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Review Article

POPULATION AGING: AN INEVITABLE TREND AND GLOBAL CHALLENGE FOR PUBLIC HEALTH AND DEVELOPMENT

Nguyen Thien Nhan

ASTRACT: Population Aging is a global trend characterized by an increasing proportion of people aged 65 and over in the total population. This article analyzes the phenomenon of PA through a demographic lens, clarifying that aging is not solely the result of increased life expectancy, but also due to a prolonged period of below-replacement total fertility rate (TFR). Evidence from South Korea illustrates this dynamic: within just 60 years, the country transitioned from a non-aged society (1960) to a super-aged society (projected in 2027), with the consequence of a steep population decline starting in 2020. Vietnam, projected to become an 'aged' society by 2036 and a 'super-aged' society around 2060, must recognize emerging trends and underlying causes early to develop appropriate adaptation policies. Population Aging is not merely the outcome of medical advances and improved living conditions; it also reflects national governance decisions related to fertility, elder care, and sustainable human development. This article emphasizes the importance of monitoring TFR, the proportion of older adults, and the labor force in order to formulate responsive population policies in the context of rapidly advancing aging.

Keywords: Unsustainable and Sustainable Population Aging; Population Aging in Japan, South Korea, the World, and Vietnam; Solutions for Sustainable Population Aging; Total Fertility Rate

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1. INTRODUCTION

Population aging is one of the most important demographic changes in the 21st century, reflecting medical progress, increased longevity, and improved living conditions. However, this phenomenon is occurring at an increasingly rapid pace in many countries, especially in Asia - where many developing countries do not have sufficient time and resources to prepare for response. Population aging is associated with far-reaching consequences not only in healthcare and social security, but also affecting the demographic structure, economy, and culture of the nation.

Vietnam is entering a strong transformation phase in demographic structure, with projections to become an aged society by 2036 and super-aged around 2060. Early understanding of the nature and trends of this process will help policymakers develop appropriate strategies to ensure quality of life for the elderly while maintaining sustainable development.

Article objectives: Clarify the concept and classification of population aging according to international standards; Analyze the nature of population aging from two main drivers: increased longevity and decreased total fertility rate; Provide specific demographic data from South Korea and Vietnam to illustrate trends and consequences; Suggest policy orientations for Vietnam in the context of increasingly rapid aging.

2. CONTENT

2.1. Population aging: phenomenon and nature

Population aging (PA) is the phenomenon of increasing proportion of elderly people (according to current UN definition, people aged 65 and over) in a country's total population.

If the proportion of older adults (POA) exceeds 7%, the country (society) is called an aging society

If POA exceeds 14%, the country (society) is called an aged society

If POA exceeds 21%, it is called a super-aged society

South Korea had a POA of 7.2% in 2000 (entering the aging phase), after 20 years, in 2020 POA was 14.3% (entering the aged phase), and it is projected that after 7 years, in 2027 POA will be 21.3%, entering the super-aged phase. By 2060, POA is projected to reach 40.1%.

Since Vietnam's Elderly Law (2009) defines people aged 60 and over as elderly, calculating POA according to this criterion cannot be compared with POA statistics in other countries according to UN criteria.

According to the General Statistics Office, Vietnam's elderly population was 7.45 million in 2009, accounting for 8.68% of the population; in 2019 it increased to 11.41 million, accounting for 11.86% of the population. Projections show that by 2029 the elderly population will increase to 17.28 million, accounting for 16.53%; by 2049 it will be 28.61 million, accounting for 24.88%; and by 2069 it will be 31.69 million, accounting for 27.11% of the population.

According to the criterion of elderly being 65 years and over, Vietnam will have 14.17% of its population as elderly in 2036. This means Vietnam will enter the aged society phase in 2036, 16 years after South Korea (2020). South Korea will become a super-aged society in 2027 (POA of 21.3% of population). If we estimate Vietnam's transition from aged to super-aged society to be 33 years after South Korea, then around 2060 Vietnam will enter the super-aged phase (2027 + 33 years = 2060).

The time for South Korea to transition from aged society (2020) to super-aged society (2027) is only 7 years. Assuming Vietnam's transition time is 21 years, then in 2057 (2036 + 21 years = 2057) Vietnam will be a super-aged society. This means we can roughly estimate that Vietnam will enter the super-aged phase around 2060.

When nutritional conditions are still inadequate, living conditions do not ensure hygiene and safety, when healthcare is still backward, when working conditions are still polluted with long working hours (12 hours a day or more), human lifespan is short. Therefore, the number of elderly people in society is small. However, with progress in nutritional conditions, living and working conditions, and increasingly modern and universal healthcare, people live longer and longer. The number and proportion of

$$\text{Tỉ lệ người già} = \frac{\text{Dân số người già (từ 65 tuổi trở lên)}}{\text{Tổng dân số đất nước}} \quad (1)$$

$$\text{Tổng dân số} = \underset{\text{(Từ 14 tuổi trở xuống)}}{\text{Dân số trẻ em}} + \underset{\text{(Từ 15 tới 64 tuổi)}}{\text{Dân số tuổi lao động}} + \underset{\text{(Từ 65 tuổi trở lên)}}{\text{Dân số già}} \quad (2)$$

$$\text{Tỉ lệ người già} = \frac{\text{Dân số già}}{\text{Dân số trẻ em} + \text{Dân số tuổi lao động} + \text{Dân số già}} \quad (3)$$

$$= \frac{1}{\frac{\text{Dân số trẻ em} + \text{Dân số tuổi lao động}}{\text{Dân số già}} + 1}$$

elderly people also increase. Thus, PA is the result of a purposeful process by humans and nations, like the New Year wish: "May you live long!" Increased average lifespan and fewer illnesses among the elderly are achievements that a country can be proud of, and the happiness of every family.

Besides increased longevity, the increase in POA has another very important reason.

From equation (3) we see:

When the elderly population increases (due to increased longevity), the elderly proportion increases.

When the child population and working-age population decrease, the elderly proportion also increases.

For a country, when the Total Fertility Rate (average number of children a woman gives birth to in her lifetime) is below the Replacement-level Fertility (2.1 children/woman), the number of children will decrease , which subsequently leads to a reduction in the labor force after 15 to 20 years. That is, when a country's Total Fertility Rate (TFR) remains below the Replacement-level Fertility for an extended period, the proportion of elderly people in society will increase.

Thus, while the population aging phenomenon is measured by only one indicator - the proportion of elderly people in the total population, the essence of population aging is due to two direct causes: Increased longevity, Decreased number of children born annually (Diagram 1)

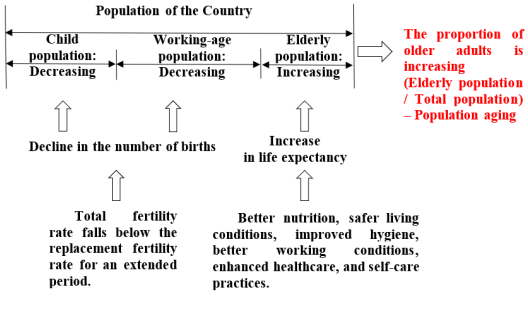


Diagram 1. Population Aging – Phenomenon and Nature

Statistical data and projections on the number of elderly people (65 years and over), elderly proportion, and Total Fertility Rate of South Korea from 1960 to 2100 provide us with a comprehensive picture of South Korea's population aging over 140 years (Figure 1).

