Column B New Population Dynamics: From WPP2022

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In July 2022, the United Nations released the World Population Prospects 2022 ("WPP2022")[1]. Comparing WPP2022 with the previous estimates ("WPP2019"), the world population will reach 8 billion earlier in the former than in the latter. The next milestone of 9 billion people is expected to be reached in 2037, 15 years to increase from 8 to 9 billion in WPP 2022 (medium estimate). Taking into consideration that it took 12 years for the world population to increase from 7 to 8 billion, this is due to a decline in the world's fertility rate. By region, there are signs of change in Asia, where previously the population increased significantly, the population of China has entered a phase of decline, while India's population is steadily increasing.

Column B presents the world demographic characteristics based on WPP 2022. Column B.1 identifies the demographic characteristics of the world's major regions, and Column B.2 identifies the demographic characteristics of the major countries. Column B.1 identifies demographic trends by major world region. Column B.2 identifies the demographic characteristics of major countries, and Column B.3 presents the implications of the analysis.

1. Demographics by Major Region

(1) World Population

According to WPP2022, the world population will reach 8 billion in November 2022, and India is projected to overtake China as the most populous country in the world in 2023[2]. It is of great interest to see in which areas population growth has occurred so far and in which areas population decline will happen in the future. Before we conduct analysis by region, let us review the extent to which the world population projection

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1) WPP2022 is a global population estimate based on 1,758 censuses and dynamics registration systems and 2,890 global sample surveys conducted between 1950 and 2022.
2) India conducts a national census every 10 years, but the survey scheduled for 2021 was postponed due to the COVID-19 pandemic, and the next census is scheduled for 2023. Therefore, it is still estimated that India's population will exceed that of China.

has changed from the previous report (Figure 1-CB-1). WPP 2019 projects a slight increase of the world population until 2100. However, this report estimates that the world population would peak at 10.43 billion in 2086 and begin declining subsequently. Population estimates for 2100 are 10.88 billion in WPP2019 and 10.35 billion in WPP2022, making a difference of 530 million people. This is due to the change in the estimated outlook for world's fertility and mortality rates.

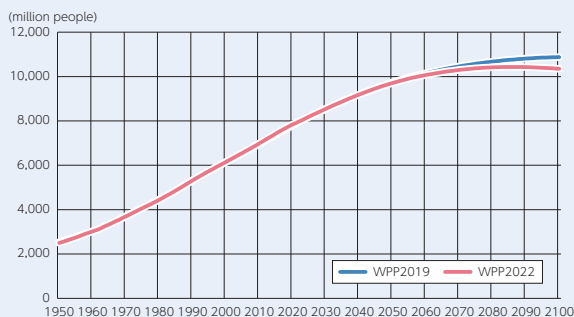Figure 1-CB-2 shows the transition of crude birth rate and death

Figure 1 –CB- 1   Comparison of World Population Projections

Note: WPP2019 is actual data until 2020 and medium estimate afterwards
      WPP2022 is actual data until 2021 and medium estimate afterwards
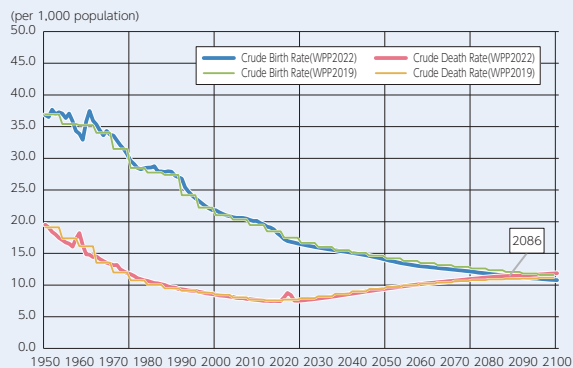Source: WPP2019 and WPP2022

Figure 1 –CB- 2   World Crude Birth and Death Rates (estimated)

Note: Actual data until 2020, medium estimates after 2025
Source: WPP2019 and WPP2022

rate per thousand world population[3]. In the WPP2019 projection, the crude birth rate did not fall below the crude death rate until 2100. However, in the WPP2022 projection, the crude death rate was modified and projected to exceed the crude birth rate in 2086. The downward modification of the crude birth rate and upward modification of the crude death rate are probably due to the global expansion of COVID-19 in 2020.

