more than 80% of municipalities are conducting needs surveys of older people to inform the development of their plan *(8)*. A template for the survey is provided by the MHLW, but many insurers modify the template. If each of the municipalities conduct the survey using different methods, the results are not comparable. This would be a lost opportunity as so much data is being collected on a very important national and local policy issue. AGES/JAGES worked with the municipalities to design and implement the local needs survey so the resulting data would be comparable. This is how it became possible to develop a benchmark system that compares municipalities on common indicators, and to create a large database from which strong research evidence could be produced.

Fig. A1.3 Percentage of people over 65 years receiving certification of the need for long-term care



Source: Koureisha no Kenko Fukushi [The health and welfare of older persons]. Tokyo: Ministry of Health, Labour and Welfare; 2017 (in Japanese) (https://www8.cao.go.jp/kourei/whitepaper/w-2017/html/zenbun/s1_2_3.html, accessed 7 June 2018).

Table A1.1 Criteria for the levels of cognitive disability in the Japanese long-term care insurance system

Rank		Criteria	Examples of observable symptoms or behaviours
Independent			
I		Suffers from certain dementia symptoms, but daily living is almost all independent in domestic and social spheres.	
II		Manifests some symptoms/behaviour and communication difficulties that may hinder daily activities, but can be independent if someone takes care them.	
	IIa	The above mentioned conditions in II are observed while outside the domestic sphere.	Frequently gets lost on the street or makes noticeable mistakes in matters that they were previously able to handle, such as shopping, personal administrative tasks or managing finances.
	IIb	The above mentioned conditions in II are also observed in the domestic sphere.	Is unable to manage taking medication or staying alone at home due to an inability to answer the phone or the door.
III		Occasionally manifests communication difficulties or symptoms/behaviour that hinder daily activities, thus requiring care.	
	IIIa	Manifests above mentioned conditions described in III predominantly during the day.	Has difficulty or takes time changing clothes, eating meals, going to the bathroom; puts objects into mouth, picks up and collects objects, is incontinent, makes loud and incoherent screams, carelessly handles fire or engages in unhygienic acts or inappropriate sexual acts, etc.
	IIIb	Manifests above mentioned conditions described in III predominantly at night.	Same as rank IIIa.
IV		Frequently manifests difficulties communicating or symptoms/behaviour that hinder daily activities and constantly requires care.	Same as rank III.
M		Manifests significant mental symptoms, problematic behaviour, or severe physical illnesses and requires specialized medical care.	Shows continued mental symptoms, such as delirium, delusions, and agitation, and manifests associated problematic behavior, such as self-mutilation or harm to others.

Sources: Ninchisho Koreisha no Uchiwake [Breakdown of Older People with Dementia]. Tokyo: MHLW; 2013 [in Japanese] [https://www.mhlw.go.jp/topics/2013/02/dl/tp0215-11-11d.pdf, accessed 7 June 2018]. Ninchisho Koreisha no Nichijo-seikatsu Jiritsudo Hantei-kijun [Criteria for degree of independence in activities of daily living for older persons with dementia]. Tokyo: Ministry of Health, Labour and Welfare; 2008 [in Japanese] [https://www.mhlw.go.jp/shingi/2008/02/dl/s0220-7c_0015.pdf, accessed 7 June 2018].

Review of the long-term care insurance system

In light of the increasing number of older people needing support and long-term care, the long-term care insurance system has been reviewed every few years.

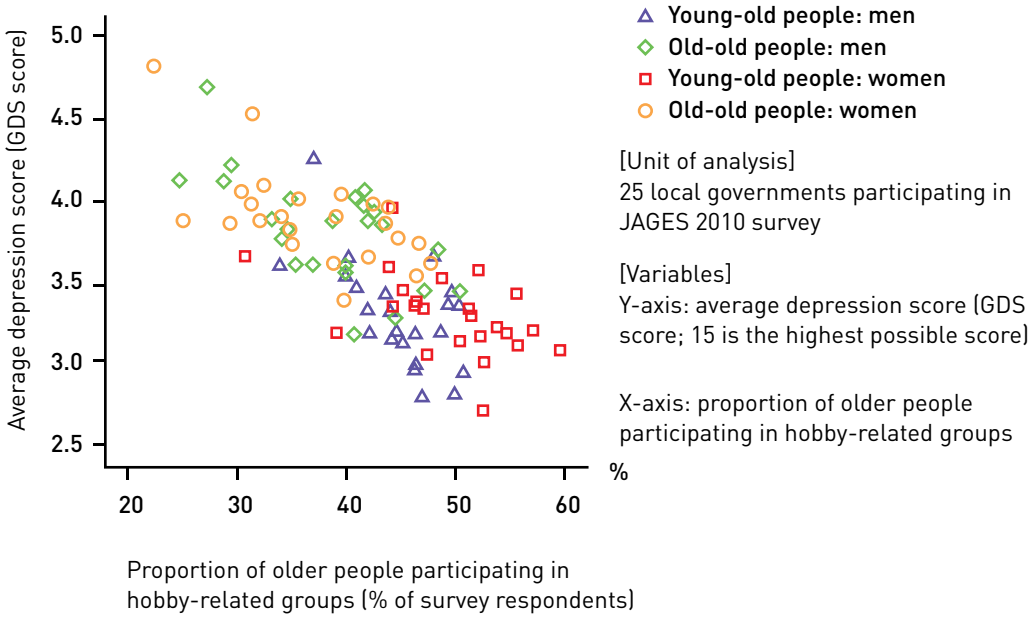
Introducing a system that places emphasis on preventing the need for long-term care

The breakdown of people certified as needing long-term care shows that, although the total number is increasing, relatively more people need only limited care. In response to this situation, and as a result of a review in 2006, a new system was put in place that recognized the importance of preventing the need for long-term care. This included tertiary prevention for people who have already received certification of the need for long-term care, as well as secondary prevention for people who have not yet received this certification. Specifically for the latter, a system was introduced whereby "people at risk of needing support or long-term care" (high-risk people) would be identified through screenings during health check-ups and be recommended to take classes for preventing the need for long-term care. Despite efforts to improve the coverage of screening by changing the method from health check-ups to mail surveys to increase coverage, this system did not work well.

From the high-risk approach to a population approach through community building

Why didn't the high-risk approach work? The probable reason is that people with lower SES had poorer health status, and those people are less likely to go for their health check-ups *(9)* or to respond to mail surveys. Therefore, these methods were not effective at identifying high-risk people, or getting them to participate in the preventive care programmes. JAGES exposed the fact that UHC was not being achieved in terms of preventive care for older people, and reported this finding to the MHLW. At the same time, it presented the fact that there are fewer people at risk of needing long-term care in areas with greater social participation (*see* Fig. A1.4) along with supporting evidence from the Taketoyo project (*see* Chapter 2, section 2.4, case study 1). The Taketoyo project showed that creating regular meeting places for older people in various locations throughout the town resulted in a steady increase in participation among the older population. Moreover, the rate at which the participants of these regular social gatherings received certification for needing long-term care over time was about half that of non-participants *(10–12)*. These research findings contributed to a policy revision in 2014 that shifted the implementation strategy from a high-risk approach to a population approach, which emphasized the importance of promoting social participation through community building.

Fig. A1.4 Association between social participation and prevention of the need for long-term care



Source: JAGES

References

1. Kondo K. Kenko Kakusa Syakai: Naniga Kokoro to Kenko wo Mushibamunoka [A society with health inequalities: what affects mental and physical health?]. Tokyo: Igaku-shoin; 2005 (in Japanese).

2. Kondo K. Kensho Kenko Kakusa Syakai: Kaigo Yobo ni Muketa Syakaiekigakuteki Daikibochosa [Exploring inequalities in health: a large-scale social epidemiological survey for long-term care prevention in Japan]. Tokyo: Igaku-shoin; 2007 (in Japanese).

3. Kondo K. Health inequalities in Japan: an empirical study of older people. Melbourne: Trans-Pacific Press; 2010.

4. Commission on Social Determinants of Health. Closing the gap in a generation: health equity through action on the social determinants of health. Geneva: World Health Organization; 2008.

5. Kondo K. Kenko Kakusa Syakai wo Ikinuku [Surviving a society with health inequalities]. Tokyo: Asahi Shimbun Shuppan; 2010 (in Japanese).

6. Kokumin no Kenko no Zoshin no Sogo-tekina Suishin wo Hakarutameno Kihontekina Hoshin [A basic direction for comprehensive implementation of

national health promotion] [Internet]. 2012 (in Japanese) (http://www.mhlw.go.jp/stf/houdou/2r9852000002eyv5-att/2r9852000002eywv.pdf, accessed 10 August 2018).

7. Ziki Kokumin Kenko-dukuri Undo-puran Sakute-senmon-iinkai: Kenko Nihon 21 (Dai-niji) no Suishin ni Kansuru Sanko-shiryo [Commission on the Establishment of the Next National Health Promotion Movement Plan: reference materials regarding the promotion of Health Japan 21 (the second term)]. 2012 (in Japanese) (http://www.mhlw.go.jp/stf/shingi/2r9852000002ddhl-att/2r9852000002ddxn.pdf, accessed 15 March 2018).

8. Kaigo Yobo / Nichijou Keniki Needs Chousa [Municipal needs survey]. (in Japanese) (http://www.mhlw.go.jp/file/05-Shingikai-12301000-Roukenkyoku-Soumuka/0000138618.pdf, accessed 7 June 2018).

9. Hiramatsu M, Kondo K, Hirai H. Kaigo-yobo Sesaku no Taisho-sya ga Kenshin wo Jushin Shinai Haike-yoin – Syakai-keizaiteki Inshi ni Chumoku Shite [The factors behind people eligible for long-term care prevention measures not receiving medical checkups: focusing on socioeconomic factors]. Journal of Health and Welfare Statistics. 2009;56(3):1–8 (in Japanese).

10. Murayama H, Kondo K, Fujiwara Y. Social capital interventions to promote healthy aging. In: Ichiro Kawachi, Soshi Takao, Subramanian SV, editors. Global perspectives on social capital and health. New York: Springer Science+Business Media; 2013:205–38.