In 1960, the number of elderly people in South Korea was 0.73 million; in 1980 it was 1.46 million; in 1990 it was 2.2 million; in 2000 it was 3.4 million. The elderly proportion in 1960 was 2.9% and in 2000 was 7.2%. Thus from 1960 to 1999, South Korea was a non-aged society, as the elderly proportion did not exceed 7% of the population. During this time, TFR decreased from 5.9 in 1960, to 4.53 in 1970, 2.82 in 1980, and 1.74 in 1984 - the first time below RLF (Figure 1). Thus, 15 years before South Korea transitioned from non-aged to aging society, TFR had already fallen below RLF.

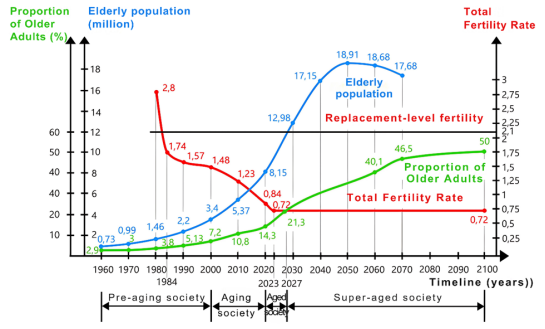


Figure 1. Population Aging in South Korea and Projections (2024–2100)

In 2010, the elderly population increased to 5.37 million and in 2020 to 8.15 million. During this time, the elderly

proportion increased to 10.8% and 14.3% respectively. This means in 2020 South Korea completed the aging society phase and entered the aged society phase (elderly proportion over 14%) (Figure 1). From 2000 to 2020, TFR decreased sharply from 1.48 to 0.84. It is projected that by 2027 the elderly proportion will be 21.3%, meaning South Korea will enter the super-aged phase just 7 years after becoming an aged society (2020-2026) (Figure 1). In the super-aged phase, the elderly population is projected to increase to 12.98 million in 2030, 17.5 million in 2040, and 18.91 million in 2050 (Figure 1). After that, the elderly population will gradually decrease, with about 17.68 million remaining in 2070. TFR in 2023 was extremely low at 0.72 - the lowest in the world, and is projected to remain at this level until 2100 (Figure 1).

The elderly proportion will increase from 21.3% in 2027 to 40.1% in 2060, 46.5% in 2070, and approach 50% by 2100 (Figure 1).

Thus, in the 100 years of the 21st century, South Korea will have 20 years as an aging society (2000-2019), 7 years as an aged society (2020-2026), and 73 years as a super-aged society (2027-2099) (Figures 1 and 2). Since TFR fell below RLF from 1984, after 117 years of TFR below RLF (1984-2100), South Korea's population must decrease: South Korea's population was 25 million in 1960, 32 million in 1970, 42.8 million in 1990, 49.55 million in 2010, and reached its maximum of 51.84 million in 2020. Projections show that after 50 years, the population will decrease to 38 million in 2070 and about 20 million in 2100. This means in the remaining 80 years of the 21st century (2021-2100), South Korea will lose 61.4% of its population, retaining only 38.6% compared to its peak population of 51.84 million in 2020.

Thus, after 27 years as aging and aged society (2000-2026), the following 74 years as super-aged society with elderly proportion increasing from 21.3% to 50% (Figures 1 and 2), a very painful process occurs simultaneously: in the first 20 years of population aging (2000-2020), the elderly proportion increased (from 7.2% to 14.3%) while population still grew, but in the following 80 years (2021-2100), when

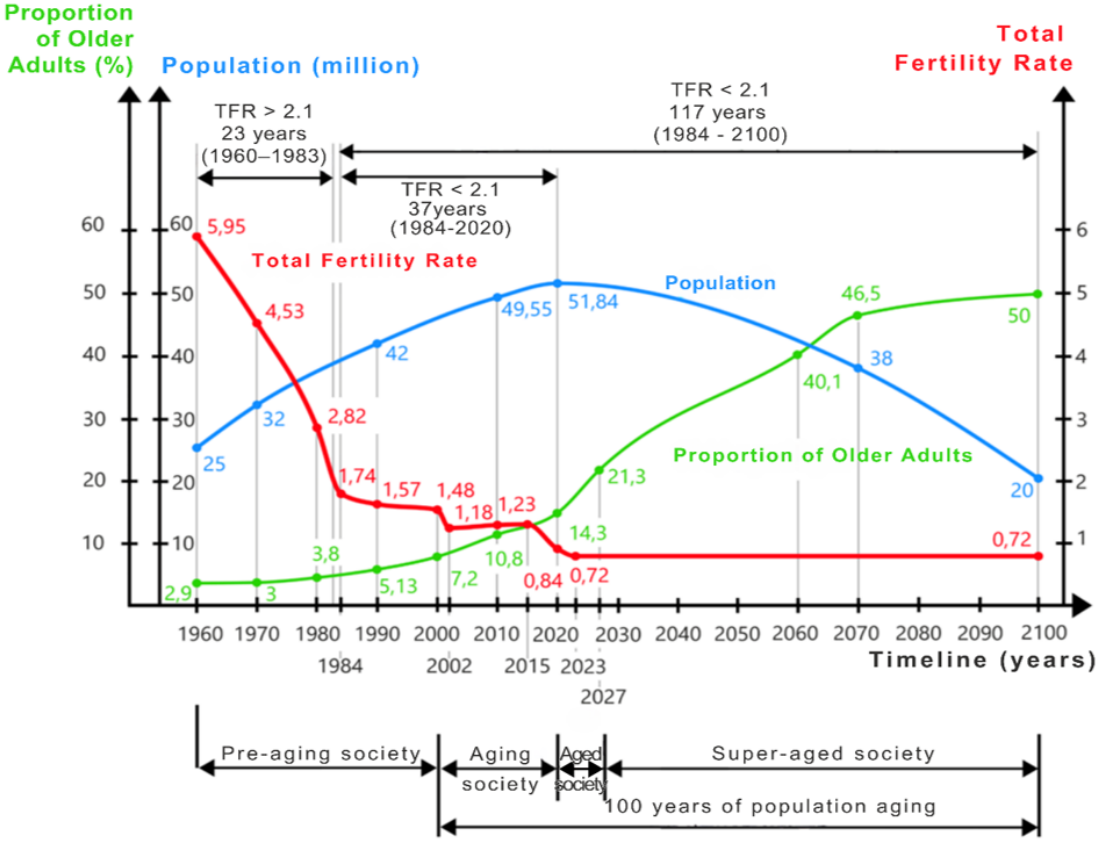


Figure 2. Consequences of 100 years of population aging in South Korea (2000–2100)