(2) Comparison of Population by Major Region

Next, let us look at the world population by region (Figure 1-CB-3). In 1950, 55.2% of the world population was from Asia, 22.0% from Europe, 9.1% from Africa, 6.7% from Latin America, 6.5% from North America, and 0.5% from Oceania, in descending order. In particular, Asia has consistently accounted for a large share, reaching a peak of 60.8% in 2003. Since then, however, its share has shown a declining trend, falling to 59.4% in 2021, and is projected to decrease to 54.5% in 2050, and 45.2% in 2100.
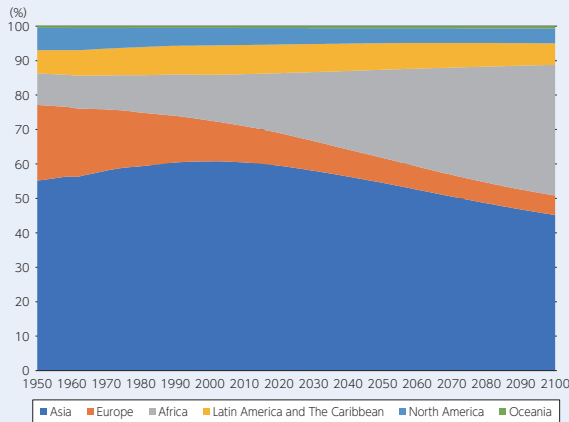

| Figure 1–CB-3 | Population Estimates by Region (Share) |

Note: Actual data until 2021, medium estimates after 2022
Source: Prepared by the author using WPP2022

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3) Crude birth rate and crude death rate are calculated by dividing the number of births and deaths in a given year by the population in that year. In WPP, they are calculated as the number of births and deaths per 1,000 population in that year. For WPP2019, values are given every five years, and for WPP2022, values are given for each year.

The share of the Asian region will decline while that of the African region will increase. The share of the African region in 2021 was 17.6%, but it is expected to increase significantly to 25.6% by 2050 and to 37.9% by 2100.

Thus, the center of population growth is shifting from Asia to Africa. In the following subsections, we will review population dynamics in major regions (Asia, Europe, North America, and Africa).

[Asia]
Figure 1-CB-4 shows the population by age group and crude birth and death rates in the Asian region. The total population is 4,694.58 million in 2021, and will reach a peak of 5,305.28 million in 2055. However, the
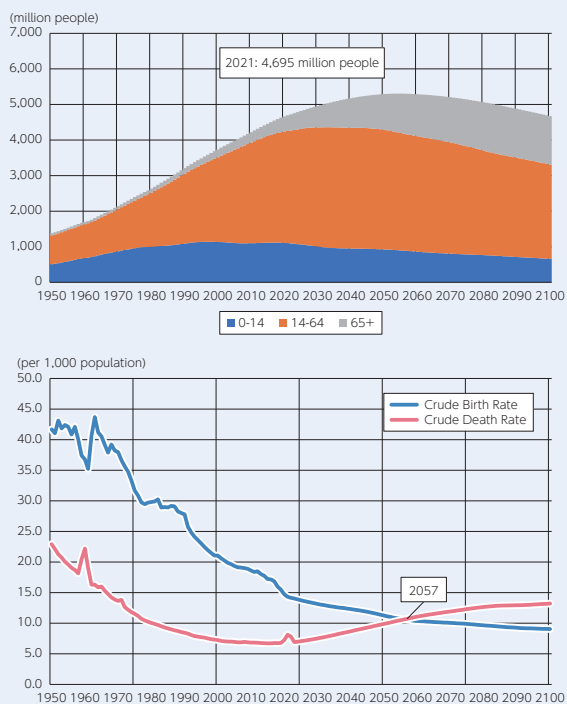

Figure 1-CB-4   Population in Asia (upper graph) and crude birth and death rates (lower graph)

Note: Actual data until 2021, medium estimates after 2022
Source: Prepared by the author using WPP2022

population is expected to show a downward trend thereafter, reaching 4,674.25 million by 2100.

The working-age population (15-64 years old) is expected to increase steadily from the 1980s to the 2030s, but is projected to decline gradually after the 2040s. The population aged 0-14 (hereinafter referred to as the "juvenile population") has been gradually increasing since 1950, but after a slight increase in the 1990s, it began to decline in the 2000s, and is expected to increase slightly or remain almost flat in the 2010s before declining again after 2020. On the other hand, the population aged 65 and over (hereinafter referred to as "the elderly population") has been gradually increasing since the 2010s, and is expected to increase significantly from the 2030s onward. This is due to the declining birthrate and aging population in China, which will be discussed later.