11. Hikichi H, Kondo K, Takeda T, Kawachi I. Social interaction and cognitive decline: results of a 7-year community intervention. Alzheimers Dement (NY). 2017; 3(1):23–32. doi:10.1016/j.trci.2016.11.003.

12. Hikichi H, Kondo N, Kondo K, Aida J, Takeda T, Kawachi I. Effect of a community intervention programme promoting social interactions on functional disability prevention for older adults: propensity score matching and instrumental variable analyses, JAGES Taketoyo study. J Epidemiol Public Health. 2015; 69(9):905–10.

Annex 2: Development process of JAGES

The study began as one project involving a few researchers at a single university in 1999. It evolved into JAGES, which currently has about 50 collaborating researchers across the country. To accommodate the expansion, the secretariat was spread out across five universities where the core research team members held academic positions. In 2016, the National Center for Geriatrics and Gerontology became the headquarters of the JAGES secretariat. The reinforcement of the administrative offices and acquisition of research funds that made this possible were major factors in the further advancement of JAGES.

This annex describes the process through which the JAGES initiative strengthened its secretariat structure and function in response to the increasing scale of the survey research and associated funding, in four major phases of development.

Development process of JAGES

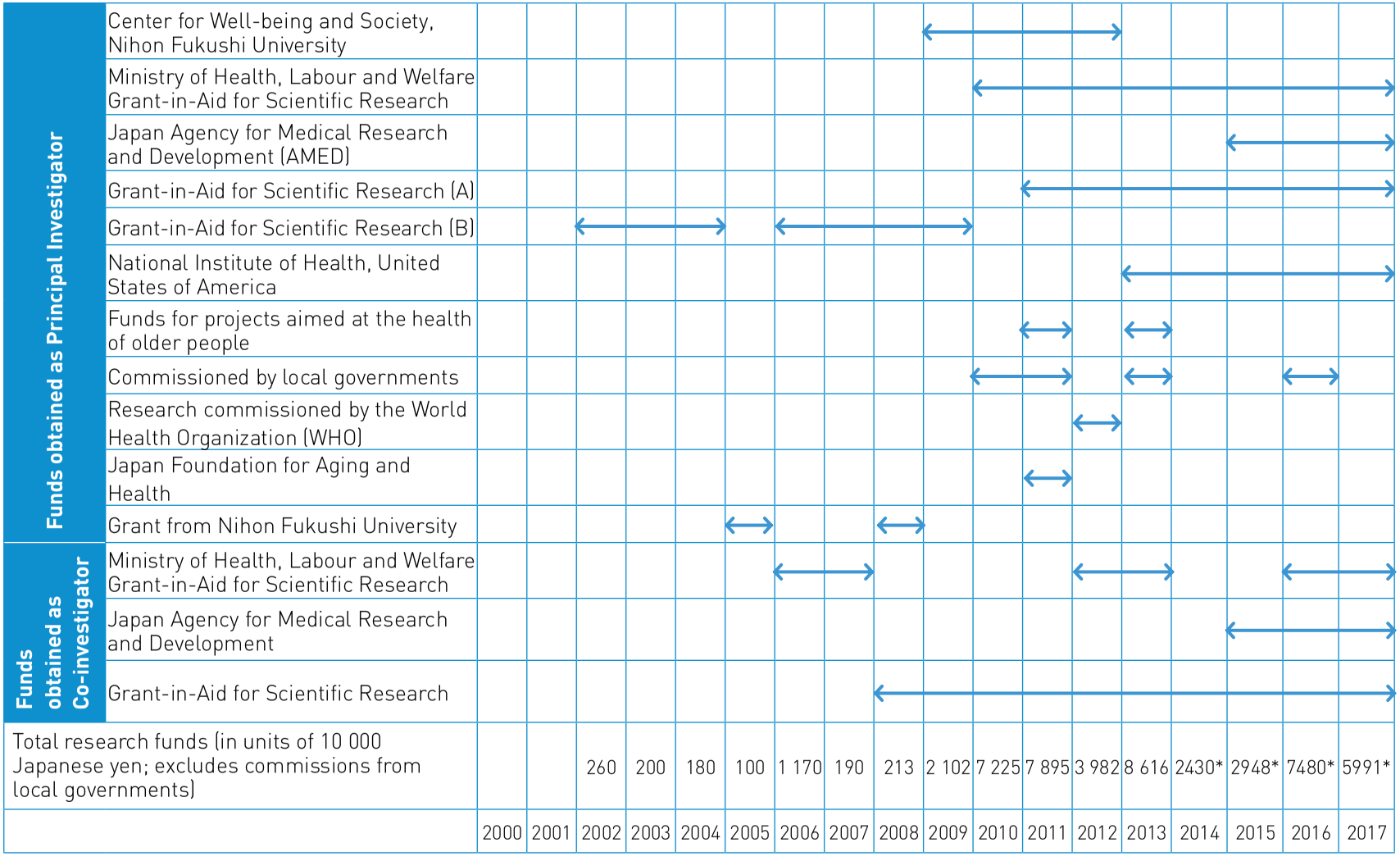
Some of the conditions for success in scaling up JAGES included: (i) emphasizing collaborative implementation research with municipalities; (ii) developing longitudinal research; and (iii) enabling semi-open data access to researchers across many institutions. These factors were also recognized as being critical aspects of the project's operational strategy.

This type of operational strategy requires a secretariat function that goes beyond supporting and carrying out research activities in the narrow sense. Thus, as JAGES scaled up, the secretariat function was strengthened primarily through four phases of change (*see* Table A2.1).

Table A2.1 Four phases of the JAGES' Secretariat framework and survey scale

Development phase	Secretariat framework	Survey scale
1st: 1999–2002	Three researchers + one graduate school student + one university research administrator	Two municipalities (1999)
2nd: 2003–2008	5–7 researchers from several universities + one post-doctorate researcher + one administrative assistant + one university research administrator	18 municipalities, 30 000 people (2003) Nine municipalities, 30 000 people (2006)
3rd: 2009–2013	Over 10 researchers from several universities + 1-4 post-doctorate researchers + about 10 graduate students + one administrative assistant + one university research administrator	31 municipalities, 100 000 people (2009) 30 municipalities, 140 000 people (2013)
4th: 2014 onward	Distributed the secretariat functions to five universities (including the National Centre for Geriatrics and Gerontology as headquarters from 2016)	41 municipalities, 200 000 people (2016)

Fig. A2.1 Trends in acquisition of funds for JAGES research



* Provisional figures.

Table A2.2 The JAGES development process across four phases

Item	First phase: 1999-2002	Second phase: 2003–2008	Third phase: 2003-2008	Fourth phase 2014 onward
Research aims, concepts and issues	• Contribute to enhancing the quality of care for senior citizens • Build database for empirical gerontological research with multidimensional variables • Mass produce evidence as a basis for Doctoral Institute for Evidence Based Policy (EBP) • Empirical program and policy evaluation research • Conduct cross-sectional survey in two municipalities (1999)	• Empirically demonstrate health inequities and inequalities using data on older Japanese people (social epidemiological research) • Gain scientific knowledge that can provide the basis for policies on elder care (gerontological research) • Conduct policy and program evaluation research that can meet contemporary expectations for evaluation and accountability • Aim not for "small government" but "efficient (even if large) public sector" • Develop a policy evaluation system that can assist long term care insurers/municipalities (implementation research) • Develop an evaluation research project management cycle which includes feedback loops to policymakers and society	• Develop a world-class social epidemiological research hub • Develop a hub for elderly care policy and evaluation research that can meet contemporary expectations for evaluation and accountability • Contribute to policy formulation and management by providing scientific knowledge to policymakers including central government, insurers and service providers • Build relationships with MHLW, for example, by serving on the Elderly Health Care System Reform Committee • Develop JAGES-HEART • Increase dissemination to public through mass media • Develop the basis for a large-scale longitudinal survey to increase the likelihood of having publications accepted in international peer-reviewed journals	• Disseminate scientific knowledge about healthy ageing from Japan, the country with the longest life expectancy, to the world • Recognized by WHO as a model for implementation research on health systems and policy • Research findings are referenced in policy documents not only by MHLW but also by other central government agencies such as the Cabinet Office, Sports Agency and Ministry of Economy, Trade and Industry • MHLW's community-based integrated care "visualization" system, based on JAGES-HEART, becomes operational

Item	First phase: 1999-2002	Second phase: 2003–2008	Third phase: 2003-2008	Fourth phase 2014 onward
		• Accumulate granular data that enables policy evaluation research at the local government (municipality) level • Foresee the need for greater interest and policy debates in issues such as care quality, fairness/equity, program evaluation and elder abuse. • Survey scale: 15 municipalities, approx. 40 000 older persons in 2003-04; 9 municipalities, approx. 40 000 older persons in 2006-07	• Increase the number of collaborative research projects by inviting in more young researchers • Acquire enough research funding to expand the survey to cover 100 000 older persons • Survey scale: 31 municipalities, approx. 100 000 older persons in 2010-11; 30 municipalities, approx. 140 000 older persons in 2013-14	• Initiate regular press announcements/ meetings • Increase research publications in international peer-reviewed journals
Research funding sources	Shared MHLW Grants-in-Aid for Scientific Research (PI: Sadahisa Noguchi) : Community Care Project (CCP)	• Japan Society for the Promotion of Science (JSPS) "Grant-in-Aid for Scientific Research (B)" (2002–04, 2006–09) (PI: Katsunori Kondo) • Ministry of Education, Culture, Sports, Science and Technology (MEXT) Academic Frontier Promotion Program, Program for the Promotion of Enhancement of Academic Research at Private Universities (2002–06, 2006–09) (PI: Takayuki Hirano)	• MEXT Support Program for the Creation of Strategic Research Foundation at Private Universities (2009–13) (PI: Katsunori Kondo) • MHLW Grant-in-Aid for Scientific Research, Designated Research "Development of Comprehensive Policy Evaluation Benchmark System for Long-Term Care Insurance" (2012-Longevity-Designated-008, 2010–12)	• AMED (Gerontology Research and Development Program, etc.) • MHLW Grant-in-Aid for Scientific Research (Gerontology Research and Development Program, etc.) JSPS Grant-in-Aid (Foundation A) • JSPS Grant-in-Aid (Foundation A)

