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Systemic Design For Elderly Healthcare: Analysis of the current responses in China, Italy and Japan

Wen Lu, Silvia Barbero, and Amina Pereno

Politecnico di Torino, Department of Architecture and Design

Accompanied by the continuous changes in society, environment, culture, science and technology, the changing demographic structure of the world is also leading all countries to face multi-level cross-cutting and comprehensive challenges from the social, economic and environmental perspectives because of the increasing ageing of the population. Few studies use a systemic design approach to discuss the gaps in healthcare policy under different political regimes, thus expanding the discussion of the complex social, economic and environmental problems that elderly people face in community care. The knowledge generated through ageing research has huge potential for improving individual lives and society (Editorial,2021). In contrast, cross-cutting policy gaps are especially relevant to improving the quality of life of elderly people, the quality of healthcare – and the quality of nursing staff in community care. The paper adopts a deductive research methodology, starting from the general perspective of cross-cutting policy gaps, criteria-specific gaps and systemic design contribution, and outlines the systemic challenges of population ageing in China, Italy and Japan. The research cross-analysed models of cross-scale community care and community care stakeholder map derived from differences in healthcare policies and levels of sustainability under different political regimes in China, Italy and Japan. A holistic vision of sustainable healthcare should not consider only the treatment's social, economic and environmental impacts. It should also take into consideration the care seekers and care providers in

relation to their context by analysing the interactions they establish among them and with the context itself, assessing the influences from and consequences they generate on it. The systemic design approach is built around four additional key principles that contribute to environmental, social and economic sustainability (Silvia B. & Agnese P.,2017). Therefore, this paper attempts to add key criteria for whether healthcare policy considers elderly care, which mainly considers whether community care can reduce the burden on home care stakeholders brought about by long-term care and whether it considers effective age-appropriate design.

Keywords: elderly people, healthcare, population ageing, community care, policy gaps, systemic design

RSD: Health & Well-Being

Introduction

Accompanied by the continuous changes in society, economy, environment, science and technology, people's concept of having offspring has also changed. The most obvious trend of population structure is the declining birth rate and the increasing population ageing. Therefore, in the current transformation of the healthcare system, the ageing of the population is a huge challenge facing China, Italy and the whole world. In the process of changing the healthcare system from traditional healthcare to smart healthcare, sustainable development has a huge impact on the healthcare system—the potentialities offered by the application of a systemic design approach to healthcare as an effective way of addressing the complexity of the issue (Silvia B.& Agnese P., 2017). So, will sustainability and a systemic design approach intervene in the transformation of healthcare, and thus healthcare for the elderly? In turn, will the transformation of elderly healthcare intervene in the role of sustainability and systemic design in healthcare? Thinking and empirical research on the above-mentioned issues not only allow us to observe the changing trends in the process of sustainable development and healthcare policy transformation in China, Italy and Japan but also provide information

for cross-cutting policy gaps in China, Italy, and Japan, and evidence and provide a new perspective on understanding the transformation of geriatric healthcare.

An Italian healthcare transformation research found that during the transformation, the vision of healthcare has evolved toward people-centred, integrated health service systems (World Health Organization, 2016). People-centred health service is, at its core, putting people and communities at the centre of health systems and empowering people to take charge of their health instead of being passive recipients of care (Patricio L. & et al., 2020). Before the transformation, traditionally, healthcare has focused on curing illnesses (i.e., what is the matter with the patient) (Deloitte, 2019). When the transformation achieves more significant results, people's trust in public health institutions will increase significantly, which will greatly facilitate the effective implementation of policies in the community. During the transformation of healthcare systems in China, Italy, and Japan, the lessons learnt from China could help other nations improve Universal health coverage (UHC) in sustainable and adaptive ways, including continued political support, increased health financing and a strong primary healthcare (PHC) system as a basis. A clear and simple definition has been developed by World Health Organization " PHC is a whole-of-society approach to health that aims at ensuring the highest possible level of health and well-being and their equitable distribution by focusing on people's needs and as early as possible along the continuum from health promotion and disease prevention to treatment, rehabilitation and palliative care, and as close as feasible to people's everyday environment", and it includes engaging and empowering individuals, families, and communities for increased social participation and enhanced self-care and self-reliance in health (World Health Organization,2021).

How have the Sustainable Development Goals (SDG3) and the systemic design approach impacted healthcare system changes during the transformation of healthcare systems in China, Italy and Japan? The above questions are very important, but there is not much research on their relationship. Theoretically, after the COVID-19 pandemic, the care of the frail elderly is one of the key factors that will greatly impact the healthcare system of various countries. Community care of the elderly will pass through three levels (Macro,

Meso and Micro) and four criteria (Social sustainability, Economic, Environment, and Elderly care) for systemic analysis.