The crude birth rate was 40 per 1,000 population between the 1950s and 1960s, but has shown a gradual downward trend since 1970. The crude death rate, excluding the effects of the Chinese famine and the spread of COVID-19 infection, has been declining from 1950 to 2020, but is expected to increase gradually after 2030, exceeding the crude birth rate by 2057.

[Europe]

Figure 1-CB-5 shows the population by age group and crude birth and death rates in the European region. The total population is expected to peak at 746.23 million in 2020, followed by a gradual decline. The total population in 2021 was 745.17 million, and it is expected to decrease to 586.52 million by 2100.

The working-age population has been steadily increasing since 1950, but is expected to decline after peaking at 501.96 million in 2010. The juvenile population peaked at 167.76 million in 1965 and has been declining since then. On the other hand, the elderly population has been increasing since 1950, and is expected to start declining after 2057.

The crude birth rate, which had been at about 20 per 1,000 population in the 1950s, showed a gradual downward trend after 1960, falling below the crude death rate in 1993 and temporarily exceeding the crude death rate in the early 2010s before declining again thereafter. The crude death rate, on the other hand, has shown an upward trend since
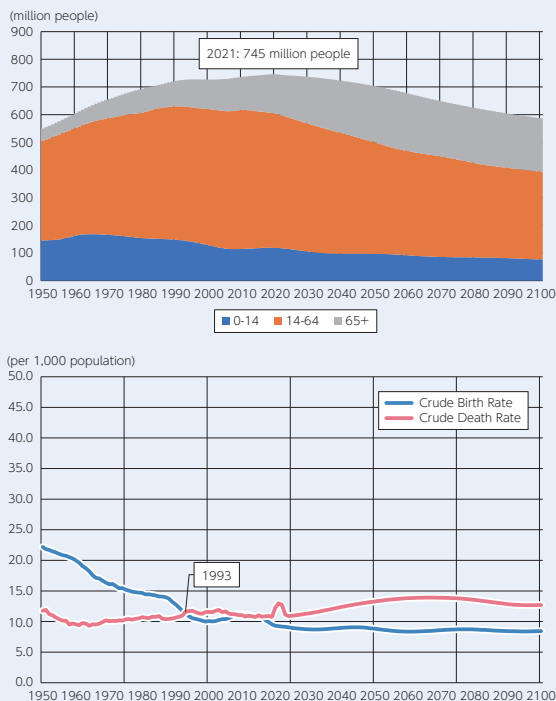
Figure 1–CB–5 Population in Europe (upper graph) and crude birth and death rates (lower graph)

Note: Actual data until 2021, medium estimates after 2022
Source: Prepared by the author using WPP2022

the 1970s and has increased significantly from 2020 to 2022 due to the COVID-19 pandemic, and is expected to remain above the crude birth rate from 2023 onward.

[North America]
Figure 1-CB-6 shows trends in population by age group and crude birth and death rates in the North American region.

The total population has been on an upward trend since 1950, reaching 375.28 million in 2021, and is expected to increase gradually after 2022, reaching 448.03 million by 2100.

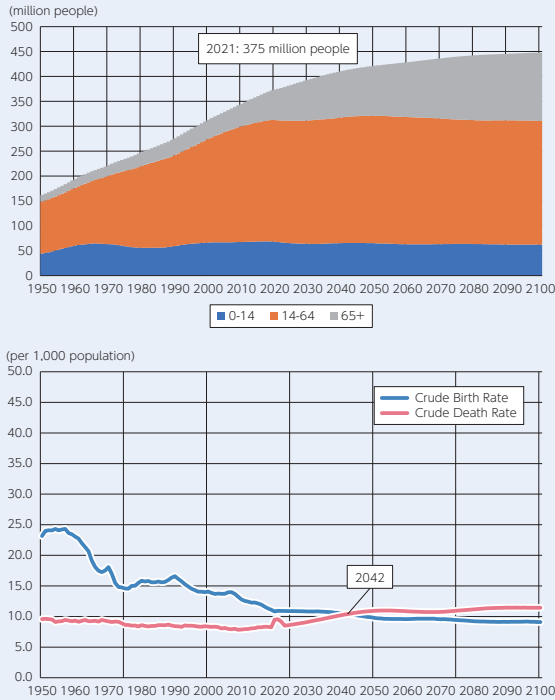The working-age population has been increasing since 1950, as has

(million people)

2021: 375 million people

■ 0-14 ■ 14-64 ■ 65+

(per 1,000 population)

Crude Birth Rate
Crude Death Rate

2042

| Figure 1-CB-6 | Population in North America (upper graph) and crude birth and death rates (lower graph) |

Note: Actual data until 2021, medium estimates after 2022
Source: Prepared by the author using WPP2022

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the total population, and is expected to peak at 256.07 million in 2053 before declining at a slower pace than in other regions. The juvenile population is expected to peak at 68.79 million in 2018 and then decline at a slower pace. On the other hand, the elderly population has been increasing since 1950 and is expected to exceed the juvenile population by 2023. The elderly population is expected to exceed 100 million by 2050, and the aging of the population is expected to continue.