Item	First phase: 1999-2002	Second phase: 2003–2008	Third phase: 2003-2008	Fourth phase 2014 onward
		• MEXT 21st Century Center Of Excellence (COE) Program (PI: Ryu Niki) • Field B Three surveys (general senior citizens survey, long-term caregiver survey, survey of people needing long-term care) conducted as the 2003 AGES Project commissioned by municipalities as "policy evaluation research on care for senior citizens," i.e. one of the three research themes established in Field B "Evaluation Research on Welfare Policies in Developed Countries" (PI: Katsunori Kondo)	• JSPS, Foundation Research A "Research on Well-Being and Social Capital as Social Exclusion" (2010–12) • National Institutes of Health (NIH, USA; 2013–17) • World Health Organization (WHO) "Research on Older Adult Health Equity Assessment: Case Study of Kobe"	• National Institutes of Health (NIH) (USA; 2013–17) • WHO "Research on improving measurement, research and knowledge translation to promote universal health coverage and healthy ageing in Japan" (2017)
Research groups and meetings	• Working groups of the Community Care Project (CCP) • Health inequality research group • Clinical working group	• Health inequality research group • Clinical working group • AGES research group	• JAGES research group	• JAGES research group • Established the Japan Agency for Gerontological Evaluation Study as a general incorporated association in 2018

Item	First phase: 1999-2002	Second phase: 2003–2008	Third phase: 2003-2008	Fourth phase 2014 onward
Main achievements (summative publications)		• Kondo K. "Iryo-hi Yokusei no Jidai" wo Koete [Beyond 'the era of cost containment']. Tokyo: Igaku-shoin; 2004 (in Japanese). • Kondo K. Kenko Kakusa Syakai: Naniga Kokoro to Kenko wo Mushibamunoka [A health gap society: what affects mental and physical health?]. Tokyo: Igaku-shoin; 2005 (in Japanese). • Kondo K ed. Kensho Kenko Kakusa Syakai: Kaigo Yobo ni Muketa Syakaiekigakuteki Daikibochosa [Exploring inequalities in health: a large-scale social epidemiological survey for long-term care prevention in Japan]. Tokyo: Igaku-shoin; 2007 (in Japanese).	• Kondo K. Kenko Kakusa Syakai wo Ikinuku [Surviving in a health gap society]. Tokyo: Asahi Shimbun Shuppan; 2010 (in Japanese). • Kondo K ed. Health inequalities in Japan: an empirical study of older people. Melbourne: Trans Pacific Press; 2010. • Kondo K. Kenko no Syakaiteki Kettei Yoin: Shikkan Jotai Betsu "Kenko Kakusa" Rebyu [The social determinants of health: a review of health inequalities by diseases and conditions]. Tokyo: Japan Public Health Association; 2013 (in Japanese).	• Kondo K. Kenko Kakusa Syakai eno Syoho-sen [Prescription for a health gap society]. Tokyo: Igaku-shoin; 2017 (in Japanese). • Kenko Kakusa Taisaku no Nana Gensoku [The seven principles of addressing health inequalities]. Tokyo: Iken; 2015 (in Japanese).

The amount of research funds for JAGES has risen sharply since 2009 (phase 3) because of the heightened interest in social epidemiology among researchers and recognition of the relationship between the research projects and the MHLW's policy issues (*see* Fig. A2.1, Table A2.2). By 2017, the number of participating municipalities had risen to 41 and around 50 researchers were participating in the monthly JAGES study group meetings. Since 2009 (phase 3), the survey data were made semi-open under the condition that data users would submit research plans, analyse the data and report results to the JAGES secretariat. The number of applications for data use increased from 36 during 2009–2011, to 90 during 2012–2014, and to 194 during 2015–2017 (as of 24 October 2017).

The number of published academic papers has been growing at a steady pace of at least 20 papers per year since 2011 (*see also* Annex 3). The number of presentations at symposiums and public forums has climbed sharply in the past five years (*see* Table A2.3). Furthermore, the number of times JAGES was mentioned in the mass media dramatically increased from less than 20, prior to 2015, to over 40 since 2016. This increase in media coverage is partly due to the start of periodic press conferences, at a pace of about once every one to two months, since October 2015.

Table A2.3 Annual research outputs of JAGES, 2004–18 (as of December 2018)

	Journal publications (in English)	Journal publications (in Japanese)	Books and other publications	Symposiums	Lectures	Presentations at Academic Conferences	Awards	Media coverage e.g. newspaper, TV
2018	24	16	3	5	0	11	13	41
2017	28	22	4	4	9	10	4	51
2016	20	25	2	8	27	18	11	49
2015	11	24	5	10	32	19	2	20
2014	9	16	1	5	18	12	5	13
2013	5	15	20	7	9	1	1	1
2012	9	20	2	5	9	5	3	2
2011	9	23	13	5	9	1	3	13
2010	1	21	10	6	2	0	1	13
2009	3	16	0	2	1	0	5	6
2008	2	14	5	2	1	0	3	4
2007	0	24	1	1	0	2	1	5
2006	1	12	0	0	0	1	1	7
2005	0	20	0	0	0	1	1	9
2004	0	8	0	1	0	0	0	1
Total	122	276	66	61	117	81	54	240

The JAGES secretariat

Work handled by the JAGES secretariat

The role and function of the secretariat have steadily expanded to accommodate the growth of the JAGES initiative. Researchers (i.e. university faculty, post-doctoral researchers, graduate students) and administrators (i.e. research administrators and administrative assistants) fulfil diverse roles in the secretariat (*see* Table A2.4).

Table A2. 4 Roles of the JAGES Secretariat and changes over time

Period	Role of researchers (University faculty, post-docs, graduate students)	Role of administrative staff (research administrators, administrative assistants)
First term 1999–2002	• Research: consultation with municipalities, drafting questionnaires, collecting and managing data, drafting reports	• Managing contracts and agreements with municipalities/insurers • Accounting • Assisting researchers
Second term 2003–2008	• Research: design, collecting data (contracted out to survey company), managing data, drafting reports • Managing research group/meetings: Clinical working group, Health inequality research group • Assisting researchers and graduate students who want to conduct data analysis • Assisting in writing a paper series (preparing data summaries) • Holding joint research meetings with insurers • Creating work shop materials, etc. for Taketoyo officials and residents, where the community intervention had begun	• Managing contracts and agreements with municipalities/insurers • Managing employment contracts with post-doc researchers • Accounting • Assisting researchers
Third term 2009–2013	• Research design: design, collecting data (contracted out to survey company), data management (creating data specifications, codebook and user's guidebook) • Managing research group/meetings: JAGES research group	

Period	Role of researchers (University faculty, post-docs, graduate students)	Role of administrative staff (research administrators, administrative assistants)
	• Assisting researchers and graduate students who want to conduct data analysis • Assisting in writing a paper series (preparing data summaries) • Holding joint research meeting with insurers • Creating work shop materials, etc. for Taketoyo officials and residents, where the community intervention had begun • Bolstering secretariat function (operating and managing Healthy Society Research Center and other websites, issuing press release and newsletters)	• Managing contracts and agreements with municipalities/insurers • Managing employment contracts with post-doc researchers • Accounting • Collecting, tabulating and filling data • Assisting researchers
Fourth term 2014 onward	• Chiba University: conducting JAGES surveys, overall data management and software development, assisting the analysis of the municipal needs surveys (7th term), developing evaluation indicators for long-term care prevention and daily life support, developing data visualization system • The University of Tokyo: managing research plan, distributing and managing data, managing guidebooks for JAGES users, designing survey sampling and manual, survey of local government employees • Hamamatsu University School of Medicine: managing data on cause of death, assisting analysis of the municipal needs surveys (6th term) • Tohoku University: managing the Iwanuma Project, designing JAGES research questionnaire, conducting international comparative studies	• National Center for Geriatrics and Gerontology (JAGES secretariat headquarters): Managing research contracts and agreements • Nihon Fukushi University: oversight for projects involving Aichi Prefecture local governments, constructing longitudinal data, organizing joint research meetings • Accounting • Collecting, tabulating and filling data • Assisting researchers

Infrastructure of the JAGES administrative office

This section describes the main research fund acquisitions that facilitated the hiring of post-doctorate researchers and the infrastructure of the administrative offices during each of the four phases of development.

Phase 1: 1999–2002

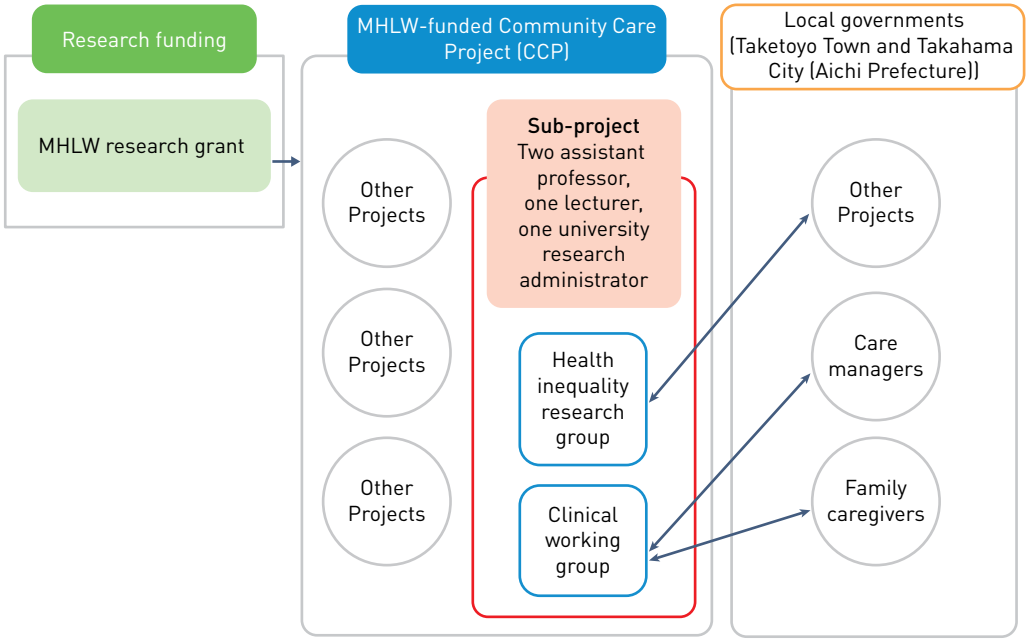
The predecessor of JAGES, the Aichi Gerontological Evaluation Study (AGES), began as a clinical working group that was part of a broader Community Care Project (CCP) funded by the MHLW (principal investigator, Professor Sadahisa Noguchi of Nihon Fukushi University). The clinical working group originally consisted of three researchers, one graduate student and one research administrator.