The relationship between sustainable development, systemic design approach, and healthcare are mutually reinforcing and mutually fulfilling since the 2030 agenda for sustainable development, adopted by all United Nations Member States in 2015, at its heart are the 17 sustainable development goals (after the SDGs), the member states of the United Nations incorporate the SDGs into their national legal systems according to their national conditions, develop execution plans and set budgets (Wikipedia, 2022). Research on sustainable healthcare concentrates on formulating appropriate strategies, policies, and actions to tackle the main economic, social and environmental issues of the healthcare sector (Pereno A., 2017). Simultaneously, systemic design (SD) intends to develop methodologies and approaches that help to integrate systems thinking with design towards sustainability at the environmental, social and economic levels. It is a pluralistic initiative where many different approaches are encouraged to SD for sustainable healthcare thrive and where dialogue and organic development of new practices is central." ("Systemic Design", n.d., as cited in Pereno A., 2017).

Furthermore, SD addresses design problems from a systems thinking perspective, proposing comprehensive solutions that consider all elements in the system, avoid side effects and promote environmental, economic and social sustainability. (Pereno A., 2017). Therefore, the healthcare expenditure in the national budget is indirectly affected by the SDGs, which in turn affects the development of healthcare, and the development of healthcare also affects the progress of sustainable development. SD approach can be a solution and design tool for sustainable healthcare (SH).

Methodology

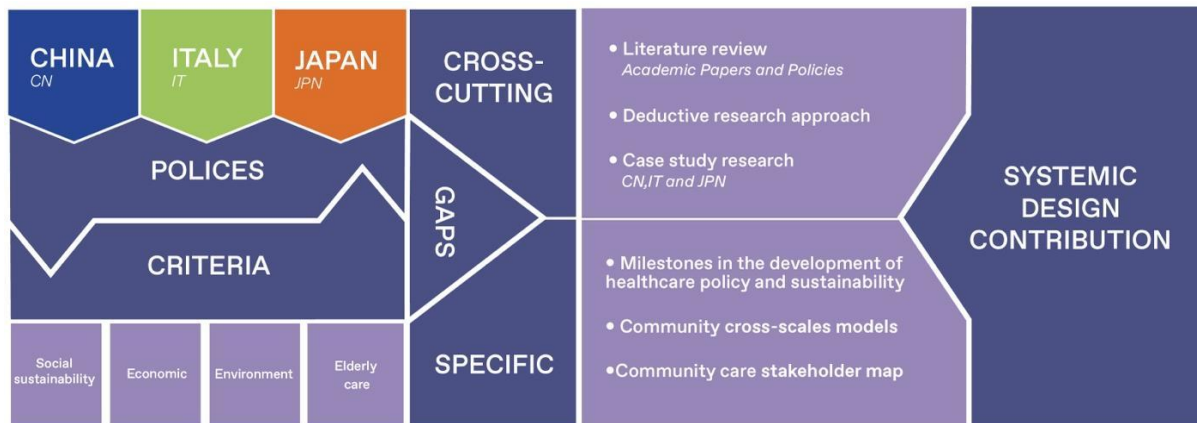


Figure 1. Graphical visualisation of the research methodology.

Deductive reasoning is a theory-testing process which commences with an established theory or generalisation and seeks to see if the theory applies to specific instances (Hyde K. F., 2000). Deductive, exploratory research is more intentionally connected to previous research. The initial framing device is located or designed using the literature (Casula M., Rangarajan N. & Shields P., 2021). Therefore, the paper adopts a deductive research methodology (Figure 1), starting from the general perspective of cross-cutting policy gaps and criteria-specific gaps to define the possible SD contribution. Since healthcare is a complex system, the concept of SH should consider the many different variables of the economy, environment and society to reflect this complexity (Barbero S. & Pallaro A., 2017).