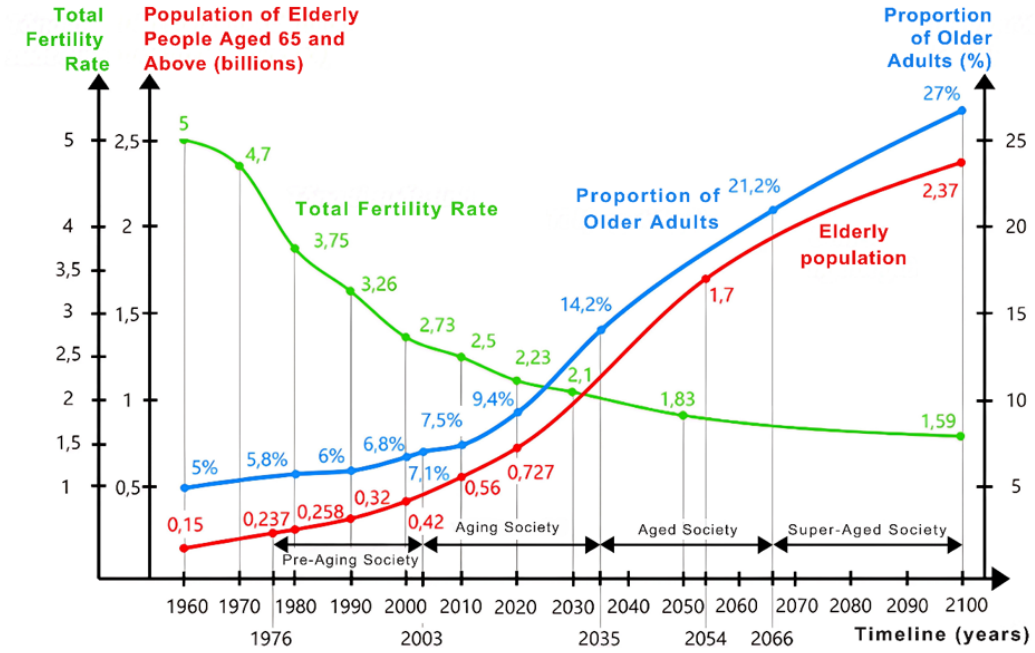


Figure 3. Global Population Aging Over 140 Years (1960–2100)

Source: World Fertility Rate, World Bank, Population Forecasting, IHME (Institute for Health Metrics and Evaluation), and author's own calculations.

transitioning to super-aged society from 2027, the elderly proportion increases to 50% simultaneously with population decline: by 2100 population decreases by 61.4%, leaving only about 20 million people, equivalent to the population in 1955 (Figure 2).

From Figure 2, we see that in the first 37 years after TFR fell below RLF (1984-2020), despite continued TFR decline, population still increased due to the increase in people of reproductive age and increased elderly longevity. However, after 2020, population began to decline.

This means that during the 37 years from 1984-2020, the increase in elderly population was greater than the decrease in newborns, so population still grew. But in the following 80 years, 2021-2100, the additional increase in elderly population is less than the decrease in newborns, so population declines (Figure 2).

Globally, the population aging process from 1960-2020 and projections for 2020-2100 are shown in Figure 3.

Source: World Fertility Rate, World Bank, Population Forecasting, IHME (Institute for Health Metrics and Evaluation), and author's own calculations.

We see TFR decreasing from 5 in 1960, to 2.1 - RLF in 2030, then continuing to

$$\text{Tỉ lệ phụ thuộc} = \frac{\text{Dân số trẻ em + Dân số già}}{\text{Dân số tuổi lao động}}$$

decrease to 1.83 in 2050 and 1.59 in 2100. According to country statistics, on average 30 years after TFR equals RLF, population declines. This means around 2060, world population will decline. Before that, global labor force (15 to 64 years) will begin to decline (around 2055).

The elderly population (65 years and over) increases from 150 million in 1960 to 727 million in 2020, 1 billion in 2032, 1.7 billion in 2050, and 2.37 billion in 2100. This means the elderly population in 2100 equals 10 times the elderly population in 1976 (Figure 3). The elderly proportion in 1960 was 5%, reached 7.1% in 2003 (entering aging society), 14.2% in 2035 (entering aged society), and 21.2% in 2060 (super-aged society) (Figure 3). World population in 1947 was about 2.37 billion people. Thus after 150 years, in 2100, the elderly population aged 65 and over equals the global population in 1947.

From Diagram 1, we have the definition of Dependency Ratio (total):

Dependency Ratio = (Child Population + Elderly Population) / Working-age Population (4)

The ratio of Child Population/Working-age Population is called the child dependency ratio, while the ratio of Elderly Population/Working-age Population is called the elderly dependency ratio.

When society ages, according to equations (1), (3) and Diagram 1, child population decreases, working-age population also decreases but more slowly (after 15-20 years), so within about 20-25 years after TFR declines, child population decreases, but elderly population increases, while working-age population still increases slightly, so the Dependency Ratio changes little, may increase slightly.

When TFR has been low below RLF for more than 25 years, working-age population will decrease, elderly population will increase rapidly, so even though child population decreases, the Dependency Ratio still increases, according to equation (4).

2.2. Consequences of unsustainable population aging

PA is driven by two main forces: increasing elderly population and prolonged decrease in births. Each process leads to specific consequences and common consequences.

Challenges with the elderly and elderly happiness

When the elderly population increases, it creates rising demands for elderly care in both quantity and quality of care and treatment services for the elderly.

When the elderly population increases, an increasingly large portion will not live with children and grandchildren. Advanced age reduces the elderly's ability for daily self-care:

Needs for cleaning and cooking

Mobility needs

Bathing and oral hygiene needs

Table 1. Proportion of elderly people receiving support to meet daily needs in Vietnam

All People Aged 60 and above	Elderly Men	Elderly Women
From son (46.7%)	From wife (52.34%)	From son (46.69%)
From daughter-in-law (35.49%)	From son (46.73%)	From daughter-in-law (41.87%)
From daughter (33.07%)	From daughter (24.96%)	From daughter (37.62%)
From spouse (25.64%)	From daughter-in-law (24.08%)	From granddaughter (12.32%)
From grandson (11.29%)	From grandson (9.9%)	From grandson (12.07%)
From granddaughter (10.42%)	From granddaughter (7.02%)	From husband (10.67%)
From son-in-law (5.21%)	From son-in-law (6.04%)	From son-in-law (4.75%)
From tenant (2.68%)	From tenant (1.54%)	From tenant (3.33%)
From healthcare worker (0.93%)	From healthcare worker (1.02%)	From healthcare worker (0.82%)
From nursing home (0.04%)	From nursing home (0.04%)	From nursing home (0.03%)

While increasing longevity, along with fewer illnesses among the elderly, is the desire of most countries and families, having TFR persistently low below RLF is a consequence of national governance and corporate governance that does not prioritize enhancing people's happiness and sustainable human development as the country's top goal, which has led and will lead to extremely serious consequences.