The working group conducted a survey in 1999, and again in 2000, aimed at evaluating the effects of the new long-term care insurance system introduced in 2000 on the following three groups: (i) older adults; (ii) managers of long-term care; and (iii) caregivers.

Fieldwork took place in the two municipalities (Taketoyo and Takahama) in Aichi Prefecture, which commissioned the development of their municipal plan for long-term care insurance to Nihon Fukushi University. Additionally, after obtaining research funds from the Japan Society for the Promotion of Science (with Katsunori Kondo as the lead researcher) in 2002, the health inequality research group broke off from the clinical working group and started its own research activities conducting surveys of older people.

The main functions of the secretariat at that time included negotiations with municipalities, managing the joint research agreements, managing contracts for outsourcing the survey, overseeing survey implementation, collecting and managing the survey data, and preparing survey reports. The researchers and the university research administrators handled these tasks together (*see* Fig. A2.2).

Fig. A2.2 Origin of AGES and the secretariat (1st Phase)



Phase 2: 2003–2008

The Japan Society for the Promotion of Science's *kakenhi* (scientific research grants) is a leading source of research funding in Japan. Basic research is the primary target of these grants and is grouped into categories S, A, B and C, in descending order of the grant amount. The upper limit of basic research B funds obtained by Katsunori Kondo (2002–2004, 2006–2009) is 20 million Japanese yen over three years. This was not sufficient to hire a full-time researcher.

Fortunately, two research projects developed by the Nihon Fukushi University received large-scale competitive research funds from the Ministry of Education, Culture, Sports, Science and Technology (MEXT), into which AGES was also integrated. As part of this research, AGES received commissions from municipal governments to conduct three surveys in 2003 and repeat them in 2006 as a sub-project to evaluate the policy on care for older people. The health inequality research group conducted the surveys on the general older population, and the clinical working group from the CCP carried out the surveys of care managers to obtain data on people in need of long-term care, and the surveys of family caregivers. The surveys were conducted in three prefectures with fifteen municipalities in 2003 and nine of those municipalities in 2006, all of which had existing relationships with Nihon Fukushi University by virtue of being in the local area of the university or having previously commissioned surveys to the university.

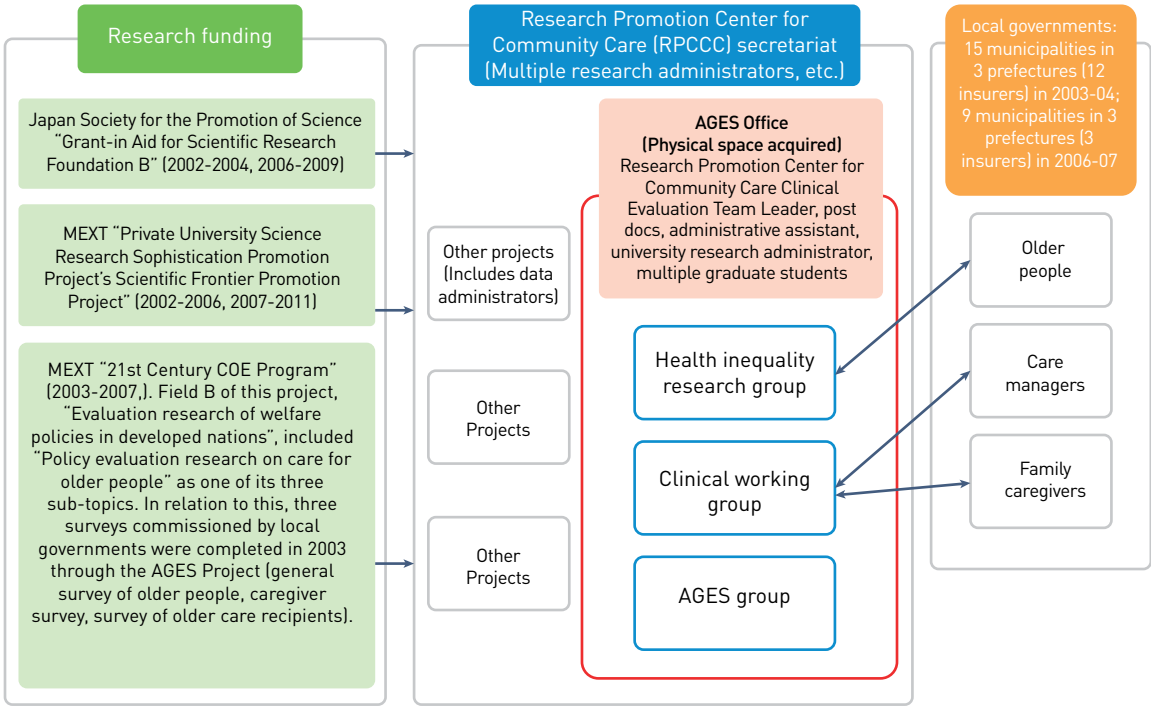
The acquisition of these two large external research funds (the MEXT funds received by Nihon Fukushi University and the *kakenhi* obtained by Katsunori Kondo) facilitated the establishment of the Research Promotion Center for Community Care (RPCCC) at Nihon Fukushi University, as well as procurement of office space and hiring of one postdoctoral researcher for the AGES secretariat (*see* Fig. A2.3).

The postdoctoral researcher primarily handled the secretariat work from the second phase. These tasks included: designing surveys; overseeing the implementation of the surveys outsourced to research companies; managing data after the questionnaire forms were collected; attending to, assisting and guiding researchers and graduate students interested in the survey data analysis; helping to write a series of papers presenting the aggregated survey results; organizing joint meetings between municipalities and researchers; and preparing materials to be used in workshops with officials and residents in Taketoyo, where the community intervention had started.

The administrative staff in the university research division continued to handle practical tasks related to managing joint research agreements and survey commission contracts with municipal governments/insurers, researcher employment contracts and accounting.

A total of about 20 researchers, comprising 5–7 teachers, 1–2 post-doctoratal scholars and 5–7 graduate students from several universities participated in monthly meetings of the health inequality research group during the second phase.

Fig. A2.3 Secretariat infrastructure of AGES (second phase)



Phase 3: 2009–2013

From 2009, the project led by Katsunori Kondo (as the principal investigator) obtained large research funds from three sources – the MHLW, MEXT and the Japan Society for the Promotion of Science. This resulted in the establishment of the Center for Well-Being and Society at Nihon Fukushi University.

Additionally, the AGES research group meeting attracted an increasing number of researchers, expanding the scale of the project. Many participants had read *A society with health inequalities – what affects mental and physical health? (1)* and *Exploring inequalities in health: a large-scale social epidemiological survey for long-term care prevention in Japan (2)* or were interested in social epidemiology. Furthermore, these additional researchers contributed to recruiting more municipalities into the study through their own connections, which led to expanding the network of participating municipalities nationwide and, ultimately, the establishment of the Japan Gerontological Evaluation Study (JAGES).

In 2011, JAGES developed their hallmark data visualization tool, JAGES–HEART, with the funding and support of the WHO Centre for Health Development (Kobe, Japan), based on the concept of the WHO Urban Health Equity Assessment and Response Tool (Urban HEART) and using Kobe city as a case study. The same year, Iwanuma City, which was one of the municipalities that participated in the JAGES 2010 survey, was affected by the Great East Japan earthquake and tsunami in 2011, creating an opportunity to conduct research using a natural experimental design. This research was successfully funded by a research grant from the U.S. National Institutes of Health (NIH) for 2013–2017. The Center for Well-Being and Society at Nihon Fukushi University hence acquired multiple research contracts and grants that enabled it to hire several post-doctoral scholars and expanded the secretariat operations (*see* Fig. A2.4).

During this period, the workload of the secretariat increased considerably because of the doubling of the number of participating municipalities from 15 to 31 and from about 20 collaborating researchers to around 40. For example, it had to handle a greater number of research fund applications and report preparations. The survey data size also became larger: The cross-sectional data alone (from 2003, 2006, 2010 and 2013) included data on over 310 000 people in total. The types of databases to be managed also increased with the creation of cohort data with mortality and certification for long-term care need as end-points, panel data from surveys that are repeated with the same individuals, and data on publicly funded health check-ups received from some municipalities.

The increasing volume of data necessitated the creation of data specifications and codebooks, and the expansion of items included in the database user's guide. It was also necessary to make system enhancements for compiling and processing data. The web-based geographical information system (GIS) software Instant Atlas™ was adopted to make the online data visualization tool (JAGES–HEART). Thus, tasks related to preparing and updating GIS data were also added. The secretariat also shouldered public relations work, such as managing and operating the website of the Center

for Well-Being and Society at Nihon Fukushi University, issuing press releases and publishing newsletters. Joint research with international entities also started, which required international communication.

In light of the expanded scale of operations, core members of the JAGES research team (namely Katsunori Kondo, Toshiyuki Ojima, Naoki Kondo, Jun Aida and Masahige Saito) began holding regular meetings to discuss the operation and management of the JAGES initiative from around May 2013 (Fig. A2.4).