The crude birth rate remained at around 20-24 per 1,000 population from the 1950s to the early 1960s, and showed a downward trend from the late 1960s to the 1970s, followed by a slight upward trend in the 1980s and 1990s. Since 1991, however, it has been on a gradual downward trend,

and is expected to remain at an average of about 9 per 1,000 population after 2048. On the other hand, the crude death rate declined somewhat from 1950 to the 2000s, but has been gradually increasing since 2010. Although the crude death rate is expected to exceed the crude birth rate in 2042, the degree of increase will be lower than in other regions.

[Africa]
Figure 1-CB-7 shows population trends and crude birth and death rates in the African region. As shown in the figure, the total population of the African region has been rising steadily since 1950, reaching 1,393.68 million in 2021, and will be 3,924.42 million in 2100, which is characterized by the fact that the population is not expected to decline as in the North
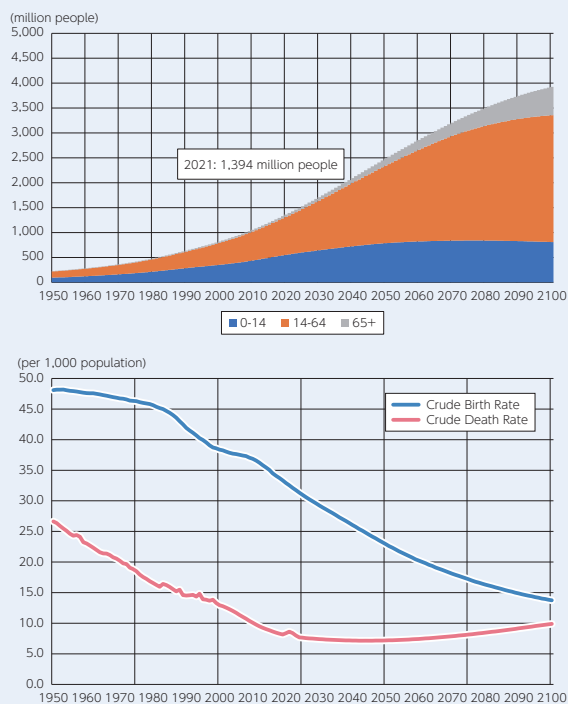
(million people)

2021: 1,394 million people

■ 0-14   ■ 14-64   ■ 65+

(per 1,000 population)

Crude Birth Rate
Crude Death Rate

Figure 1 –CB– 7   Population in Africa (upper graph) and crude birth and death rates (lower graph)

Note: Actual data until 2021, medium estimates after 2022
Source: Prepared by the author using WPP2022

America region.

By age group, the working-age population is steadily increasing and is expected to account for a large portion of the total population until the year 2100. The elderly population is expected to increase at a slower pace than the working-age population after 2040. On the other hand, the juvenile population is expected to gradually decline after 2080, although it has been on an increasing trend.

The crude birth rate remained at a high level of approximately 40 per 1,000 population from 1950 to the 1990s, and is expected to decline gradually after 2000. On the other hand, the crude death rate remained at about 20 per 1,000 population from the 1950s to the 1970s, but has shown a downward trend since 1980, and is expected to remain flat or increase slightly after the 2020s. Thus, the African region is characterized by the fact that the crude birth rate has consistently been higher than the crude death rate.

2. Population Trends in Major Countries

(1) Population Trends in Major Asian Countries

As described in Column B.1, the world's population is expected to decline in the future, especially in the Asian region. In this subsection, we will focus on major countries in the Asian region and review the demographic trends of each country. We will also examine the demographics of Russia, which has close ties to the Asian region, including China and India, as well as to Europe.

[Japan]
Figure 1-CB-8 shows trends in population by age group, crude birth rate, and crude death rate in Japan.