Dressing needs

Toilet needs

Medication needs according to doctor's prescription

Health exercise needs

Eating and drinking needs

Information, communication, and entertainment needs

Therefore, there is a need for non-family members to support elderly people in meeting these needs (hired live-in caregivers or hourly workers, healthcare workers, social care workers hired by families, or elderly people moving to public or private nursing homes).

According to the 2021 population survey on the elderly, the proportion of elderly people (60 years and over) receiving support to meet daily needs is as follows:

Thus, unlike European countries, in Vietnam today, members of the extended family (sons, daughters, daughters-in-law, sons-in-law, grandchildren, and spouses) play the primary and most important role in supporting the elderly in their daily lives. Only a very small percentage (about 3%) receive support from hired helpers, and only about 1% are assisted by healthcare workers. The number of elderly people living in nursing homes is very low (0.04%).

The physical characteristics, medical conditions, and methods of treatment and care for the elderly differ from those of younger people. This has led to the emergence of a specialized medical field called geriatrics. As the number of elderly people in society increases, transitioning from a pre-aging stage (where the proportion of elderly does not exceed 7% of the population) to aging, aged, and super-aged stages, the demand for doctors and healthcare workers specializing in elderly care will also rise. Departments dedicated to elderly care and treatment in hospitals will expand, as will geriatric hospitals. This necessitates investments from the government, local authorities, and private sectors.

Since a large majority of the elderly in Vietnam are cared for by family members who are often untrained in the principles and methods of elderly care, it is essential to prepare and distribute instructional materials to help them self-learn, either through printed materials or online resources. Specifically, a guide containing 100–200 questions and answers about elderly health care at home should be compiled. Individuals hired to assist families with elderly members should also be trained using these materials.

To ensure that people live healthy lives with fewer illnesses in old age, health care and physical training must begin in childhood (through diet, exercise, and a positive attitude). This should be

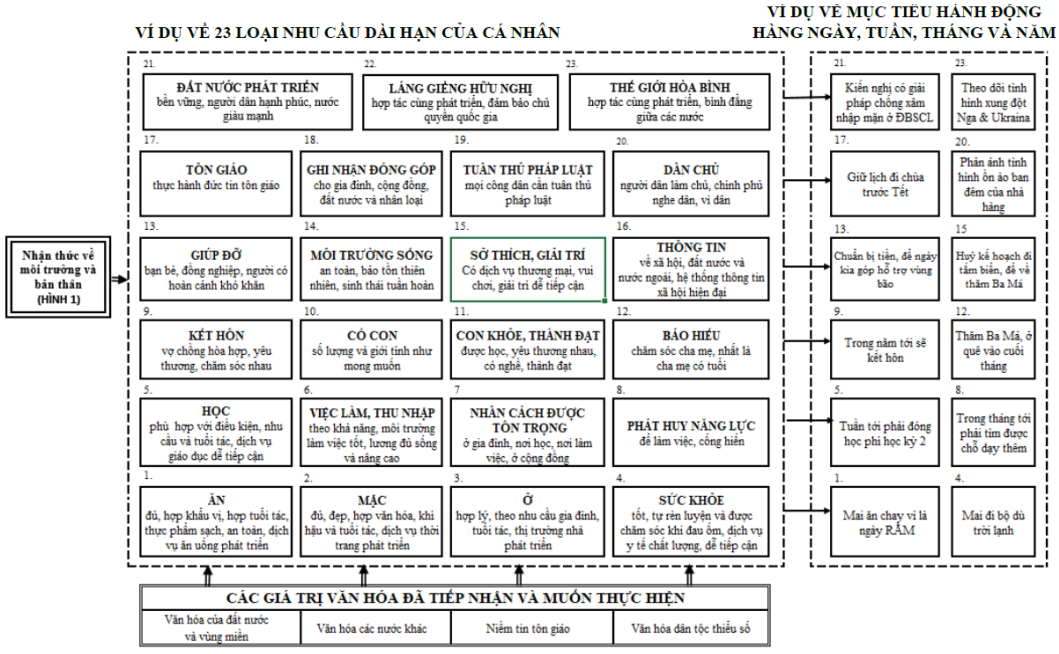


Figure 4. The foundational role of culture: an example of 23 types of long-term individual needs and personal action goals on a daily, monthly, and yearly basis

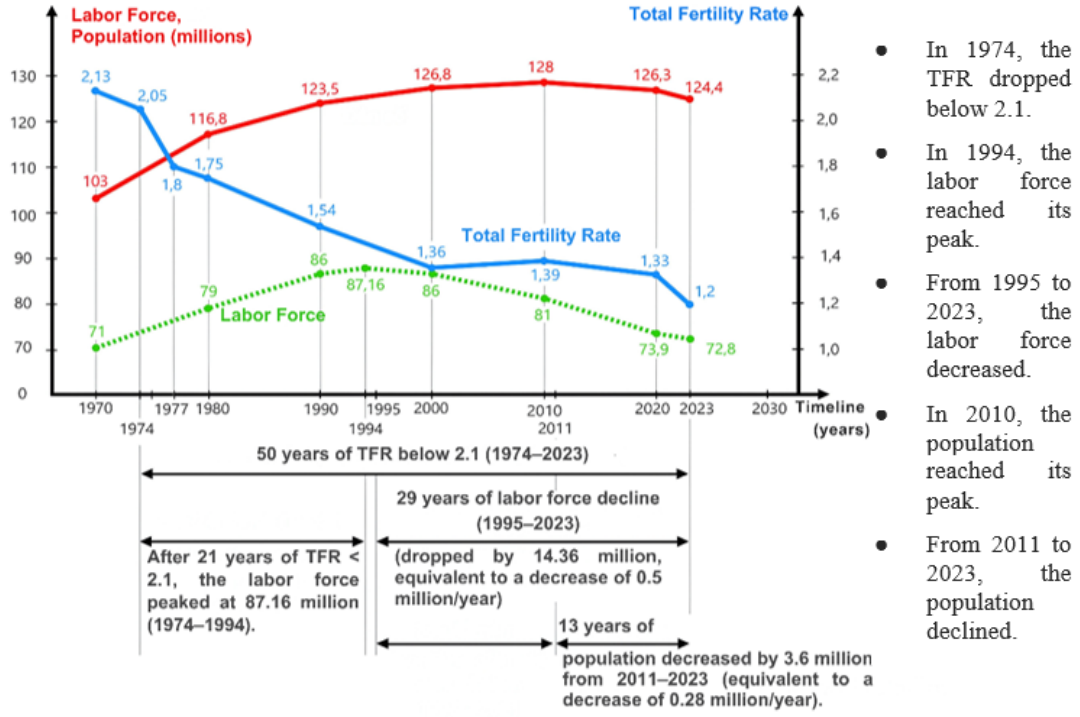


Figure 5. Trends in Total Fertility Rate, Labor Force, and Population of Japan (1970 - 2023)

Source: Working age population, Fred 15 - 64 years

integrated into the general education curriculum.