In the case study, four variable criteria were designed starting from the key areas of policy-making in the SH-related areas: social sustainability, economic, environment, and elderly care and these four variable criteria were used to conduct literature reviews of academic papers and healthcare policies, to diagnose specific healthcare activities and their fields, analyse its complex data, services, and information flow, and presented the milestones in the development of healthcare policies in these three countries, as well as the display of the sustainable development process and the status quo of community care models. Through the horizontal comparison of macro, meso, and micro levels, it is

shown community care model for Chinese, Italian, and Japanese cities and villages. The data sources include the national statistical database of China, Italy, and Japan and select the data from 2020-2022 in the database. The data includes the population structure, the number and percentage of the population of each age group, life expectancy at birth, statutory retirement age, social security (ageing policy and ageing services provided), healthcare data (number of the public health agency, number of nursing homes, number of public hospitals, number of private hospitals, number of traditional Chinese hospitals, number of the community health centre, clinic, family doctor, free healthcare services and healthcare education provided, live arrangement of older people (percentage of older people living independently, percentage of older people living with spouse, percentage of older people living with children and percentage of older people living with extended family) and living habit (food and behaviour), data analysis was performed using Excel spreadsheets, and the results were shown in Figure 4-1 & 4-2 (Community cross-scale model and community care stakeholder map in China, Italy & Japan).

This paper also explores SD's contribution to this research and identifies the methodological tools that can support these research contributions. Finally, this paper discusses the contribution of systemic thinking to the sustainable development of the family nursing industry under the background of the ageing population.

Ageing population challenges community care and home care

The prominence of the ageing population symbolises the change in the population structure, and the care of the elderly in the community and home faces more challenges. A 2021 UN report shows that Health risk factors in old age are complex as these factors start to influence the health status and subsequent mortality earlier in people's life cycle. Risk factors mainly include behaviours, environment, and metabolism (Medici A. C.,2021). The daily life radius of the elderly mainly revolves around the community and home. Therefore, whether the community and home provide the elderly with appropriate ageing services will directly affect the quality of the elderly's health. These are the places where the elderly actively participate and create opportunities for them where they receive attention and support; therefore, China, Italy

and Japan all need to explore and develop a network of age-friendly communities (Carney G. M. & Nash P., 2020), because preparing for future ageing trends, are in the process of expanding their care services via the establishment of a long-term care insurance system. The implementation of some sort of community-based integrated care system is likely to become the next critical step to ensure the sustainability of the system (Tsutsui T., 2014).

As shown by the data provided by the Institute of Health Metrics and Evaluation, in developed countries, after age over 50 years, environmental and metabolic risks increase rapidly, while behavioural risks decrease year by year. In developing countries, three factors will increase year by year, and environmental factors are at the greatest risk. Among underdeveloped countries, but compared with low-income, lower-middle-income, and upper-middle-income countries, the three factors of developed countries can only account for the lowest overall proportion in different income countries. In sum, population ageing affects health and long-term care systems (Song P. & Tang W., 2019), and lifestyle changes are still crucial to a healthy transition from the working age to retirement age, especially quitting smoking and balancing the diet (including controlling sugar and salt intake).

Case studies 1: Analyse and compare the development of healthcare policy and sustainability in China, Italy and Japan

At the present time, the national healthcare policies in China, Italy and Japan seldomly consider the sustainability of healthcare policies and the sustainable development of healthcare, but the three countries have been thinking about and developing the concept of sustainability for decades, for that reason the part of the research aims to explore the cross-cutting gaps in the development of healthcare policy and sustainable development. The gaps in healthcare policy and sustainable development progress in three countries were also ranked according to four criteria, and the reasons were analysed.