The total population peaked at 128.12 million in 2009 and has been declining, reaching 124.61 million in 2021.

The working-age population peaked at 87.12 million in 1994 (69.6% of the total population) and has continued to decline, reaching 72.82 million (58.4%) in 2021. The working-age population is expected to halve from 2021 to 53.31 million (51.4%) in 2050 and 36.87 million (50.1%) in 2100. On the other hand, the ratio of the elderly population to the total population
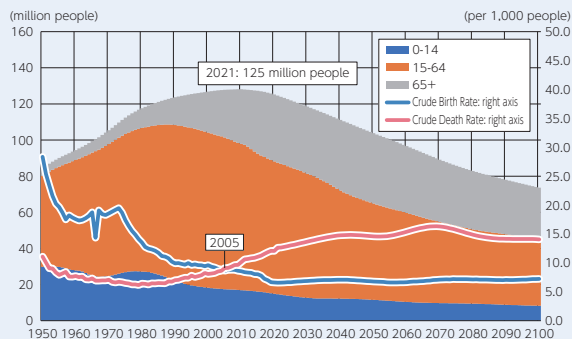
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| Figure 1-CB-8 | Population in Japan (by age group) and crude birth and death rates |

Note: Actual data until 2021, medium estimates after 2022
Source: Prepared by the author using WPP2022

was 4.9% in 1950, but has increased significantly to 29.8% in 2021. The aging rate is projected to be 37.5% in 1950 and 38.7% in 2100, indicating that the aging of the population is expected to further progress.

The crude birth rate averaged 24 per 1,000 population in the first half of the 1950s after the so-called "First Baby Boom[4]" and showed a downward trend until 1961. It again showed an upward trend from 1962 to 1974, which included the period of the "second baby boom[5]," but turned to a downward trend after 1975. On the other hand, the crude death rate has been on an upward trend since 1980 and exceeded the crude birth rate in 2005.

[China]
Figure 1-CB-9 shows the trends of population by age group, crude birth rate, and crude death rate in China.

Although the total population has been on an increasing trend, it is

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4) The term "first baby boom" refers to the phenomenon in which more than 2.6 million babies were born each year between 1947 and 1949.
5) The "second baby boom" is the term used to refer to the phenomenon in which the generation of children born during the "first baby boom," were born by more than 2 million each year from 1971 to 1974. The birth rate temporarily declined in 1966, which is believed to be due to the superstition that women born in the year of Hinoe-uma have a violent temperament, and many couples avoided having children in that year.
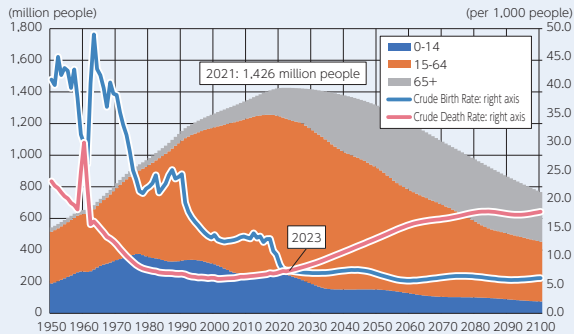
Figure 1-CB-9   Population in China (by age group) and crude birth and death rates

Note: Actual data until 2021, medium estimates after 2022
Source: Prepared by the author using WPP2022

expected to peak at 1,425.89 million in 2021, and is expected to decline thereafter.

The working-age population peaked at 998.23 million (71.6%) in 2015 and began to decline, reaching 986.46 million (69.2%) in 2021. The population is expected to continue to decline thereafter, reaching 767.37 million (58.5%) in 2050 and 378.06 million (49.3%) in 2100. On the other hand, the aging rate is projected to be 5.0% in 1950, 13.1% in 2021, 30.1% in 2050, and 40.9% in 2100. The aging population is expected to be higher than that of Japan in 2100, and it will need to urgently cope with an aging society in the future.

The crude birth rate averaged about 40 per 1,000 population in the 1950s and 1960s, excluding the effects of the great famine in China[6]. After 1970, the crude birth rate showed a gradual downward trend, but increased somewhat in the 1980s. Since 1990, however, it has again been on a downward trend, and is expected to fall below the crude death rate by 2023.

[Korea]
Figure 1-CB-10 shows trends in population by age group, crude birth rate, and crude death rate in Korea.