Helping the elderly live healthy and happy lives should be a goal for both the elderly themselves and their children and grandchildren. For the elderly to be happy, a fundamental requirement is for them to adjust their life needs and goals (daily, monthly, and annually) to align with their family circumstances, health, and social conditions. The elderly need to redesign their "Matrix of Needs and Action Goals" in a way that suits their situation (Figure 4).

Happiness is defined as an individual's satisfaction with their life when their needs and goals are fulfilled in ways that align with their personal circumstances. The greater the fulfillment of their needs and goals, the greater their happiness. Given the differences in health, age, economic conditions, housing, family relationships, and social connections between the elderly and working-age individuals, adapting the needs and goals of the elderly appropriately is the FIRST PREREQUISITE for their happiness.

When elderly individuals are no longer working and their children are away at work all day, their level of social interaction and communication with others decreases significantly. This can have adverse effects on their mental and physical health. However, excessive social interaction can also be harmful. Therefore, elderly individuals should consciously choose a group of friends to share personal conversations and engage in activities such as exercise, arts, travel, or charitable work. These activities help maintain good mental health and overall well-being.

In reality, for the elderly, living a purposeful life (helping others) remains an important motivational factor that brings them joy and happiness (combining the needs for work, income, and helping others, as illustrated in the "Matrix of Needs and Action Goals," Figure 3). A small portion of elderly individuals still have the ability to work and meet the needs of businesses, schools, healthcare facilities, communities, or their own families. They should be prepared and supported to work in a suitable manner, which not only contributes to society but also brings them

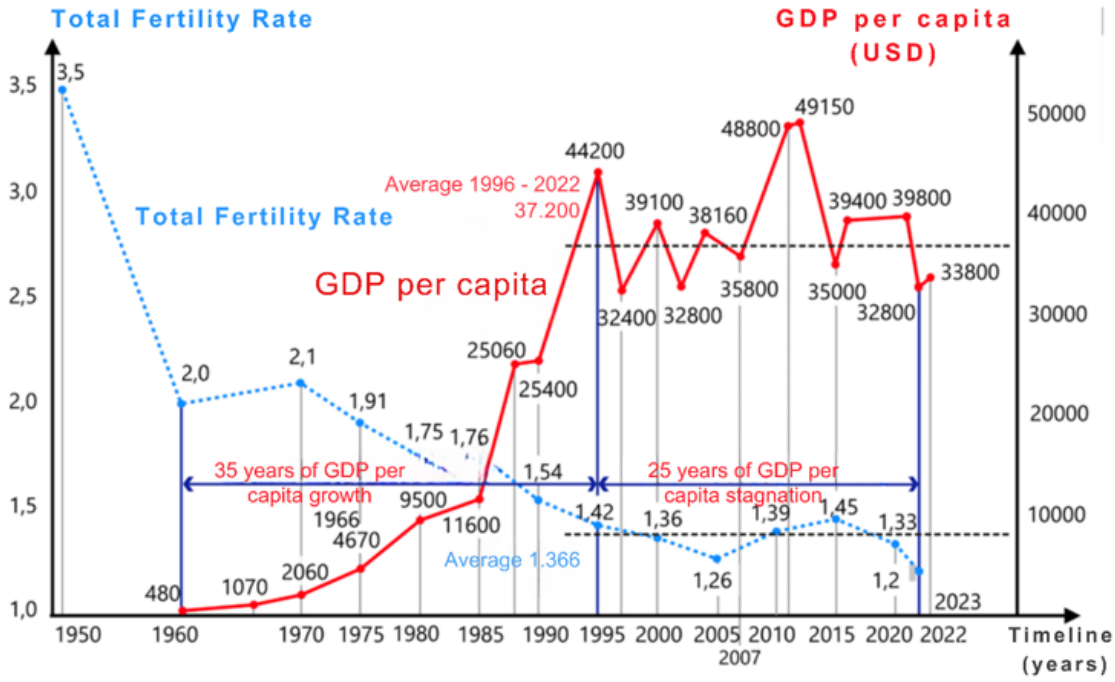


Figure 6. Total Fertility Rate and GDP per Capita of Japan (1950–2023)

personal happiness.

As people age, their need for support in daily life increases, as do their medical expenses. In the UK, for example, the estimated cost of treatment for individuals aged 85 and above is three times higher than for those aged 65 to 74. This financial burden is often unsustainable for health insurance systems and patients. Therefore, when a society transitions to an aging or super-aged stage, it is necessary to redesign the salary system for workers, adjust tax rates, social insurance, health insurance contributions, corporate income taxes, and the government's budget allocation structure. This ensures that the elderly do not fall into poverty or extreme hardship during illness.

A prolonged low TFR below the replacement level leads to very serious consequences, as illustrated in Diagram 1.

Consequences of Prolonged Low Total Fertility Rate Below Replacement Level

A prolonged low TFR below the replacement level results in several consequences, among which the following five are the most notable:

Labor Shortage and Negative Impacts on Economic Growth and Elderly Care Services Provision:

The Case of Japan:

Japan's TFR has been below the replacement level since 1974 (Figure 5).

Thus, Japan has experienced 50 years of TFR below the replacement level (1974–2024). The TFR in 2023 is 1.2. As a consequence, 20 years after the TFR dropped below the replacement level, starting in 1995, the working-age population began to decline (Figure 4), after peaking at 87.16 million people in 1994. Although labor productivity has continued to increase over the past 50 years.

Although this increase could not compensate for the decline in the labor force, the result was that, after 1995, Japan's GDP per capita ended its 35-year period of continuous growth (1960–1995, Figure 5) and entered a nearly 30-year stagnation period (1996–2024).

During the period 1996–2022, Japan's average GDP per capita was $37,200, which is only 84.2% of the 1995 level ($44,200). The GDP per capita in 2024 is estimated to reach $35,600, equivalent to just 80.6%