Phase 4: 2014 onward

Following the move of the principal investigator, Katsunori Kondo, from Nihon Fukushi University to Chiba University in 2014, and the further expansion of JAGES, administrative offices were spread across five universities where the core members held academic positions. Fig. A2.5 represents the roles of the five universities – Chiba University (Katsunori Kondo), Nihon Fukushi University (Masashige Saito), Hamamatsu University School of Medicine (Toshiyuki Ojima), Tohoku University (Jun Aida) and the University of Tokyo (Naoki Kondo). Katsunori Kondo assumed a cross-appointment as the Director of the Gerontological Evaluation Unit of the Center for Gerontology and Social Science at the National Center for Geriatrics and Gerontology since 2016, with this division acting as the headquarters of the JAGES secretariat (Fig. A2.5).

The core members acquire external research funds for research proposals using data from JAGES. These funds are used to support the hiring costs of post-doctoral researchers, administrators, graduate students and outsourcing costs for general administrative tasks.

The Chiba office is the largest with a staff of about nine people, which handles implementation of the JAGES surveys, overall data management and software development, as well as providing analytical assistance for the municipal needs survey on long-term care. It also develops indicators for evaluating preventive interventions for long-term care and daily life support services for older people, and manages the data visualization system. The Tokyo office handles the management of research plans, manages and distributes data, develops the JAGES user guide, designs survey sampling methods and manuals, and conducts surveys of municipality officials. The Tohoku office handles the NIH-funded Iwanuma project, and the Hamamatsu office mainly manages mortality data. The secretariat headquarters covers practical tasks related to the arrangements with municipal governments/insurers, such as managing joint research agreements and survey commmission contracts. The current secretariat organization consists of 3.5 full-time equivalent (FTE) post-doctoral scholars, 0.3 FTE researchers (including PhD candidates), four data managers and technical assistance staff, four administrative assistants, and outsourcing to about 1.2 FTE, as of July 2017 (*see* Fig. A2.5).

Fig. A2.4 Secretariat structure of JAGES (third phase)

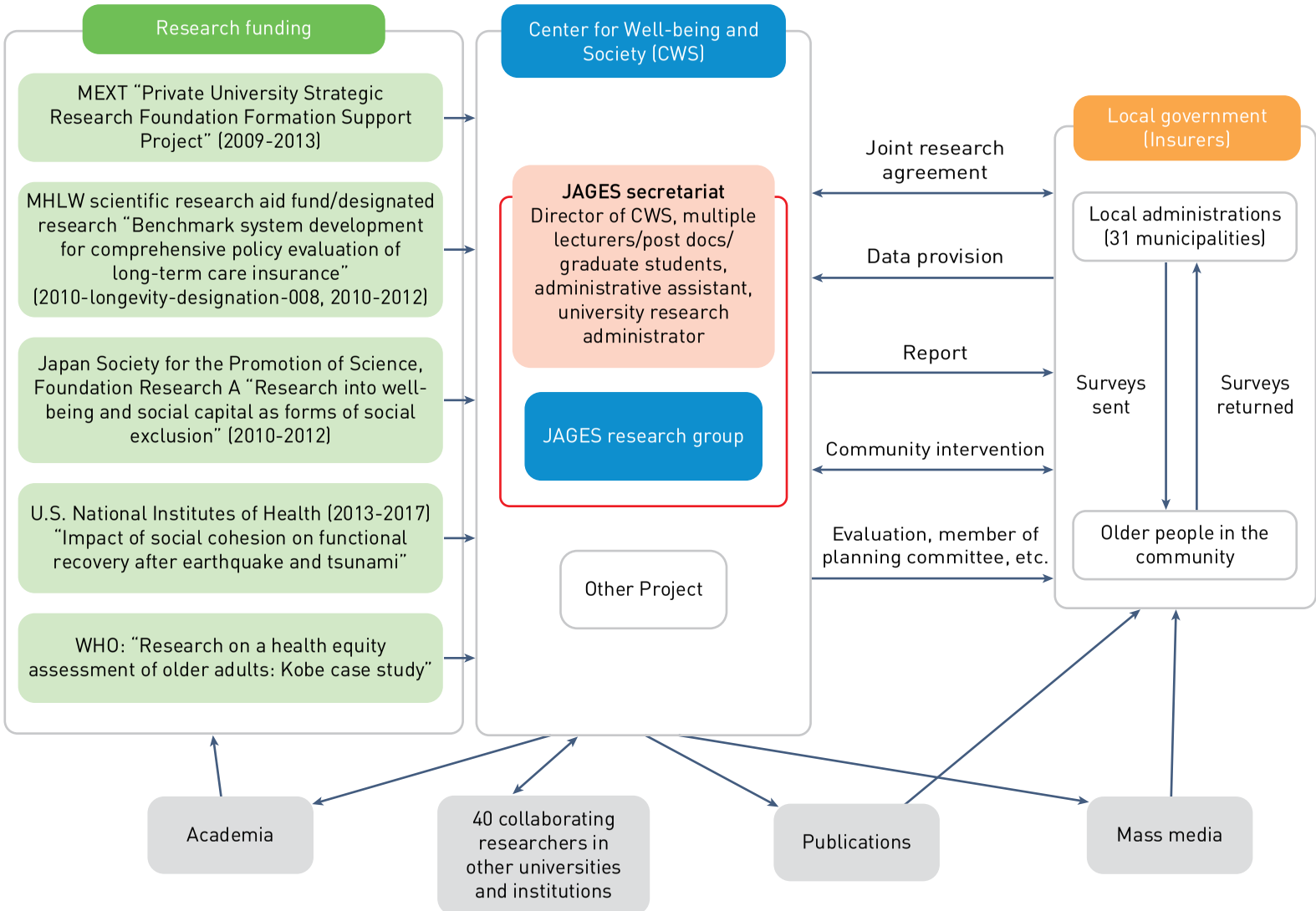
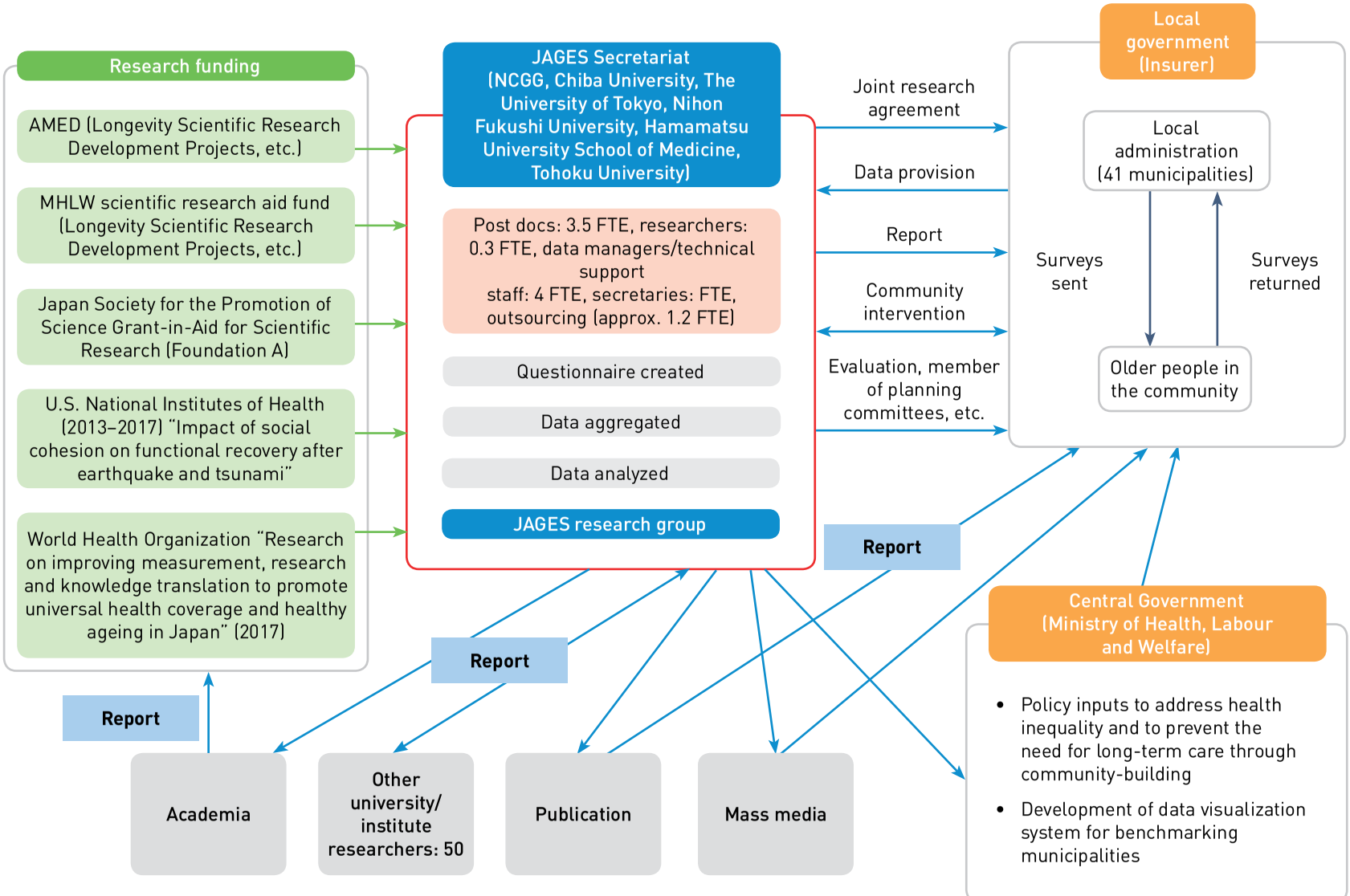


Fig. A2.5 Secretariat structure of JAGES



References

1. Kondo K. Kenko Kakusa Syakai-Naniga Kokoro to Kenko wo Mushibamunoka [A society with health inequalities: what affects mental and physical health?]. Tokyo: Igaku-shoin; 2005 (in Japanese).