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6) In addition to the occurrence of natural disasters, China experienced a large-scale famine in 1959-1961 due to the "Great Leap Forward" policy of that time.
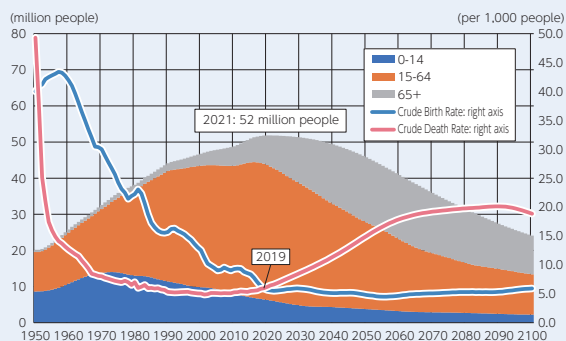
| Figure 1-CB-10 | Population in Korea (by age group) and crude birth and death rates |

Note: Actual data until 2021, medium estimates after 2022
Source: Prepared by the author using WPP2022

As the figure shows, the total population is projected to peak at 51.85 million in 2020 and decline to 24.1 million by 2100.

The working-age population peaked at 37.64 million (73.1%) in 2017 and has been on a downward trend since, reaching 37.04 million (71.5%) in 2021. The working-age population is expected to further decrease to 23.98 million (52.4%) in 2050 and 11.16 million (46.3%) in 2100. On the other hand, the aging rate, which was 2.7% in 1950, is expected to increase significantly to 16.7% in 2021. The aging rate will further increase to 39.4% in 2050, peaking at 47.5% in 2081, and continuing at a high level thereafter. As approximately half of the population of Korea will be elderly within the next 60 years, it will be necessary to take more urgent measures to cope with an aging society than in Japan and China.

The crude birth rate, which had remained at about 40 per 1,000 population in the 1950s, declined rapidly from 1960 onward. The crude death rate, on the other hand, was very high during the Korean War (1950-1953), but declined rapidly thereafter, and began to rise again in the 2000s, exceeding the crude birth rate in 2019.

[India]
Figure 1-CB-11 shows trends in population by age group, crude birth rate, and crude death rate in India.

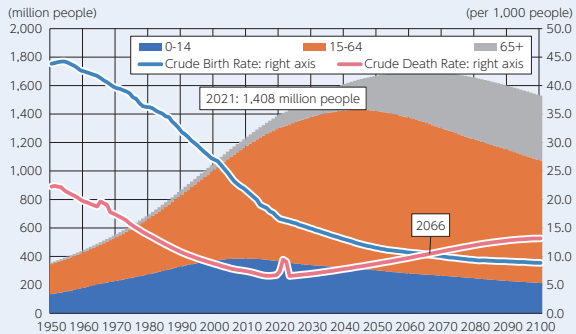The total population has been steadily increasing since 1950, and

(million people) ... **(per 1,000 people)**

Legend: 0-14 | 15-64 | 65+ | Crude Birth Rate: right axis | Crude Death Rate: right axis

2021: 1,408 million people

2066

| Figure 1–CB-11 | Population in India (by age group) and crude birth and death rates |

Note: Actual data until 2021, medium estimates after 2022
Source: Prepared by the author using WPP2022

is expected to reach 1,407.56 million in 2021, surpassing China as the world's most populous country by 2023.

The working-age population is expected to peak at 1,119.4 million (67.4%) in 2048, followed by a downward trend. The aging rate in 1950 was 3.1%, and it will be 6.8% in 2021, still in the single-digit range. This rate would increase by 29.8% in 2100, which is still lower than in Japan, China, and Korea.

The crude birth rate remained at about 40 per 1,000 population from 1950 to 1970, and has shown a gradual downward trend since then. On the other hand, the crude death rate, which had been gradually declining since 1950, is expected to rise again after 2018 and to exceed the crude birth rate in 2066.

[Russia]

We have looked at the demographics of major Asian countries, so let us now examine the demographics of Russia, a country with close ties to Asia. Figure 1-CB-12 shows the population by age group, crude birth rate, and crude death rate in Russia.

