Bibliographical Guidelines on Aging-Related Materials

Overview

Overview: Global Processes in Demographic Transition

Dr. Kei Takeuchi

1. Universality of Demographic Transition

In the process of modernization, the population of a country is believed to make the transition from

(1) high birth rate – high death rate = low population growth, to
(2) high birth rate – low death rate = high population growth, and finally to
(3) low birth rate – low death rate = low population growth.

This process of "demographic transition" was first observed in western countries, as well as in other regions of the World where modernization has had an impact. If we acknowledge that there are places in the World where this process is yet to start, or is still in progress, then we can say that demographic transition is a globally universal phenomenon.

However, the timing of a demographic transition, its duration, and population growth during its phases vary significantly from country to country, indicating that the details of demographic transition are diverse. The table below is from Massimo Livi-bacci's *A Concise History of World Population* (5th ed. 2012, translation by Toru Hayami, Osamu Saito). (The author has added annual growth rates to the table.)

Table : Start, End, Duration, and "Multiplier" of Demographic Transitions in Various Countries

Country	Start & End of Transition	Duration of Transition Period (No. of Years)	Multiplier	Annual Growth (‰)
Sweden	1810-1960	150	3.83	9.0
Germany	1876-1965	90	2.11	8.3
Italy	1876-1965	90	2.26	9.1
Soviet Union	1896-1965	70	2.05	10.3
France	1785-1970	185	1.62	2.6
China	1930-2000	70	2.46	12.9
Taiwan	1920-1990	70	4.35	21.0
Mexico	1920-2000	80	7.02	24.3

Source: J.C. Chesnais, *La Transition Démographique,* Presses Universities de France (PUF), Paris, 1986, pp. 294, 301. English edition: *The Demographic Transition*, Oxford University Press, New York, 1992, pp. 305, 312. Reproduced with permission from PUF.

In Japan, 1920 can be regarded as the year when a declining trend in the death rate began. A decline in the birth rate began in 1950. Following a decline in the total fertility rate (TFR) to below 2.0 in 1975, the annual growth in the population fell below 10‰ (1%) in 1976. Therefore, Japan's demographic transition period can be said to have been from 1920 to 1975. The duration of this period was 55 years, the population magnification ratio was 2.0, and the annual growth of the population was 12.6‰.

Although the United Kingdom (UK) is not listed on the above table, the end of the Plague brought high population growth to England during the 18th to 19th centuries. On the other hand, the decline in the death rate becomes evident only in the latter half of the 19th century. Therefore, UK's demographic transition period would be listed between Scandinavia (Sweden) and Germany.

For China, the table lists 1930 as the start of its demographic transition. Although this was the time at which the Chinese Nationalist Government had achieved a tenuous unification of the country, China was in the middle of a long period of chaos due to civil wars and foreign invasion (Japan) starting from the Revolution of 1911 until the establishment of the People's Republic of China in 1949. Therefore, this was a time in which reliable population statistics was yet to be established, and it is doubtful that data that would substantiate the 1930 beginning of a demographic transition exist. On the other hand, in view of the fact that the population increased by 40% (annual growth of 8.4‰) in about 40 years during this period, while historically it has been normal for the population to drop significantly during the chaos preceding and/or following the fall of a dynasty, perhaps it can be said that China was at least in the preparatory period for a demographic transition during this period, or during the last days of the Qing Dynasty prior to this.

In many developing countries, rapid population growth, often called the "population explosion," was observed following the Second World War, which can be considered to demark the start of demographic transitions in those countries. While the birth rate has started to decline in many of these countries, high population growth is still continuing, indicating that the demographic transitions are yet to conclude.

2. Issues concerning the definition of Demographic Transition

In defining the demarcations of a demographic transition, it is possible to identify its commencement with the start of the declining trend in the death rate, and its conclusion with the time at which the declining trend in the birth rate ends, the birth and death rates become balanced, and the population stabilizes. However, these definitions are not without problems.

In many countries, before the modern concept of "demographic transition" can be applied, it is necessary for the society to become relatively stable. That is, drastic changes in the death and birth rates due to natural disasters, climate change, epidemics, or warfare must be suppressed. In Europe, this stability was brought by the end of the Plague, the cessation of religious wars, and the stabilization and increase of food production. The period in which such stabilization occurs can be considered the preparatory period for demographic transition. In Europe, this was from the 18th to the 19th centuries, with some countries already recording high population growth due to the absence of spikes in the death rate, and the growth and stabilization of the birth rate.