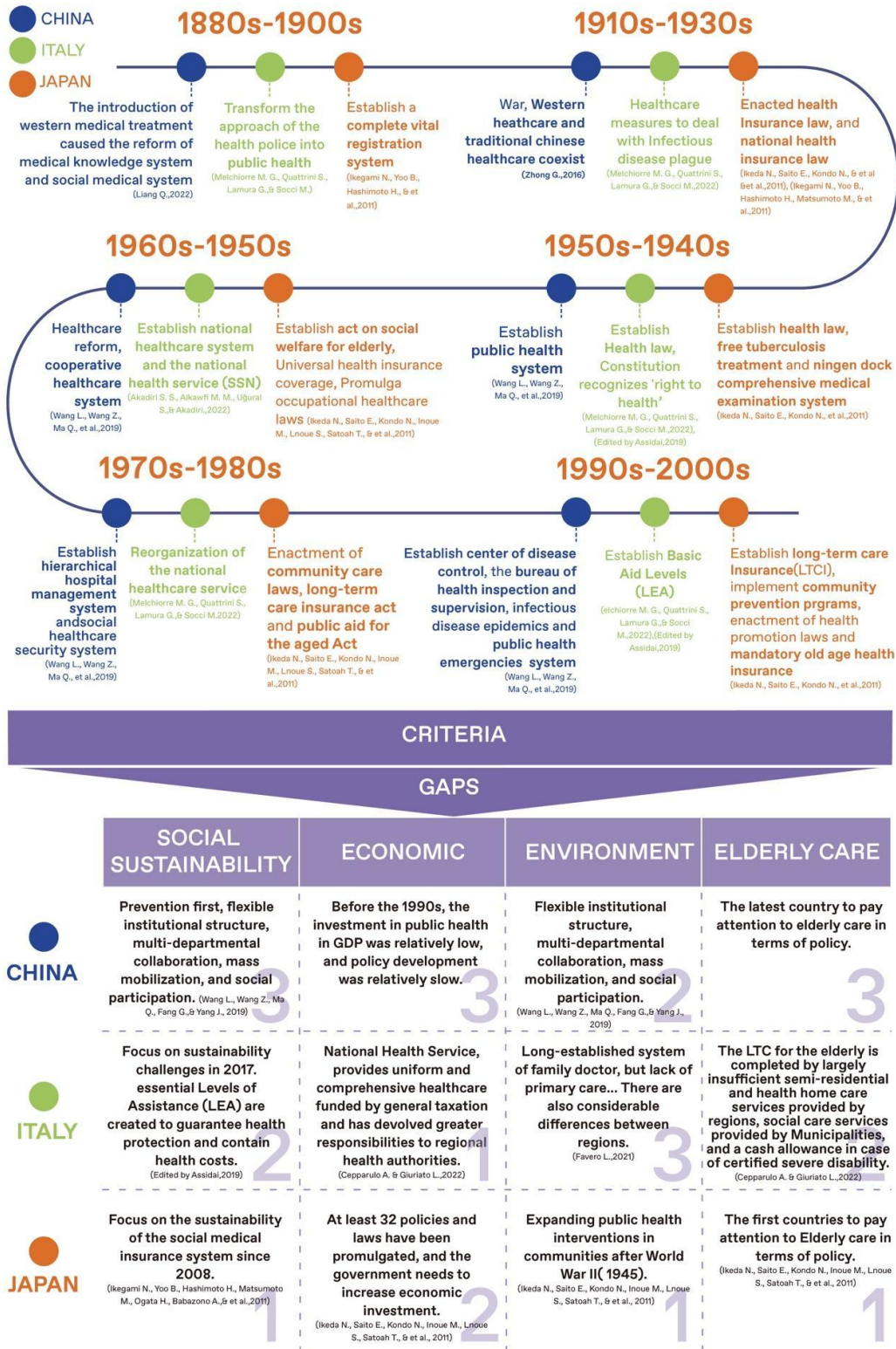
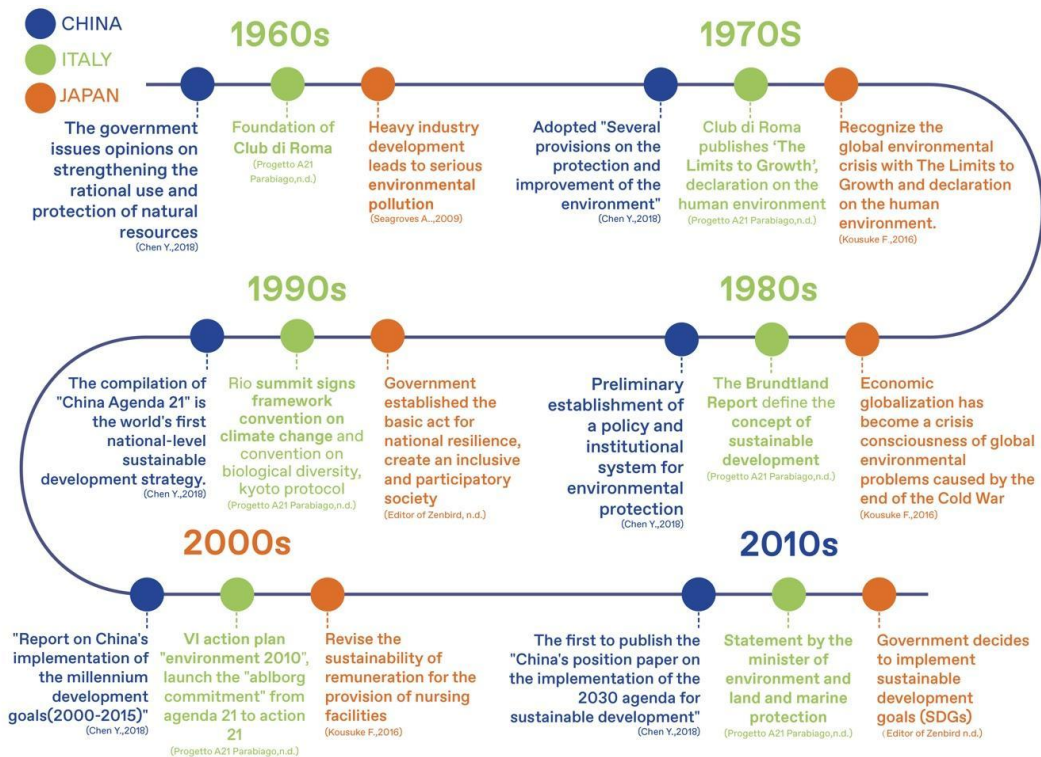