The total population peaked at 148.9 million in 1993 and has been on a declining trend, increasing somewhat since 2010, but then declining again in 2020, reaching 145.1 million in 2021. The population of Russia is expected to decrease to 133.13 million in 2050 and to 112.07 million in 2100.
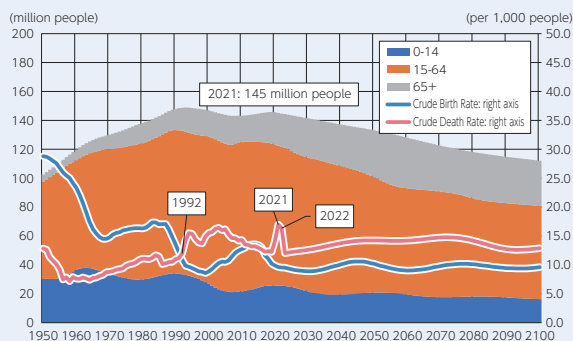
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Figure 1-CA-12   Population in Russia (by age group) and crude birth and death rates

Note: Actual data until 2021, medium estimates after 2022
Source: Prepared by the author using WPP2022

The crude birth rate has been higher than the crude death rate since the establishment of the Russian Federation in 1991[7]. Although the crude birth rate increased somewhat after 2010[8], it is expected to decline again after 2020, remaining at about 10 per 1,000 population. The crude death rate was high in 2022, partly due to the invasion in Ukraine, but it had already risen sharply in the previous year.

(2) Comparative analysis of total fertility rates

We have looked at population by age group and crude birth and death rates in major countries and regions. Here, we focus our analysis on the

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7) According to Kumo (2022), the "sharp decline in the birth rate since the 1990s is due to the abolition and fee-charging of social childcare support facilities such as nursery schools and kindergartens, which were extremely inexpensive in the Soviet era, and the sharp decline in income following the systemic change, which has darkened future prospects." The increase in the mortality rate was attributed to "increased social stress, increased alcohol consumption, worsening social unrest, and the spread of accidents and crimes."

8) Kumo (2022) points out that the "Maternity Capital," launched in 2007, has had an impact on the temporary increase in the birth rate. The fund was established to provide 250,000 rubles (about JPY 1.2 million at the time) to parents with two or more children to subsidize either the cost of purchasing a house, the cost of their children's education, or the accumulation of funds in a pension fund. Considering that the average monthly income in Russia was 12,000 rubles as of September 2007, its benefit is considered to be very large.

total fertility rate[9], an important variable for population projections.

According to the WPP2022 medium projection, the global total fertility rate is 2.31 in 2022 (Figure 1-CB-13), falling below the replacement-level fertility rate (2.07) in 2059, and is projected to decrease to 1.84 by 2100. The population of Europe fell below the replacement-level as early as 1975, while the population of Asia will fall below the replacement level in 2019, and the population of Africa fell below the replacement-level in 2091. There are major differences by region, so let's take a look at the total fertility rates in major Asian countries (Figure 1-CB-14).

First, the total fertility rate in Japan has been on a downward trend since 1950, and although it fell far below the replacement-level fertility rate in 1966 due to the aforementioned "Hinoe-uma" superstition, it rose again and remained near 2.00. In 1974, it fell below the replacement-level fertility rate at 2.06, and has remained below 2.00 since then. The replacement-level fertility rate is projected to be 1.31 in 2022, 1.47 in 2050, and 1.55 in 2100.

Next, China's total fertility rate remained at an average level of 6.00 from 1950 to 1970, excluding the effects of the famine mentioned
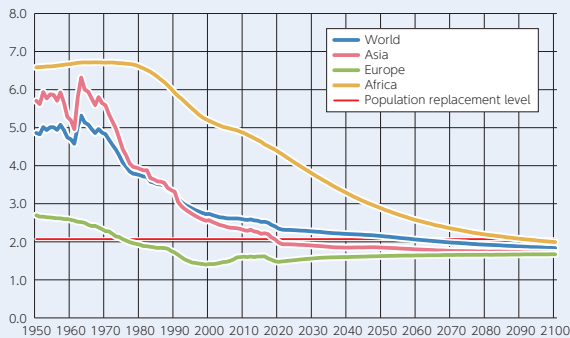

Figure 1 –CB-13   Total Fertility Rates in Major World Regions

Note: Actual data until 2021, medium estimates after 2022
Source: Prepared by the author using WPP2022

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9) Total fertility rate is the average number of children a woman bears during her lifetime. The total fertility rate at which the population reaches an equilibrium state of neither increasing nor decreasing is called the "replacement-level fertility," which is set at 2.07 in 2022. If the birth rate falls below this level, children become fewer, leading to a decrease in the population.
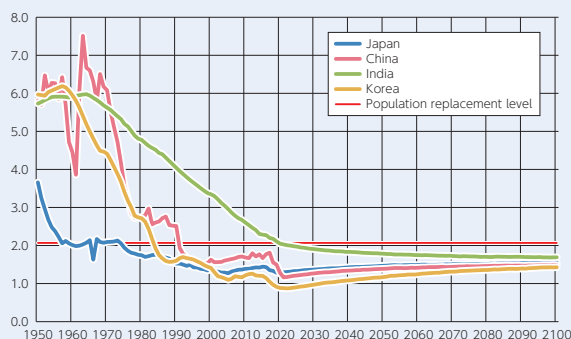
Figure 1-CB-14   Total Fertility Rate in Asian Countries