2. Kondo K. Kensho[Kenko Kakusa Syakai]-Kaigo] yobo ni muketa syakaiekigakuteki daikibochosa [Exploring inequalities in health: a large-scale social epidemiological survey for long-term care prevention in Japan]. Tokyo: Igaku-shoin; 2007 (in Japanese).

Annex 3: List of publications by JAGES (as of March 2018)

1. Aida J, Cable N, Zaninotto P, Tsuboya T, Tsakos G, Matsuyama Y et al. Social and behavioural determinants of the difference in survival among older adults in Japan and England. Gerontology. 2018; 64:266–77. doi:10.1159/000485797.

2. Mochida Y, Yamamoto T, Fuchida S, Aida J, Kondo K. Does poor oral health status increase the risk of falls? The JAGES Project Longitudinal Study. PLoS One. 2018; 13(2):e0192251. doi:10.1371/journal.pone.0192251.

3. Saito J. Exploring 2.5-year trajectories of functional decline in older adults by applying a growth mixture model and the frequency of outings as a predictor: 2010–2013 JAGES longitudinal study. J Epidemiol. 2018, doi:10.2188/jea.JE20170230.

4. Sato Y, Aida J, Tsuboya T, Shirai K, Koyama S, Matsuyama Y et al. Generalized and particularized trust for health between urban and rural residents in Japan: A cohort study from the JAGES project. Soc Sci Med. 2018; 202:43–53. doi:10.1016/j.socscimed.2018.02.015.

5. Tsuji T, Miyaguni Y, Kanamori S, Hanazato M, Kondo K. Community-level sports group participation and older individuals' depressive symptoms. Med Sci Sports Exerc. 2018; 50(6):1199–205. doi:10.1249/MSS.0000000000001541.

6. Yanagi N, Hata A, Kondo K, Fujiwara T. Association between childhood socioeconomic status and fruit and vegetable intake among older Japanese: the JAGES 2010 study. Prev Med. 2018; 106:130–6.

7. Amemiya A, Murayama H, Tani Y, Kondo K, Fujiwara T. Adverse childhood experiences and higher-level functional limitations among older Japanese people: results from the JAGES study. J Gerontol A Biol Sci Med Sci. 2018 Jan 16; 73(2):261–6. doi:10.1093/gerona/glx097.

8. Cable N, Chandola T, Aida J, Sekine M, Netuveli G. Can sleep disturbance influence changes in mental health status? Longitudinal research evidence from ageing studies in England and Japan. Sleep Medicine. 2017; 30:216–21.Cable N et al. Identifying frail-related biomarkers among community-dwelling older adults in Japan: a research example from the Japan Gerontological Evaluation Study. Biomed Res Int. 2018; 2018:5362948. doi:10.1155/2018/5362948. eCollection 2018.

9. Fujiwara T, Takamoto I, Amemiya A, Hanazato M, Suzuki N, Nagamine Y et al. Is a hilly neighborhood environment associated with diabetes mellitus among older people? Results from the JAGES 2010 study. Soc Sci Med. 2017; 182:45–51.

10. Gero K, Kondo K, Kondo N, Shirai N, Kawachi I. Associations of relative deprivation and income rank with depressive symptoms among older adults in Japan. Soc Sci Med. 2017; 189:138–44.

11. Haseda M, Kondo N, Ashida T, Tani Y, Takagi D, Kondo K. Community social capital, built environment and income-based inequality in depressive symptoms among older people in Japan: an ecological study from JAGES project. J Epidemiol. 2018; 28(3):108–16.

12. Hikichi H, Kondo K, Takeda T, Kawachi I. Social interaction and cognitive decline: results of a 7-year community intervention. Alzheimers Dement (NY). 2016; 3(1):23–32. doi:10.1016/j.trci.2016.11.003.

13. Hikichi H, Sawada Y, Tsuboya T, Aida J, Kondo K, Koyama S et al. Residential relocation and change in social capital: a natural experiment from the 2011 Great East Japan earthquake and tsunami. Sci Adv. 2017; 3(7):e1700426. doi:10.1126/sciadv.1700426.

14. Hikichi H, Tsuboya T, Aida J, Matsuyama Y, Kondo K, Subramanian S et al. Social capital prevents cognitive decline in the aftermath of a natural disaster: a quasi-experiment from the 2011 Great East Japan earthquake and tsunami. Lancet Planet Health. 2017; 1(3):e105–e113.

15. Honjo K, Tani Y, Saito M, Sasaki Y, Kondo K, Kawachi I et al. Living alone or with others and depressive symptoms, and effect modification by residential social cohesion among older adults in Japan: JAGES longitudinal study. J Epidemiol. 2018; 28(7):315–22. doi:10.2188/jea.JE20170065.

16. Inoue Y, Andrew S, Yazawa A, Aida J, Kawachi I, Kondo K et al. Adverse childhood experiences, exposure to a natural disaster and posttraumatic stress disorder among survivors of the 2011 Great East Japan earthquake and tsunami. Epidemiol Psychiatr Sci. 2017:1–9. doi:10.1017/S2045796017000233.

17. Matsuyama Y, Aida J, Tsuboya T, Hikichi H, Kondo K, Kawachi I et al. Are lowered socioeconomic circumstances causally related to tooth loss? A natural experiment involving the 2011 Great East Japan earthquake. Am J Epidemiol. 2017; 186(1):54–62. doi:10.1093/aje/kwx059.

18. Matsuyama Y, Aida J, Watt R, Tsuboya T, Koyama S, Sato Y et al. Dental status and compression of life expectancy with disability. J Dent Res. 2017; 96(9):1006–13. doi:10.1177/0022034517713166.

19. Murata C, Saito T, Tsuji T, Saito M, Kondo K et al. A 10-year follow-up study of social ties and functional health among the old: the AGES Project. International Journal of Environmental Research and Public Health. 2017; 14(7). pii: E717. doi:10.3390/ijerph14070717.

20. Murayama H, Fujiwara T, Tani Y, Amemiya A, Matsuyama Y, Nagamine Y et al. Long-term impact of childhood disadvantage on late-life functional decline among older Japanese: results from the JAGES prospective cohort study. J Gerontol A Biol Sci Med Sci. 2017; 73(7):973–9. doi:10.1093/gerona/glx171.

21. Nemoto Y, Saito T, Kanamori S, Tsuji T, Shirai K, Kikuchi H et al. An additive effect of leading roles on the association between social participation and dementia onset among Japanese older adults: the AGES cohort study. BMC Geriatrics. 2017; 17(1):297. doi:10.1186/s12877–017–0688–9.

22. Saito M, Kondo N, Aida J, Kawachi I, Oyama S, Ojima T et al. Development of an instrument for community-level health related social capital among Japanese older people: the JAGES Project. J Epidemiol. 2017; 27(5):221–7.

23. Saito T, Murata C, Aida J, Kondo K. Cohort study on living arrangements of older men and women and risk for basic activities of daily living disability: findings from the AGES project. BMC Geriatrics. 2017; 17(1):183. doi:10.1186/s12877–017–0580–7.

24. Saito T, Murata C, Saito M, Takeda T, Kondo K. Influence of social relationship domains and their combinations on incident dementia: a prospective cohort study. J Epidemiol Public Health. 2018; 72(1):7–12. doi:10.1136/jech-2017–209811.

25. Sasaki Y, Aida J, Tsuji T, Miyaguni Y, Tani Y, Koyama S et al. Does the type of residential housing matter for depressive symptoms in the aftermath of a disaster? Insights from the Great East Japan earthquake and tsunami. Am J Epidemiol. 2018; 187(3):455–64. doi:10.1093/aje/kwx274.

26. Sato Y, Aida J, Kondo K, Tsuboya T, Watt RG, Yamamoto T et al. Tooth loss and decline in functional capacity: a prospective cohort study from the Japan Gerontological Evaluation Study. J Am Geriatr Soc. 2016; 64(11):2336–42. doi:10.1111/jgs.14324.

27. Shiba K, Kondo N, Kondo K, Kawachi I. Retirement and mental health: dose social participation mitigate the association? A fixed-effects longitudinal analysis. BMC Public Health. 2017; 17(1):526. doi:10.1186/s12889–017–4427–0.

28. Shobugawa Y, Fujiwara T, Tashiro A, Saito R, Kondo K. Social participation and risk of influenza infection in older adults: a cross-sectional study. BMJ Open. 2018; 8:e016876. doi:10.1136/ bmjopen-2017–016876.

29. Tani Y, Kondo N, Noma H, Miyaguni Y, Saito M, Kondo K. Eating alone yet living with others is associated with mortality in older men: the JAGES cohort survey. J Gerontol B Psychol Sci Soc Sci. 2017; gbw211. doi:10.1093/geronb/gbw211.

30. Tsuboya T, Aida J, Hikichi H, Subramanian SV, Kondo K, Osaka K et al. Predictors of decline in IADL functioning among older survivors following the Great East Japan earthquake: a prospective study. Soc Sci Med. 2017; 176:34–41. doi:10.1016/j.socscimed.2017.01.022.

31. Tsuji T, Sasaki Y, Matsuyama Y, Sato Y, Aida J, Kondo K et al. Reducing depressive symptoms after the Great East Japan earthquake in older survivors through group exercise participation and regular walking: a prospective observational study. BMJ Open. 2017; 7(3);e013706. doi:10.1136/bmjopen-2016–013706.

32. Yokobayashi K, Kawachi I, Kondo K, Kondo N, Nagamine Y, Tani Y et al.; JAGES group. Association between social relationship and glycemic control among older Japanese: JAGES cross-sectional study. PLoS One. 2017; 12(1):e0169904. doi:10.1371/journal.pone.0169904.

33. Zaitsu M. Participation in community group activities among older adults: is diversity of group membership associated with better self-rated health? J Epidemiol. 2018. doi:10.2188/jea.JE20170152.

34. Ashida T, Kondo N, Kondo K. Social participation and the onset of functional disability by socioeconomic status and activity type: the JAGES cohort study. Prev Med. 2016; 89:121–8. doi:10.1016/j.ypmed.2016.05.006.