Figure 2. Milestone in the Development of Healthcare Policy in China, Italy and Japan.



CRITERIA				
GAPS				
	SOCIAL SUSTAINABILITY	ECONOMIC	ENVIRONMENT	ELDERLY CARE
CHINA	Put forward the proposition of building a community with a shared future for mankind, and promote the implementation of the goals through the green "Belt and Road" (Chen Y., 2018)	Extensive growth model has caused increasingly prominent environmental problems, which have seriously restricted social and economic development (Chen Y., 2018)	The overall transformation from industrial civilization to ecological civilization (Chen Y., 2018)	The latest country to pay attention to elderly care in terms of policy
ITALY	Italy has strategic policy with an emphasis on "green growth" elements regarding economic improvement in the energy sector and the 2020 target non-ETS emissions reduction target. (Akadiri S. S., Alkawfi M. M., Ugural S., & Akadiri A. C. 2019)	The economy of Italy has gone in achieving cleaner and environmental sustainability targets put forward by the European Environment Agency (Akadiri S. S., Alkawfi M. M., Ugural S., & Akadiri A. C. 2019)	Energy/environmental protection policies are in accordance with economic growth policies and objectives (Akadiri S. S., Alkawfi M. M., Ugural S., & Akadiri A. C. 2019)	The LTC for the elderly is completed by largely insufficient semi-residential and health home care services provided by regions, social care services provided by Municipalities, and a cash allowance in case of certified severe disability. (Cepparulo A. & Giurato L., 2022)
JAPAN	The policy of reemploying the elderly and the system of taking care of the elderly in a community (Editor of Zenbird, n.d.)	A "super-aging" society, has slowed economic growth and increased the burden of providing social security benefits to the state. (Editor of Zenbird, n.d.)	The environment in Japan has been largely affected by the politics and economy of the country as a leader in environmental awareness and protection. (Seagroves A., 2009)	The first countries to pay attention to elderly care in terms of policy (Ikeda N., Saito E., Kondo N., Inoue M., Lnoue S., Satoah T., & et al., 2011)

Figure 3. Milestone in the Development of Sustainability in China, Italy and Japan.

Through Figure 2, it can be found that conflicts, political stability, and economic growth largely hinder medical and sustainable change and development. In the seventies, the vibrant debate around growth's limits influenced the reflection and enlightenment of various countries on environmental pollution and laid the foundation for Italy's sustainable development to be at the forefront.

According to the gap ranking of the four key criteria extracted by the approach of SD (as shown in Figure 2), Japan's healthcare policy ranks first, and Japan is the first to enter the "super-ageing" society, followed by Italy then there is China, so all three countries are facing transformation, and the concept of sustainability has been paid attention to one after another (Figure 3), Increasingly prominent environmental problems, which have seriously restricted social and economic development (Chen Y., 2018), Italy is the three countries are the first to put forward the concept of sustainable development and act in abundance; therefore, energy and environmental conservation and protection policies would not hurt or slow down the economic performance of Italy as the nation energy/environmental conservation policies are in tune with the macroeconomic objectives (Akadiri S. S. & et al.,2019). Thus, sustainable conceptual development interferes with healthcare policy development, while SD's approach seems to indirectly interfere with policymakers' problem analysis in the policy-making process. Combining Figure 2 and Figure 3, in the process of sustainable development, China put forward the proposition of building a community with a shared future for mankind and promoting the implementation of the goals through the green "Belt and Road" In a sense, this is China's initiative to contribute to global sustainable development (Chen Y., 2018). It is worth learning from other countries. At the same time, it can be seen from the ranking of the two figures that the advanced nature of the policy of community care and home care in elder care in Japan and Italy is worth learning from China.