In countries other than Europe, there also exist cases in which the population increased significantly from the 17th to the 19th centuries. In China, for example, following a period of upheaval and drastic fall in population from the end of the Ming to the beginning of the Qing Dynasties, the early to middle period of the Qing (17th-19th centuries) witnessed a four-fold increase in population. In Japan also, from around 1600 in the early Edo period when the Sengoku (warring states) period came to a close, until the beginning of the 18th century, the population increased 2.5-fold. In China, however, from 1850 onwards, the population fell dramatically due to

the Taiping Rebellion. In Japan also, from the beginning of the 18th century, famines occurred frequently halting population growth and keeping it at an extremely low level until the first half of the 19th century. In both China and Japan, demographic transitions did not begin until "modernization brought by Westernization" progressed to a certain level.

In Europe, Ireland showed idiosyncratic changes. In the 17th century, the country was conquered by Cromwell. The introduction of potatoes at the end of the 16th century increased the population carrying capacity of the land, and the population increased significantly from the18th century to 1840, reaching over eight million people. The potato famine in the 1840s, however, resulted in a drastic fall in the population, which continued to contract thereafter due to a population outflow to the United States, and by 1901 the population had almost halved at 4.5 million people. In the latter half of the 20th century it finally started to recover but even as of 2013 it stood at only 4.6 million people.

Therefore, even if the natural population growth rate of a country remains high for a century or more, this does not necessarily mean that it is getting ready for a demographic transition, or that it is commencing a demographic transition. Unless population growth is accompanied by an increase in productivity to a certain level or higher, it will result in a Malthusian state of overpopulation, which will lead to social chaos or stagnation, and the opportunity for demographic transition may be lost. This is a problem in the consideration of demographic trend of some developing countries.

What causes a demographic transition to commence, that is, start a declining trend in the death rate, is not entirely clear. While it is clear that the dramatic decline in the death rate after the Second World War was due to advances in medical care and public health, in the 19th century advances in effective medical techniques were hardly evident yet, and most probably the impact of widespread installation of water supply and sewage systems as well as improvement in urban housing conditions were more significant. Moreover, it is believed that improvement in the general standard of living due to economic growth, that is, improvement in nutrition, living conditions, and knowledge of hygiene due to the spread of education had a significant impact.

The observed delay in the beginning of a demographic transition after the beginning of "modernization," or the resulting industrialization, can be understood as due to the time necessary for their effects to permeate throughout society. From this point of view, it is puzzling how the table can claim that the demographic transition in France had already commenced in latter half of the 18th century during the twilight of the anciens régimes. In France at that time, the majority of the population consisted of people in farming communities where the feudal system still remained intact, and it is unimaginable that such communities had already been modernized.

During a demographic transition, the declining trend in the birth rate generically occurs later than the declining trend in the death rate, with France being the exception where both trends began at the same time. In some cases, the interval between the starts of the two trends can be quite long, leading to a large population increase during that period. This is often seen in developing countries, with Mexico in the above table being one example.

The decline in the birth rate is caused by the decline in the number of births per woman, or total fertility rate (TFR), and the TFR is determined by the survival rate of women until the fertile period,

marriage rate, age of first marriage, interval between pregnancies, and end of childbearing age. Artificial measures such as contraception, unnatural termination of pregnancies (infanticide in extreme cases) also have an impact on the TFR. Factors that have had a significant impact on the decline of birth rate are: higher education for women, professional advancement for women, the tendency for women to get married later due to urbanization, and a decline in the lifetime marriage rate. Later the spread of contraception technology as well as government policies also had an impact on the TFR. Even prior to modern demographic transitions, there existed significant differences between the TFRs of Western European countries and those of Asian/African countries due to differences in the average marriage age of women. Though the higher TFRs of the latter countries were offset by higher death rates, they entailed the potential of a higher natural population growth rate. Consequently, once demographic transitions commenced in these countries, the population grew rapidly in tandem with an ongoing decline in the death rate.

What caused the decline in the birth rate in developed countries is not clear in most cases. Until the Second World War, the governments of European countries, particularly in France, had aspirations for high birth rates. On the other hand, many governments in developing countries that were faced with rapid population growth after the Second World War adopted policies to control births. In many cases, however, these policies failed to achieve the desired results. The exception was China. After the Second World War, China's high birth rate, based on Chairman Mao's ideology that the bigger the population the better, was left to take its own course until the Cultural Revolution. While this period included the period when the population temporarily decreased due to the great famine caused by the failure of policies implemented during the Great Leap Forward from 1959 to 1961, China's population doubled in 30 years. At the beginning of the 1980s the Chinese government implemented its powerful "one-child policy" and, as a result, the birth rate in China started to decline rapidly since the beginning of the 1990s. In this case, the transition from the first half to the latter half of the demographic transition was clearly the result of government policy.