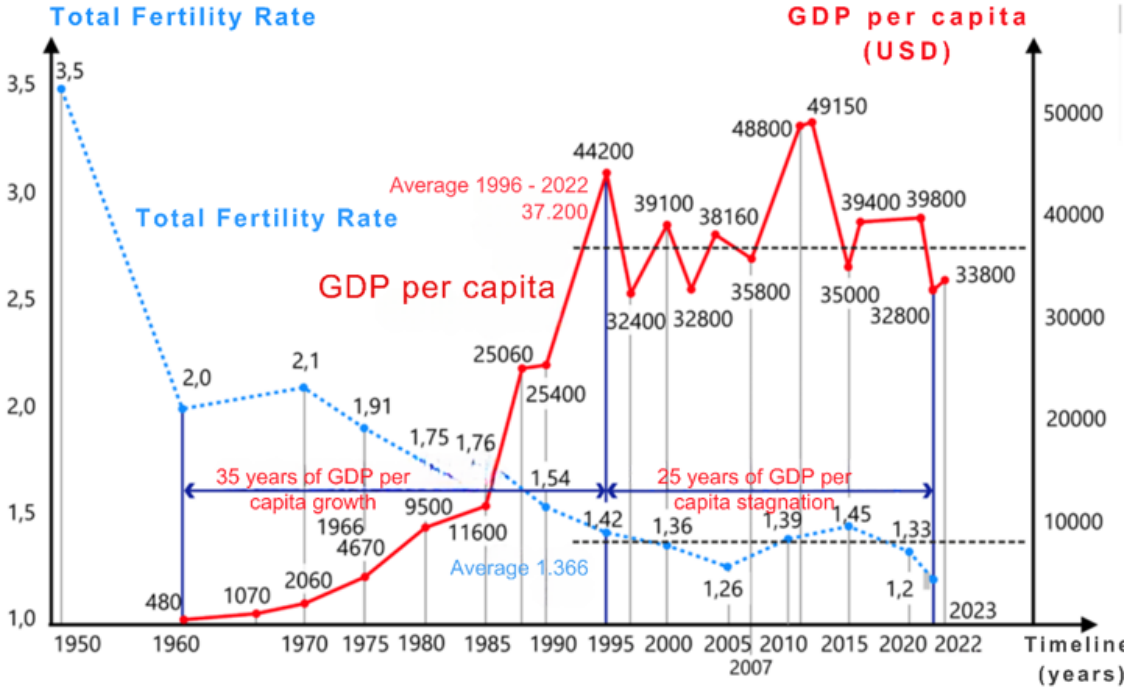


Figure 6. Total Fertility Rate and GDP per Capita of Japan (1950–2023)

of the 1995 level. As the labor force is expected to continue declining (Figure 4), it can be forecasted that, beyond 2024, Japan's economy will shift from a stagnation phase to a phase of declining GDP per capita, unless immigration policies are adjusted to compensate for the labor shortage with foreign workers. Japan's GDP per capita in 1993 was $36,345. Thus, the GDP per capita in 2024 ($35,600) is only equivalent to what it was 31 years earlier. Considering the inflation factor of 14.07% in 2024 compared to 1995, the real value of GDP per capita in 2024 is only $31,217, which is 70.6% of the 1995 level.

The labor shortage not only severely impacts economic growth but also leads to a lack of workers in healthcare and social care sectors, especially in countries where elderly people do not live with their children, such as in Europe and Japan. In 2021, there were 1.727 million foreign workers in Japan. To achieve an average GDP growth rate of 1% per year by 2040, Japan will need 6.74 million foreign workers by 2040, meaning an additional 5 million foreign workers within 20 years. Specifically, the healthcare and social care sectors will face a shortage of 1 million workers by 2040.

A country's GDP depends on labor productivity and the number of employed workers.

GDP = Labor Productivity × Number of Employed Workers (5)

In Japan's case (Figure 4), the labor force has significantly declined from 87.16 million in 1994 to just 72.8 million in 2023. Therefore, although labor productivity has increased, it has not been sufficient to offset the decline in the labor force to drive significant GDP growth. The economy has been stagnant for nearly 30 years (1996–2024, Figure 5) and is now entering a period of decline. The GDP per capita in 2024 is only 70.6% of the 1995 level when adjusted for inflation.

The Case of South Korea:

South Korea has had a Total Fertility Rate (TFR) below the replacement level since 1984, amounting to 40 years as of now (Figure 6).

The period of TFR below the replacement level in South Korea (40 years) is shorter than Japan's (50 years, 1974–2024). However, South Korea's current TFR is lower (0.72 compared to Japan's 1.2 in 2023), which is the lowest in the world.

According to Figure 6, South Korea's labor force peaked in 2017, 33 years after its TFR first fell below the replacement level (1984). Thus, it can be projected that, after 2017, South Korea's GDP per capita began to decline due to labor shortages. In fact, South Korea's GDP per capita peaked in 2018 at $33,440 (Figure 7) but decreased to $31,900 in 2019, a drop of 4.6%.

The average GDP per capita for the 5-year period from 2019 to 2023 is $32,856. This indicates that, although South Korea's GDP per capita fluctuates annually, the trend over the 5 years from 2019 to 2024 is stagnant, with an average of $32,856, which is lower than the peak in 2018 of $33,440.

In 2024, the GDP per capita is $37,670. However, when considering the inflation rate of 15.2% in 2024 compared to 2018, the real value of GDP per capita in 2024 is $32,700, equivalent to 97.8% of the GDP per capita in 2018.

It can be said that after reaching its peak in 2018, South Korea's GDP per capita, or the South Korean economy in general, has been in a stagnant phase from 2019 to the present, with no significant increase or decrease. This situation is forecasted to continue for several more years unless South Korea makes significant changes to its immigration policies to compensate for the labor shortage.

According to Figure 7, South Korea's labor force declined from 2019 to 2023, a period of 5 years, with a relatively small decrease from 36.8 million in 2017 to 35.9 million in 2023. The increase in labor productivity, along with the rise in immigration in recent years, has partially offset the decline in the labor force. As a result, GDP has remained stagnant but at a lower level compared to Japan, as shown in Figures 8 and 6. It is projected that by 2050, the working-age population will decrease by 34.8% compared to 2022, and GDP will decline by 20.5% compared to 2022.

The use of large-scale immigration to compensate for the declining labor force has led to cultural, religious, and ethnic conflicts, as well as the dilution of national cultural identity

Except for Japan, South Korea, and China, other high-income countries in Europe, the Americas, and Australia have adopted immigration as a solution to labor shortages caused by prolonged