Case studies 2: The community cross-scale models in China, Italy and Japan

This part mainly researches community cross-scale models and community care stakeholder maps in China, Italy, and Japan. Cross-analysis of policy gaps across fields from social sustainability, economic, environmental and elderly care perspectives between macro, meso and micro scale. According to the community cross-scale model in the cities of the three countries shown in Figures 4-1 & 4-2., a stakeholder map has been created using a hub-and-spoke approach, where the hub is the key object, the value bearer around the human ecosystem. It is also a key activity in human-centred design and design thinking processes, as it not only focuses on people from the beginning of a project but also identifies their relationships and connections, triggering the sustainable development process (Strumenti e pratica del design, 2022).

From the social sustainability criteria, different social systems and conditions will directly affect the concept and services of community medical care because social systems and conditions will directly affect the implementation of policies, specifically social welfare, social security, and policy models. And different countries show diverse characteristics and various levels of participation (Dang W., 2020). China's social relations are 'top-down,' and the group and grid of China incline toward hierarchism. In hierarchical societies, experts and authorities make policies and manipulate citizens. This decision-making format is coercive and lacks public engagement, so citizens have to rely on the government to solve environmental problems (Dang W., 2020). China began to solve these problems after vigorously developing the economy and the problems caused by the ageing of the population (As shown in Figure 4-1), Shanghai's newly planned 15-minute life circle, strengthening a sense of community, and improving sustainability and liveability (Huang Q.,2022). In Italy's chaotic party system, there are increasingly bipolar coalitions and its competitive multiparty system; therefore, public participation is more difficult to implement because of its top-down inter-institutional relations (Dong W., 2020). Japan, as a one-party dominant system (Sciubba, J.D.,2008), would try to appeal to the broadest segments of the citizenry and try not to alienate any particular age group. And within aged societies, policies are likely to increasingly favour the interests of the aged and exclude youth, primarily because larger older cohorts can

exert political influence and see that outcomes favour their interests (Dang W., 2020). The experience gained in the RETRACE project has proved how stakeholder engagement is fundamental to building a shared and bottom-up policy design process (Nohra C. G., Pereno A. & Barbero S.,2020). As an approach to participatory policymaking, systemic design involves creating the conditions for stakeholders to participate more meaningfully in building shared knowledge and taking collective action (BlomkampE., 2020). Therefore, different system interventions may succeed for future care and ageing.