35. Hayashi K, Kawachi I, Ohira T, Kondo K, Shirai K, Kondo N. Laughter is the best medicine? Cross sectional study of cardiovascular disease among older Japanese adults. J Epidemiol. 2016; 26(10):546–52.

36. Hikichi H, Aida J, Kondo K, Tsuboya T, Matsuyama Y, Subramanian S et al. Increased risk of dementia in the aftermath of the 2011 Great East Japan earthquake and tsunami. Proc Natl Acad Sci USA. 2016; 113(45):E6911–18. doi:10.1073/pnas.1607793113.

37. Hikichi H, Aida J, Tsuboya T, Kondo K, Kawachi I. Can community social cohesion prevent posttraumatic stress disorder in the aftermath of a disaster? A natural experiment from the 2011 Tohoku earthquake and tsunami. American J Epidemiol. 2016; 183(10):902–10. doi:10.1093/aje/kwv335.

38. Inoue Y, Stickley A, Yazawa A, Fujiwara T, Kondo K, Kondo N. Month of birth is associated with mortality among older people in Japan: findings from the JAGES cohort. Chronobiol Int. 2016; 33(4):441–7. doi:10.3109/07420528.2016.1152977.

39. Inoue Y, Stickley A, Yazawa A, Shirai K, Amemiya A, Kondo N et al. Neighborhood characteristics and cardiovascular risk among older people in Japan: findings from the JAGES Project. PLoS One. 2016; 11(10):e0164525. doi:10.1371/journal.pone.0164525.

40. Ishikawa Y, Kondo N, Kondo K, Saito T, Hayashi H, Kawachi I; JAGES group. Social participation and mortality: does social position in civic groups matter? BMC Public Health. 2016; 16(1):394. doi:10.1186/s12889–016–3082–1.

41. Kanamori S, Takamiya T, Inoue S, Kai Y, Kawachi I, Kondo K. Exercising alone versus with others and associations with subjective health status in older Japanese: the JAGES cohort study. Sci Rep. 2016; 6:39151. doi:10.1038/srep39151.

42. Kondo K. Progress in aging epidemiology in Japan: the JAGES Project. J Epidemiol. 2016; 26(7):331–6. doi:10.2188/jea.JE20160093.

43. Koyama S, Aida J, Kondo K, Yamamoto T, Saito M, Ohtsuka R et al. Does poor dental health predict becoming homebound among older Japanese? BMC Oral Health. 2016; 16(1):51. doi:10.1186/s12903–016–0209–9.

44. Koyama S, Aida J, Saito M, Kondo N, Sato Y, Matsuyama Y et al. Community social capital and tooth loss in Japanese older people: a longitudinal cohort study. BMJ Open. 2016; 6(4):e010768. doi:10.1136/bmjopen-2015–010768.

45. Nakamura M, Ojima T, Nakade M, Ohtsuka R, Yamamoto T, Suzuki K et al. Poor oral health and diet in relation to weight loss, stable underweight and obesity in community dwelling older adults: a cross-sectional study from the JAGES 2010 Project. J Epidemiol. 2016; 26(6):322–9. doi:10.2188/jea.JE20150144.

46. Sato Y, Aida J, Kondo K, Tsuboya T, Watt RG, Yamamoto T et al. Tooth loss and decline in functional capacity: a prospective cohort study from the Japan Gerontological Evaluation Study. J Am Geriatr Soc. 2016; 64(11):2336–42. doi:10.1111/jgs.14324.

47. Shiba K, Kondo N, Kondo K. Informal and formal social support and caregiver burden: the AGES caregiver survey. J Epidemiol. 2016; 26(12):622–8.doi:10.2188/jea.JE20150263

48. Tani Y, Fujiwara T, Kondo N, Noma H, Sasaki Y, Kondo K. Childhood socioeconomic status and onset of depression among Japanese older adults: the JAGES prospective cohort study. Am J Geriatr Psychiatry. 2016; 24(9):717–26. doi:10.1016/j.jagp.2016.06.001.

49. Tani Y, Kondo N, Nagamine-Takahashi Y, Shinozaki T, Kondo K, Kawachi I et al. Childhood socioeconomic disadvantage is associated with lower mortality in older Japanese men: the JAGES cohort study. Int J Epidemiol. 2016; 45(4):1226–35.

50. Tsuboi H, Hirai H, Kondo K. Giving social support to outside family may be a desirable buffer against depressive symptoms in community-dwelling older adults: Japan Gerontological Evaluation Study. Biopsychosoc Med. 2016; 10:18. doi:10.1186/s13030–016–0064–6.

51. Tsuboya T, Aida J, Hikichi H, Subramanian SV, Kondo K, Osaka K et al. Predictors of depressive symptoms following the Great East Japan earthquake: a prospective study. Soc Sci and Med. 2016; 161:47–54. doi:10.1016/j.socscimed.2016.05.026.

52. Yamamoto T, Aida J, Kondo K, Fuchida S, Tani Y, Saito M et al. Oral health and incident depressive symptoms: JAGES project longitudinal study in older Japanese. J Am Geriatr Soc. Journal of the American Geriatric Society. 2017; 65(5):1079–84. doi:10.1111/jgs.14777.

53. Yazawa A, Inoue Y, Fujiwara T, Stickley A, Shirai K, Amemiya A et al. Association between social participation and hypertension among older people in Japan: the JAGES Study. Hypertens Res. 2016; 39(11):818–24. doi:10.1038/hr.2016.78.

54. Hayashi K, Kawachi I, Ohira T, Kondo K, Shirai K, Kondo N. Laughter and subjective health among community-dwelling older people in Japan: cross-sectional analysis of the Japan Gerontological Evaluation Study cohort data. J Nerv Ment Dis. 2015; 203(12):934–42.

55. Hikichi H, Kondo N, Kondo K, Aida J, Takeda T, Kawachi I. Effect of community intervention program promoting social interactions on functional disability prevention for older adults: propensity score matching and instrumental variable analyses, JAGES Taketoyo study. J Epidemiol Community Health. 2015; 69(9):905–10. doi:10.1136/jech-2014–205345.

56. Ito K, Aida J, Yamamoto T, Otsuka R, Nakade M, Suzuki K et al. Individual- and community-level social gradients of edentulousness. BMC Oral Health. 2015; 15:34. doi:10.1186/s12903–015–0020-z.

57. Kondo K. Evaluation of effectiveness, quality and inequalities in health, medical and long-term care – achievements and challenges. Policy Research Institute, Ministry of Finance, Japan, Public Policy Review, 2015 Oct; 11(5) (https://www.mof.go.jp/english/pri/publication/pp_review/ppr031/ppr031b.pdf, accessed 17 April 2018).

58. Kondo N, Saito M, Hikichi H, Aida J, Ojima T, Kondo K et al. Relative deprivation in income and mortality by leading causes among older Japanese men and women: AGES cohort study. J Epidemiol Community Health. 2015; 69(7):680–5. doi:10.1136/jech-2014–205103.

59. Murata C, Takeda T, Suzuki K, Kondo K. Positive affect and incident dementia among the old. J Epidemiol Res. 2015; 2(1):118–24

60. Nakade M, Takagi D, Suzuki K, Aida J, Ojima T, Kondo K et al. Influence of socioeconomic status on the association between body mass index and cause-specific mortality among older Japanese adults: the AGES Cohort Study. Prev Med. 2015; 77:112–18. doi:10.1016/j.ypmed.2015.05.015.

61. Tani Y, Kondo N, Takagi D, Saito M, Hikichi H, Ojima T et al. Combined effects of eating alone and living alone on unhealthy dietary behaviors, obesity and underweight in older Japanese adults: results of the JAGES. Appetite. 2015; 95:1–8. doi:10.1016/j.appet.2015.06.005.

62. Tani Y, Sasaki Y, Haseda M, Kondo K, Kondo N. Eating alone and depression in older men and women by cohabitation status: the JAGES longitudinal survey. Age Ageing. 2015; 44(6):1019–26. doi:10.1093/ageing/afv145.

63. Yamakita M, Kanamori S, Kondo N, Kondo K. Correlates of regular participation in sports groups among Japanese older adults: JAGES cross-sectional study. PLoS One. 2015; 10(10):e0141638. doi:10.1371/journal.pone.0141638.

64. Yamamoto T, Fuchida S, Aida J, Kondo K, Hirata Y. Adult oral health programs in Japanese municipalities: factors associated with self-rated effectiveness. Tohoku J Exp Med. 2015; 237(4):259–66. doi:10.1620/tjem.237.259.

65. Fujiwara T, Kondo K, Shirai K, Suzuki K, Kawachi I. Associations of childhood socioeconomic status and adulthood height with functional limitations among Japanese older people: results from the JAGES 2010 project. J Gerontol A Biol Sci Med Sci. 2014; 69(7):852–9. doi:10.1093/gerona/glt189.

66. Hayashi T, Kondo K, Suzuki K, Yamada M, Matsumoto D. Factors associated with falls in community-dwelling older people with focus on participation in sport organizations: the Japan Gerontological Evaluation Study project. BioMed Res Int. 2014; 2014:537614. doi:10.1155/2014/537614..

67. Hayashi T et al. Factors associated with falls in community-dwelling older people with focus on participation in sport organizations: the Japan Gerontological Evaluation Study project. BioMed Res Int. 2014;2014:537614. doi:10.1155/2014/537614.

68. Kanamori S, Kai Y, Aida J, Kondo K, Kawachi I, Hirai H et al; the JAGES Group. Social participation and the prevention of functional disability in older Japanese: the JAGES Cohort Study. PLoS One. 2014; 9(6):e99638. doi:10.1371/journal.pone.0099638.

69. Matsuyama Y, Aida J, Takeuchi K, Tsakos G, Watt RG, Kondo K et al. Inequalities of dental prosthesis use under universal healthcare insurance. Community Dent Oral Epidemiol. 2014; 42(2):122–8. doi:10.1111/cdoe.12074.