Note: Actual data until 2021, medium estimates after 2022
Source: Prepared by the author using WPP2022

above. However, since 1970, partly due to the introduction of the "one-child policy," the rate has been on a downward trend, and by 2020 it was projected to be 1.28, below the level of Japan.[10] Although the rate is projected to rise somewhat to 1.39 by 2050 and to 1.48 by 2100, it is still below the replacement-level fertility rate.

Korea's total fertility rate averaged 6.06 in the 1950s. However, since the 1960s, it has been on a downward trend and recorded 1.93, which is below the replacement-level fertility rate. In 2001, it was 1.30, which was lower than that of Japan (1.33) during the same period, and in 2021, it was as low as 0.88. It is expected to increase somewhat to 1.17 in 2050 and to 1.43 in 2100, but it is still below the replacement-level fertility rate.

India's total fertility rate averaged 5.66 between the 1950s and 1970s, and remained above the population replacement level until 2019, although it showed a gradual downward trend after 1980. In 2021, the birthrate fell below the replacement-level fertility rate at 2.03, and has shown a declining trend since then, but remains above the levels of Japan, China, and South Korea.

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10) Trends in China's total fertility rate are also discussed in Chapter 1 Section 1.

3. Summary

To demonstrate the future prospects of the world economy, it is important to analyze the growth of the whole-element productivity, population, and capital in growth accounting. Column B presents the future world population and dynamics, by region and major country, based on new population estimates. The following are some of the important points obtained from WPP2022.

The center of future world population growth is shifting from Asia to Africa.

This is due to the fact that in Asia, China, which has had the world's largest population to date, is expected to decline, while India's population is projected to grow steadily. Population growth in Asia as a whole will slow down.

In Japan and Korea, the working-age population is expected to decline due to the further development of the aging society with a declining birth rate.

One of the new issues emerging from global population dynamics is the need to address labor shortages. This is a major challenge for the Japanese economy in particular. In addition to increasing productivity, it is important to increase the labor participation rate of women and the elderly. Establishment of well-balanced work styles is important for this purpose.

References

Japan Research Institute, Economic & Policy Report, "How Asia's Demographic Outlook Has Changed After the COVID-19 Pandemic" (Japanese title: *Koronaka wo Hete Ajia no Jinko Dotai no Mitoshi ha Do Kawattaka*), (November 11, 2022) (https://www.jri.co.jp/page.jsp?id=103853)

JETRO, Regional and Analytical Report, "China's Population to Decline, India to Lead the World in 2023: UN Prediction" (Japanese title: *Chugoku no Jinko ga Gensho, 2023nen niha Indo ga Sekai Shui: Kokuren Yosoku*), (September 27, 2022) (https://www.jetro.go.jp/biz/areareports/2022/db12433a352ecc90.html)

Kumo, K. (2022), "Russia's Declining Population and Acceptance of

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Foreign Labor: Migration Policy from Russian Perspective" (Japanese title: *Roshia no Jinko Gensho to Gaikokujin Rodo no Juyo Roshia Kara Mita Imin Seisaku*), (https://www2.jiia.or.jp/kokusaimondai_archive/2020/2022-08_004.pdf?noprint, last viewed on July 9, 2023) (August 2022, No. 708), Japan Institute of International Affairs.

Sumitomo Mitsui Trust Bank, Research Monthly Report, November 2022, No. 127, "Future as Seen in 'World Population Estimates' by the United Nations" (Japanese title: *Kokuren 'Sekai Jinko Suikei' Kara Mieru Mirai*), (https://www.smtb.jp/-/media/tb/personal/useful/report-economy/pdf/127.pdf)

United Nations Department of Economic and Social Affairs, Population Division (2019), "World Population Prospects 2019," (https://population.un.org/wpp2019/Publications/, last viewed on July 10, 2023)

United Nations Department of Economic and Social Affairs, Population Division (2022), "World Population Prospects 2022," (https://population. un.org/wpp/Publications/, last viewed on July 10, 2023)