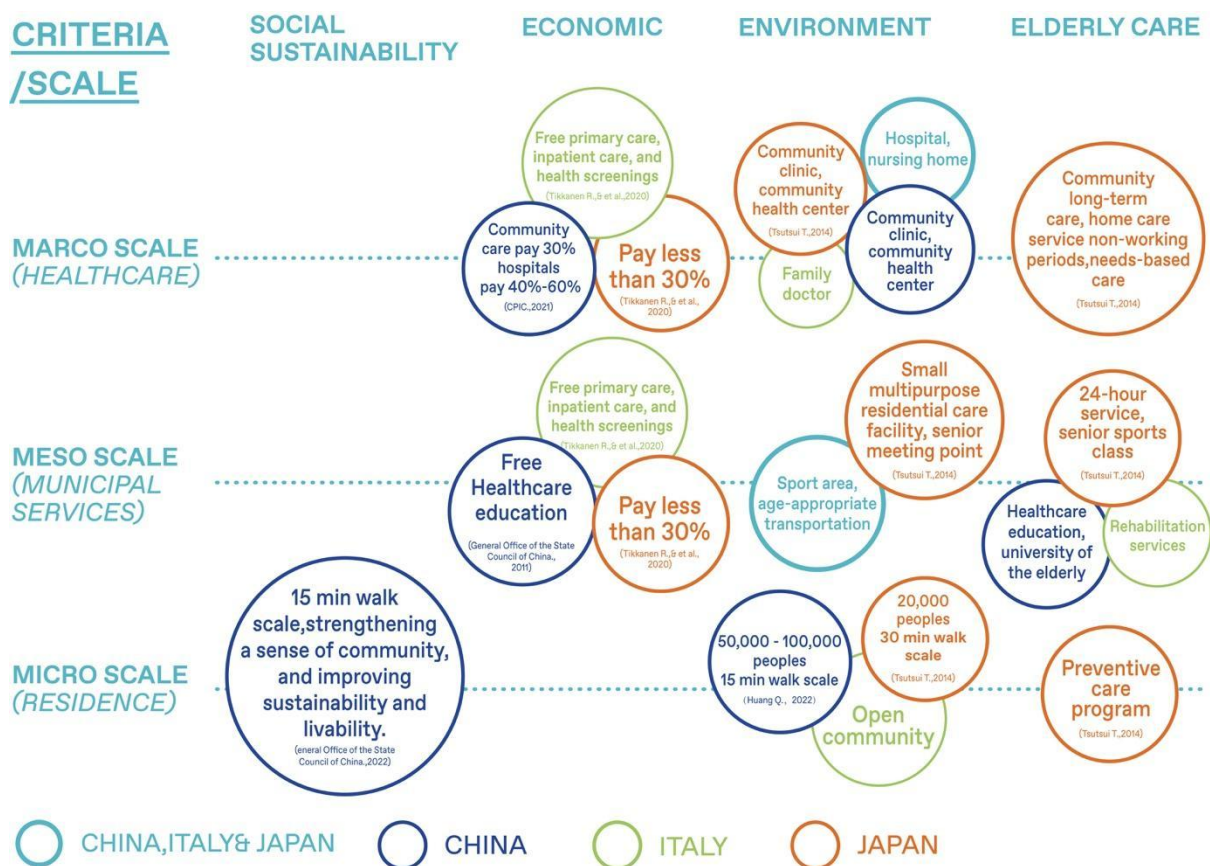


Figure 4-1. Community cross-scale model in China, Italy & Japan.

In the criteria of economics, the difference in GDP determines the key points of policymaking, which are mainly reflected in public health expenditures, pension structure proportion and medical insurance funds. Population ageing tends to increase public pension and health spending in both groups of countries (Cho D.& Lee K., 2022). China's medical expenses account for 5.2% of the GDP. It is 8.8% in Italy and 10.9% in Japan (IndexMundi,2020). It is also reflected in the percentage of paid medical activities: in Italy, it's free primary care, inpatient care, and health screenings (Donatini A., 2020). In Japan, In addition to premiums, citizens pay 30 percent coinsurance for most services, and some copayments. (Tikkanen R., Osborn R., Mossialos E. & et al., 2020), China has the highest self-pay ratio, community care pays 30%, and hospitals pay 40%-60% (CPIC., 2021). It can provide policymakers with some insights on whether to adjust the proportion of public health spending.

In the criteria of environment, community clinics and community health centres are in urban communities and rural communities and are popular in both China and Japan, and in Italy, the regional institutional autonomy makes the INHS too open to influence from local politics, undermining its technical governance (Garattini L. & Padula A., 2017). Therefore, in order to minimise the negative effect of ageing, maximise the positive effect of ageing, achieve health and longevity, and improve the quality of a community-based comprehensive healthcare system, it is essential. The progress of ageing has also put increased financial pressure on older people's long-term care services, so Japan's healthcare policy for the elderly has focused not only on providing services but also on preventing long-term care (Watanabe J. & et al.,2022).

In the criteria of elderly care, Japan began to record a complete vital registration system in the 1890s (Shown in Figure 2), analysing health influencing factors from system data and then formulating policies to reduce this influence. Therefore, the healthcare and services provided in the Japanese model are more comprehensive, and more emphasis is placed on prevention, living habits and family care. In the community comprehensive medical system, family medicine is the foundation of health care. (Yamada M. & Arai H.,2020). Combined with home care in Figure 4-2, Japan will pay special attention to preventive healthcare and long-term care in terms of the medical environment and

municipal services and try to shift the long-term care strategy to community care, providing home and even 24-hour service.

Elderly people in need of care are value bearers around the human ecosystem, and with timely intervention, nurses from hospitals, community clinics, community health centres, etc., will change from a direct service relationship to an indirect service relationship because nurses are unable to provide high-quality, comprehensive care for the elderly in need of care for long periods of time. In fact, those who have a direct relationship and can provide long-term care and home care include spouses, family members, children, and care workers who need to pay extra. The quality of life of the care recipient at this stage will be affected by the caregiver's nursing technology, the ageing level of the environment and the economic intervention. With the intervention for a longer period, caregivers who do not need to pay extra will also be intervened by the environment, economy, work, study, life, their physical conditions etc., which will reduce the quality of care.

Discussion and Conclusions

Based on the three key elements of the SD method (social sustainability, economic and environmental), this paper adds the standard elements of elderly care (is this policy/behaviour suitable for ageing?) to sort the gaps to comprehensively analyse in China, Italy and Japan, the healthcare policy and sustainable development process are analysed and verified that the goals of sustainable development will directly interfere with the formulation of healthcare policy, and the development of healthcare will, in turn, interfere with the development of healthcare policy, while the SD method It may indirectly intervene in the problem analysis in the process of policy formulation and enable policymakers to analyse complex problems in a more comprehensive way and create green solutions.