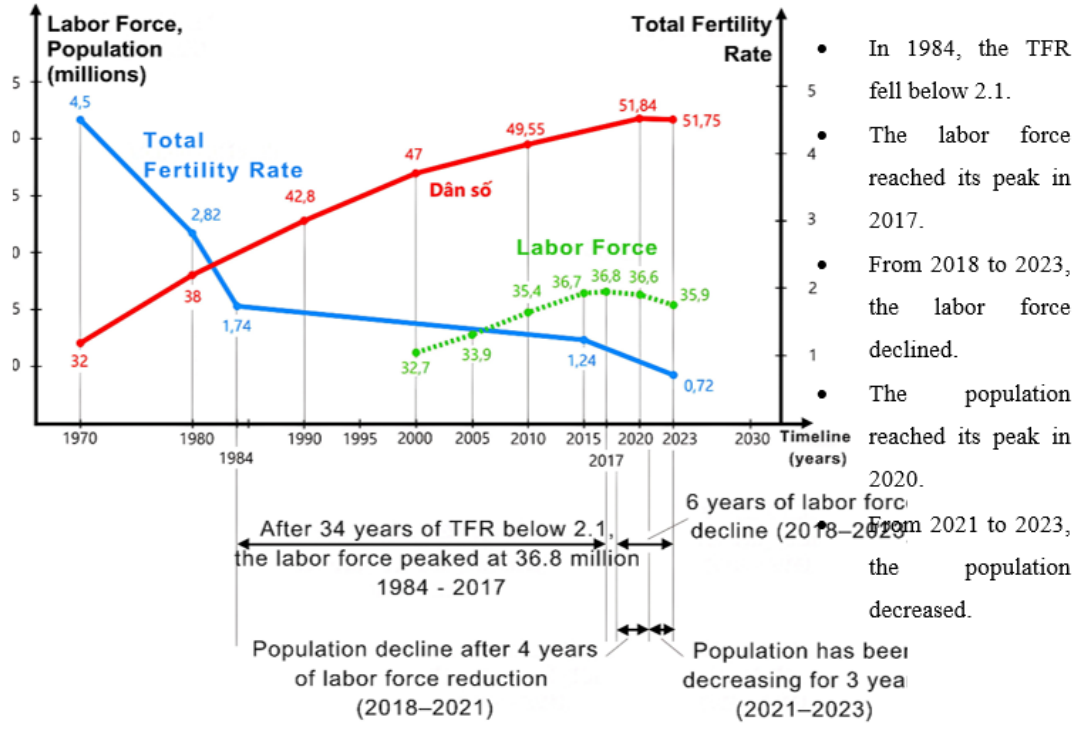
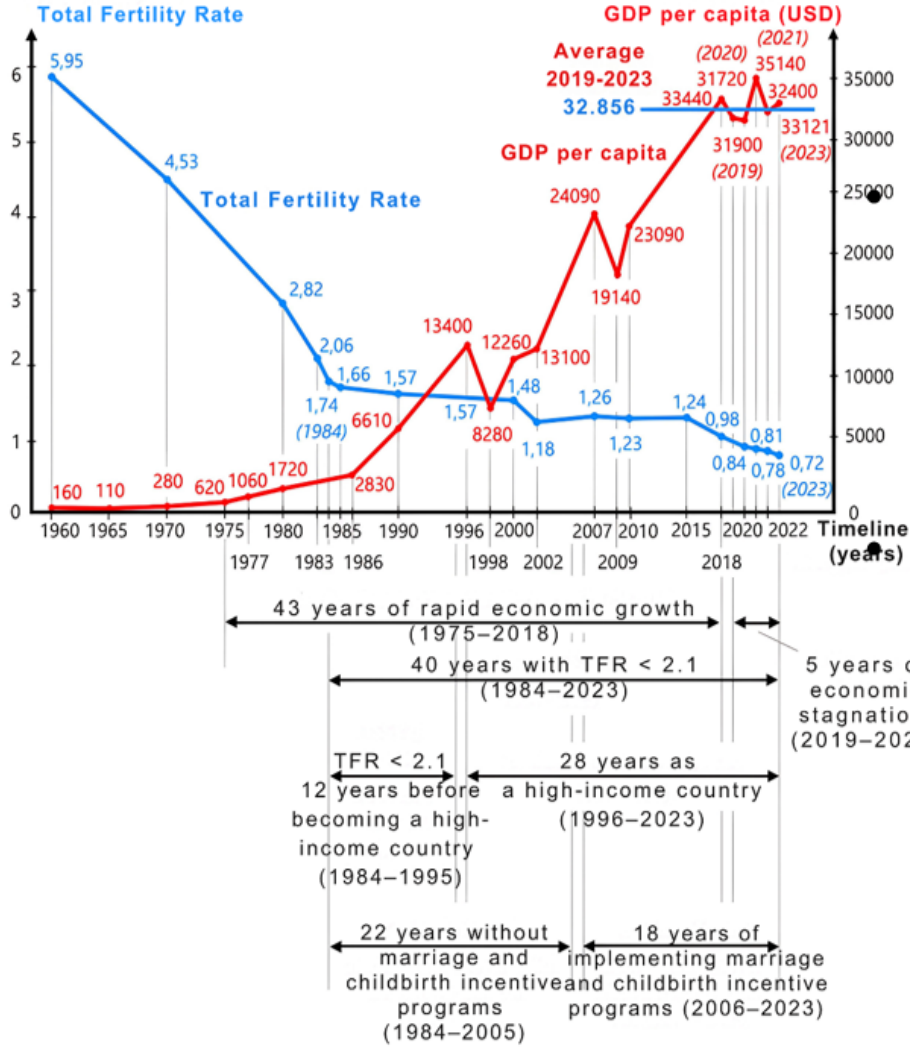


Figure 7. Trends in Total Fertility Rate, Labor Force, and Population of South Korea (1970–2023)



Average GDP per capita growth over 43 years (1975–2018) was 9.71% per year Economic stagnation for 5 years (2019–2023)

Figure 8. Trends in Total Fertility Rate and GDP per Capita in South Korea (1960 - 2023)

periods of Total Fertility Rates (TFR) below replacement levels. In 2021, the proportion of immigrants in the population (foreign-born individuals living in a country relative to its total population) was 2.2% in Japan and 2.3% in South Korea in 2019.

In contrast, Singapore, which has experienced TFR below replacement levels since 1977 (with a TFR of only 0.97 in 2023), has relied heavily on immigration to address labor shortages and increase its population. Consequently, Singapore's population has grown significantly: from 3.05 million in 1990 to 4 million in 2000, 5.08 million in 2010, and 6 million in 2023. The proportion of immigrants in Singapore was 43.14% in 2020, nearly 20 times higher than in Japan and South Korea.

To stabilize labor and population levels, high-income countries in Europe with TFR below replacement levels for 30–50 years have maintained immigration rates between 7% and 17%, averaging 12.76% (e.g., the UK at 13.79%, France at 13.6%, Italy at 10.56%, the Netherlands at 13.76%, Finland at 6.97%, Estonia at 15.02%, and Germany at 17%).

Other high-income countries in Asia, Europe, and the Americas with TFR below replacement levels for 7 to 50 years have immigration rates ranging from 15% to 43%, averaging 25.39% (e.g., the US at 15.28%, Canada at 21.3%, Australia at 30.14%, Austria at 19.3%, Norway at 15.72%, Switzerland at 28.79%, New Zealand at 28.65%, and Singapore at 43.14%).

Evidence shows that a higher

proportion of immigrants with different languages and cultures, while bringing positive contributions, also increases risks of cultural, ethnic, and religious conflicts, xenophobia, and the dilution of the host country's cultural identity.

A growing segment of younger generations is increasingly adopting the "Three Nos" trend: not marrying, not having children, and not feeling obligated to marry or have at least two children to ensure the survival of their nation

After more than 40 years of TFR below replacement levels, in the absence of effective government programs and policies to support marriage and childbirth, and without recognizing marriage and childbirth as essential for national survival, a "Three Nos" mindset has emerged among a portion of the youth. This trend drives TFR even further below replacement levels, with the inevitable consequence being the eventual extinction of a nation unless governments, businesses, and education and media sectors implement groundbreaking changes in national governance, wages, patriotism education, and citizenship responsibilities.

In 2006, Japan's National Institute of Population and Social Security Research projected that while its population was 128 million in 2010, it would decline to 50 million by 2100 (a 61% decrease), 1 million by 2350, and just 62 people by 3000.