70. Saito M, Kondo K, Kondo N, Abe A, Ojima T, Suzuki K et al; JAGES group. Relative deprivation, poverty, and subjective health: JAGES cross-sectional study. PLoS One. 2014; 9(10):e111169. doi:10.1371/journal.pone.0111169.

71. Shihoko K, Jun A, Ichiro K, Kondo N, Subramanian SV, Ito K et al. Social support improves mental health among the victims relocated to temporary housing following the Great East Japan earthquake and tsunami. Tohoku J Exp Med. 2014; 234(3):241–7.

72. Yamamoto T , Kondo K, Aida J, Fuchida S, Hirata Y; JAGES group. Association between the longest job and oral health: Japan Gerontological Evaluation Study project cross-sectional study. BMC Oral Health. 2014; 14:130. doi:10.1186/1472–6831–14–130.

73. Yamamoto T, Kondo K, Aida J, Suzuki K, Misawa J, Nakade M et al. Social determinants of denture/bridge use: Japan Gerontological Evaluation Study project cross-sectional study in older Japanese. BMC Oral Health. 2014; 14:63. doi:10.1186/1472–6831–14–63.

74. Aida J, Kondo K, Kawachi I, Subramanian SV, Ichida Y, Hirai H et al. Does social capital affect the incidence of functional disability in older Japanese? A prospective population-based cohort study. J Epidemiol Community Health. 2013; 67(1):42–7. doi:10.1136/jech-2011–200307.

75. Ichida Y, Hirai H, Kondo K, Kawachi I, Takeda T, Endo H. Does social participation improve self-rated health in the older population? A quasi-experimental intervention study. Soc Sci Med. 2013; 94:83–90. doi:10.1016/j.socscimed.2013.05.006.

76. Takagi D, Kondo K, Kawachi I. Social participation and mental health: moderating effects of gender, social role and rurality. BMC Public Health. 2013; 13:701. doi:10.1186/1471–2458–13–701.

77. Takagi D, Kondo K, Kondo N, Noriko Cable, Ikeda K, Kawachi I. Social disorganization/social fragmentation and risk of depression among older people in Japan: multilevel investigation of indices of social distance. Soc Sci Med. 2013; 83:81–9. doi:10.1016/j.socscimed.2013.01.001.

78. Takeuchi K, Aida J, Kondo K, Osaka K. Social participation and dental health status among older Japanese adults: a population-based cross-sectional study. PLOS One. 2013; 8(4):e61741. doi:10.1371/journal.pone.0061741.

79. Aida J, Kawachi I, Subramanian SV, Kondo K. Disaster, Social Capital, and Health. In: Kawachi I et al. (eds.). Global Perspectives on Social Capital and Health. Springer Science+Business Media, New York, 2013;167–187.

80. Murayama H, Kondo K, Fujiwara Y. Social capital interventions to promote healthy aging. In: Kawachi I, Takao S, Subramanian S (eds.). Global Perspectives on Social Capital and Health. Springer Science+Business Media, New York, 2013;205–38.

81. Aida J, Kondo K, Hirai H, Nakade M, Yamamoto T, Hanibuchi T et al. Association between dental status and incident disability in an older Japanese population. J Am Geriatr Soc. 2012; 60(2):338–43. doi:10.1111/j.1532–5415.2011.03791.x.

82. Hanibuchi T, Kondo K, Nakaya T, Shirai K, Hirai H, Kawachi I. Does walkable mean sociable? Neighborhood determinants of social capital among older adults in Japan. Health Place. 2012; 18(2):229–39. doi:10.1016/j.healthplace.2011.09.015.

83. Hanibuchi T, Murata Y, Ichida Y, Hirai H, Kawachi I, Kondo K. Place-specific constructs of social capital and their possible associations to health: a Japanese case study. Soc Sci Med. 2012; 75(1):225–32. doi:10.1016/j.socscimed.2012.03.017.

84. Hirai H, Kondo K, Kawachi I. Social determinants of active aging: differences in mortality and the loss of healthy life between different income levels among older Japanese in the AGES cohort study. Curr Gerontol Geriatr Res. 2012; 2012:701583. doi:10.1155/2012/701583.

85. Kanamori S, Kai Y, Kondo K, Hirai H, Ichida Y, Suzuki K et al. Participation in sports organizations and the prevention of functional disability in older Japanese: the AGES cohort study. PLoS One. 2012; 7(11):e51061. doi:10.1371/journal.pone.0051061.

86. Nishi A, Kawachi I, Shirai K, Hirai H, Jeong S, Kondo K. Sex/gender and socioeconomic differences in the predictive ability of self-rated health for mortality. PLoS One. 2012; 7(1):e30179. doi:10.1371/journal.pone.0030179.

87. Saito M, Kondo N, Kondo K, Ojima T, Hirai H. Gender differences on the impacts of social exclusion on mortality among older Japanese: AGES cohort study. Soci Sci Med. 2012; 75(5):940–5. doi:10.1016/j.socscimed.2012.04.006.

88. Yamamoto T, Kondo K, Hirai H, Nakade M, Aida J, Hirata Y. Association between self-reported dental health status and onset of dementia: Aichi Gerontological Evaluation Study project 4-year prospective cohort study of older Japanese adults. Psychosom Med. 2012; 74(3):241–8. doi:10.1097/PSY.0b013e318246dffb.

89. Yamamoto T, Kondo K, Misawa J, Hirai H, Nakade M, Aida J et al. Dental status and incident falls among older Japanese: a prospective cohort study. BMJ Open. 2012; 2(4). pii: e001262. doi:10.1136/bmjopen-2012–001262.

90. Aida J, Kondo K, Hirai H, Subramanian SV, Murata C, Kondo N et al. Assessing the association between all-cause mortality and multiple aspects of individual social capital among the older Japanese. BMC Public Health. 2011; 11:499. doi:10.1186/1471–2458–11–499.

91. Aida J, Kondo K, Yamamoto T, Hirai H, Nakade M, Osaka K et al. Income inequality, social capital and self-rated health and dental status in older Japanese. Soc Sci Med. 2011; 73(10):1561–8. doi:10.1016/j.socscimed.2011.09.005.

92. Aida J, Kondo K, Yamamoto T, Hirai H, Nakade M, Osaka K et al. Oral health and cancer, cardiovascular and respiratory mortality of Japanese. J Dent Res. 2011; 90(9):1129–35. doi:10.1177/0022034511414423.

93. Hanibuchi T, Kawachi I, Nakaya T, Hirai H, Kondo K. Neighborhood built environment and physical activity of Japanese older adults: results from the Aichi Gerontological Evaluation Study (AGES). BMC Public Health. 2011; 11:657. doi:10.1186/1471–2458–11Ð657.

94. Hanibuchi T, Kondo K, Nakaya T, Nakade M, Ojima T, Hirai H et al. Neighborhood food environment and body mass index among Japanese older adults: results from the Aichi Gerontological Evaluation Study (AGES). Int J Health Geogr. 2011; 10:43. doi:10.1186/1476–072X-10–43.

95. Hanibuchi T, Aida J, Nakade M, Hirai H, Kondo K. Geographical accessibility to dental care in the Japanese elderly. Community Dent Health. 2011; 28(2):128–35.

96. Inoue Y, Jeong S, Kondo K. Changes in hospital performance after implementation of pay-for-performance in Japan. Clinical Audit. 2011; (3):17–23. doi:https://doi.org/10.2147/CA.S24969.

97. Inoue Y, Jeong S, Kondo K, Young-joon S. Stroke rehabilitation performance and outcomes among hospitals. The Korean Society of Health Service Management. 2011; 3:53–61. (in Korean)

98. Nishi A, Kondo K, Hirai H, Kawachi I. Cohort profile: AGES 2003 cohort study in Aichi, Japan. J Epidemiol. 2011; 21(2):151–7.doi:10.2188/jea.JE20100135

99. Murata C, Yamada T, Chia-Ching Chen, Ojima T, Hirai H, Kondo K. Barriers to health care among the elderly in Japan. Int J Environ Res Public Health. 2010; 7(4):1330–41. doi:10.3390/ijerph7041330.

100. Aida J, Hanibuchi T, Nakade M, Hirai H, Osaka K, Kondo K. The different effects of vertical social capital and horizontal social capital on dental status: a multilevel analysis. Soc Sci Med. 2009; 69(4):512–18. doi:10.1016/j.socscimed.2009.06.003.

101. Ichida Y, Hanibuchi T, Kondo K, Hirai H. Social capital, income inequality and self-rated health in Chita peninsula, Japan: a multilevel analysis of 25 communities. Social Science and Medicine. 2009; 69(4):489–99. doi:10.1016/j.socscimed.2009.05.006.

102. Kondo N, Kawachi I, Hirai H, Kondo K, Subramanian SV, Hanibuchi T et al. Relative deprivation and incident functional disability among older Japanese women and men: prospective cohort study. J Epidemiol Community Health. 2009; 63:461–7. doi:10.1136/jech.2008.078642

103. Kondo K. Beyond the era of cost containment. Japan-hospitals. 2008; 27:19–38.

104. Murata C, Kondo K, Hirai H, Ichida Y, Ojima T. Association between depression and socio-economic status among community- dwelling elderly in Japan: the Aichi Gerontological Evaluation Study (AGES). Health Place. 2008; 14(3):406–14.

105. Murata C, Kondo T, Tamakoshi K, Yatsuya H, Toyoshima H. Factors associated with life space among community-living rural elders in Japan. Public Health Nurs. 2006; 23(4):324–31.

With one of the longest life expectancies in the world, Japan serves as a global reference point for the highest attainable standards of healthy ageing. The Japan Gerontological Evaluation Study (JAGES) is a longitudinal cohort study with an almost 20-year history. Research findings from over 40 municipalities have highlighted stark health disparities between and within communities, informed national policy improvements in Japan, and provided practical, evidence-based solutions to minimize evident health gaps. The lessons on how to effectively translate research findings into action have direct implications for other countries and their efforts to achieve universal health coverage.

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