Finally, the research has shown how the development of elderly care, how SD methods can intervene in the process of analysis from the top down and make it more comprehensive, and how to explore possible solutions through design tools such as stakeholders. At the same time, cross-country analysis does the thinking of using the SD

process more comprehensive and multi-faceted and may be able to learn from each other. And the research has pointed out how the analysis shows great potential but confirms the lack of a systemic design contribution. Based on the experience of other large-scale public sectors (such as energy or mobility), you assume that systemic design can bring significant benefits, and this will be the subject of future works.

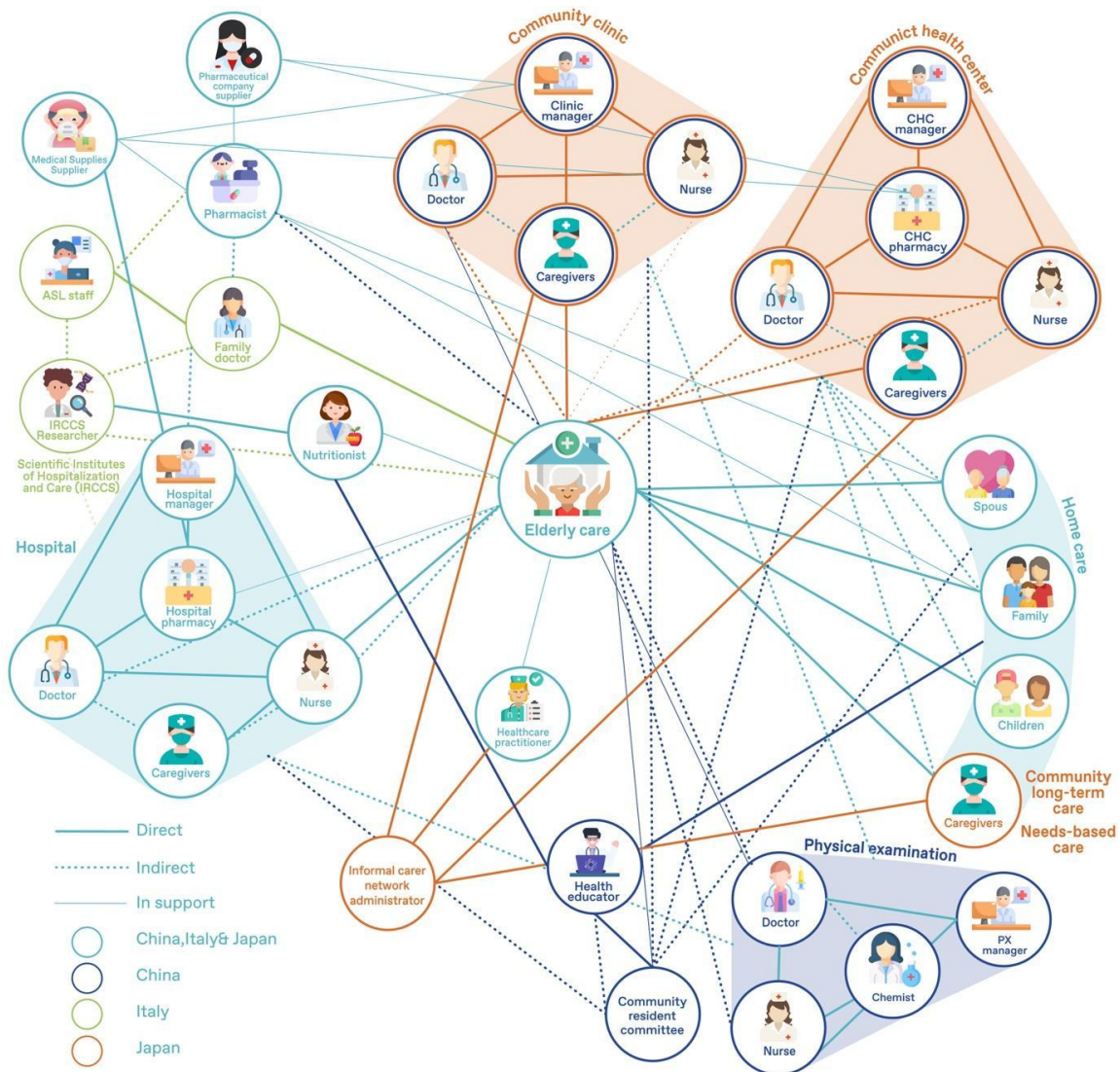


Figure 4-2. Community Care Stakeholder Map in China, Italy & Japan.

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