Similarly, in 2014, South Korea's National Assembly Research Service projected that while its population was 49.55 million in 2010, it would fall to 20 million by 2100 (a 61% decrease), 3 million by 2200, 1 million by 2300, and just 10,000 by 2503, with no South Koreans remaining by 2750.

In 2024, the Shanghai Academy of Social Sciences projected that while China's population was 1.412 billion in 2021, it would drop to 525 million by 2100 (a 63% decrease), with an average decline of 111 million people every decade from 2021 to 2100.

Clearly, Japan and South Korea are unwilling to accept a future where they might face extinction in 750 to 1,000 years. However, they have yet to find a viable solution.

Relying on immigrant labor to offset domestic labor shortages, as other countries have done over the past 50 years, is not a fundamental solution. All middle- and low-income countries, which currently supply labor to high-income countries, are also experiencing declining TFR. According to the Institute for Health Metrics and Evaluation at the University of Washington, global TFR, which was 2.23 in 2021, is projected to reach replacement levels around 2030, drop to 1.83 by 2050, and fall further to 1.59 by 2100. This indicates that after 2050, the world will face a labor shortage, and middle- and low-income countries will no longer be able to supply sufficient labor to high-income nations.

Governments may face public debt crises as they borrow to fund healthcare and social welfare for the growing elderly population, amidst economic stagnation and declining tax revenues

In Japan, tax revenue in 1990 was 60.6 trillion yen. From 1991 to 2020, tax revenue never reached or exceeded the 1990 level. In 2021, tax revenue was 63 trillion yen, representing only a 4% nominal increase over 31 years (1990–2021). During the same period, the proportion of elderly people (aged 65 and above) rose from 12.1% in 1990 to 29.92% in 2022.

Since Japan has been running budget deficits since 1975, increased spending on elderly healthcare has been entirely financed through government bonds, leading to continuous growth in public debt. Public debt was 63% of GDP in 1990, 135% in 2000, 205% in 2010, and 256% in 2021—the highest in the world.

With Japan's elderly population projected to rise from 29.92% in 2021 to 34.8% in 2040 and 38% in 2070, public debt is expected to exceed 300% of GDP, with a high risk of a public debt crisis.

Risk of Pension Fund Collapse and Elderly Welfare Crisis

When a population enters the super-aged phase, as Japan did in 2006 (with an elderly dependency ratio of 21.26%) and South Korea is projected to do in 2027 (with a ratio of 21.3%), the number of workers contributing to pension funds decreases, while the number of retirees drawing from these funds increases. This leads to two consequences:

Monthly pension payments decrease.

At some point, pension funds become imbalanced and unable to make payments.

South Korea's National Pension Service (NPS), established in 1988, is valued at $834 billion in 2024, making it the third-largest pension fund in the world. However, in 2024, South Korea's Ministry of Health and Welfare predicted that the NPS would begin running a deficit by 2041, as annual contributions (from workers' insurance payments) would fall short of the pension payouts required for the growing number of retirees.

Currently, 22.38 million people contribute to the NPS, while 6.82 million retirees aged 65 and older receive monthly pensions. This means that for every one person working and paying into the fund, 0.3 people are drawing pensions—pensions they had previously contributed to. By 2050, this ratio is expected to rise to 1:1, and by 2055, just 30 years from now, the NPS is projected to become insolvent. Tens of millions of retirees would no longer receive pensions, triggering an elderly welfare crisis.

Currently, 40% of retirees in South Korea live in relative poverty. President Yoon Suk Yeol has proposed significant reforms to the pension system to prevent a fund crisis and a broader elderly welfare crisis, including:

Increasing the contribution rate from 9% of personal income to 13%.

Raising pension payouts from 40% of the final income contributed to 42%.

Establishing an automatic stabilization mechanism for the fund, aligned with demographic and economic conditions.

Improving the fund's annual investment return from 4.5% to 5.5%.

Raising the retirement age from 62 to 64.

However, these proposed reforms have faced opposition from both the ruling party and opposition parties.

When the Total Fertility Rate (TFR) has been below replacement levels for over 25 years, the working-age population declines, while the elderly population continues to grow significantly. Even as the number of births decreases (as shown by Equation 4), the dependency ratio rises.

In South Korea, the dependency ratio in 1980 was 0.11 retirees and children per working person (11 retirees and children per 100 workers). In 1984, the TFR first fell below replacement levels. By 2010, the dependency ratio had risen to 0.67—six times higher than in 1980.

In 2016, the dependency ratio reached 1.0; in 2020, it was 1.3. Projections indicate that by 2030, the dependency ratio will rise to 2.1; by 2055, it will reach 3.74; and by 2065, it will climb to 4.4 (440 retirees and children per 100 workers). This means that the dependency ratio in 2065 will be 40 times higher than in 1980.

This trend places enormous pressure on government budgets, as tax revenues must increasingly be allocated to support children and retirees. By 2055, when the NPS is projected to become insolvent, the dependency ratio will be 3.74, and the retiree-to-worker ratio will be approximately 1.3.

In China, there were 300 million retirees (aged 60 and older, accounting for 21.1% of the population) in 2023. By 2035, this number is projected to rise to 400 million. With China's working-age population already declining since 2015, it is forecasted that by 2035—just 10 years from now—the state-managed pension fund will also become insolvent.

The Risk of Large-Scale Waste of Social Infrastructure Investments

The significant population decline will lead to substantial waste of social infrastructure that governments, businesses, and individuals have invested in, such as housing, schools, healthcare facilities, transportation systems, and commercial service infrastructure.

According to projections by the Shanghai Academy of Social Sciences, from 2021 to 2100, China's population is expected to decrease by 887 million people (from 1.412 billion to 525 million). On average, every 10 years, China's population will decrease by approximately 111 million people—more than the current population of Vietnam. This means that housing, schools, hospitals, commercial service facilities, and transportation infrastructure built for the needs of 111 million people will become unused, abandoned, and deteriorated.

In Japan, the population decreased by 3.6 million people between 2010 and 2023. Currently, there are 3 million vacant homes in Japan, especially in rural areas. Projections indicate that by 2050, just 25 years from now, Japan's population will drop to approximately 100 million, a decrease of 24 million people compared to 2023. Social infrastructure designed for these 24 million people will go unused..

3. CONCLUSION

Population aging is an irreversible global trend. While it reflects significant achievements in healthcare and social progress, this process also poses enormous challenges if not properly acknowledged and addressed. South Korea serves as a typical example of rapid transformation from a non-aged society to a super-aged society, accompanied by population decline and pressures on economic and social systems.

Vietnam, though lagging behind in terms of timing, is experiencing a rapid pace of aging, requiring urgent action. The essence of population aging lies not only in increased life expectancy but also in prolonged declines in Total Fertility Rate (TFR). Therefore, population strategies need to be restructured with a comprehensive approach: from improving living standards and childcare conditions to investing in healthcare systems and elderly welfare.

Accurately recognizing the nature and patterns of population aging is a prerequisite for developing adaptive policies, enabling Vietnam to achieve not just "aging," but "sustainable aging."

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