How one defines the end of a demographic transition is problematic. One possibility is the time at which the birth and death rates become balanced and the population stabilizes, and another is the time at which the decline in the TFR comes to a halt. In general, the two points do not coincide.

The latter half of the 20th century saw a period of significant worldwide population growth. As a result, the total population of the World is continuing to increase despite declining TFRs, and rendering the phenomenon of demographic transitions difficult to discern.

3. After the Demographic Transition

According to the classic theory of "demographic transition," at the conclusion of a demographic transition the birth and death rates reach a more or less balanced state, the age structure of the population stabilizes, and the total population becomes roughly constant (or slightly increasing or decreasing with time). This means that the TFR is maintained almost at the replacement level of about 2.05.

However, at the end of the 20th century, the TFR in many developed countries fell below 2.0, and to 1.5 or lower in some countries (Japan, Germany, etc.). In China also, the current TFR is believed to be 1.5 or lower due to its one-child policy.

In the 2010s, among the developed countries, the United States, France, UK, and the Scandinavian countries are either maintaining or recovering their TFRs to a level of 1.9 or above, while Germany, southern European countries such as Italy and Spain, Russia and the former Eastern Bloc countries, Eastern Asian countries such as Japan, Korea, Singapore, and Hong Kong have TFRs which remain at 1.5 or below.

Therefore, after the end of their demographic transitions, these countries can be roughly divided into two groups: the countries where the fertility rate steadily declines and the total population decreases, and the countries where even if the TFR temporarily falls below 2.0 in a short time, it recovers to almost replacement level. What then causes this difference?

If the TFR remains at a low level of 1.3 or less and the population declines at an annual rate of negative 2%, the very existence of a country will be at risk. Therefore, it is likely that the fertility rate will reverse in time and the decline in population may stop. However, to maintain a population at a stable level without restoring it to growth, the TFR must be at least 2.0. The question here then is when the reversal and increase in the TFR will occur and what will cause it. It goes without saying that a significant reduction in the population over a long period cannot be ruled out, but this is an “abnormal” case like the case of Ireland in the 19th and the 20th centuries, and may not be considered as a form of demographic transition.

In short, unless we take into consideration processes up until the fertility rate recovers to replacement level after the demographic transition, we should not consider the discussion on demographic transition to be complete.

Here, I also believe a differentiation should be made among the types of countries with significantly low TFR. A look at the fertility rate by maternal age in these countries shows cases with uniformly low rates for each age group, and other cases with significantly low rates up until the 20s, particularly in the first half of the 20s, but not so low rates in the 30s. The former cases are indicative of a uniform decline in fertility, while the latter cases are indicative of a rise in the average age of marriage. Russia, Eastern Europe and China belong to the former, while Japan, South Korea, Germany and countries in Southern Europe belong to the latter.

Among such countries, the former Soviet Union and Eastern European countries, due to government policies under a socialist system, had higher fertility rates than Western countries. During the social disruption after the fall of the socialist system, the fertility rate plunged suddenly. In Russia, for example not only the birth rate declined but the death rate rose rapidly and the average life expectancy shortened significantly. After some time, the economies of Russia and some other countries recovered and as economic growth got back on track, the death rate fell and the fertility rate showed a recovering trend. In these countries, therefore, there is a possibility that the decline in the TFR was a temporary phenomenon stemming from social and economic disruption. On the other hand, there is another possibility that this trend was indicative of a fundamental change in social values following a systemic change and may be ongoing. It is not still clear which one of these may be the case.

When a fall in the fertility rate is attributed to an increase in the average age of marriage and a declining marriage rate, there must be natural limits to both, and also to the fall in the TFR.

Therefore, it can be assumed that the fall in the TFR will come to a halt in due course, but it can also be assumed that it will be difficult to raise the TFR rapidly since it is not easy to bring forward the age of marriage.

In China, if the one-child policy were to continue indefinitely, the TFR will ultimately fall to 1.0 or below. The Chinese government, however, actually terminated its one-child policy in 2015 before the TFR fell to such a level. Nevertheless, there is some doubt as to whether China's fertility rate will make a rapid recovery. If it follows trends in Japan, Korea, and East Asian countries, particularly in large urban areas, there is a possibility that the fertility rate will not rise even without a government birth control policy or even with a fertility incentive policy to some extent. Moreover, in farming villages, even if people would like larger families, they may not be able to afford them.

The future of countries with abnormally low TFRs remains unpredictable. In some developing countries where the TFR is declining rapidly, such as in Thailand, it remains to be seen whether the trend will continue and their TFRs will also drop to significantly low levels.

4. Demographic Transition of the World as a Whole

During the 20th century, the world population grew from 1.6 billion people in 1900 to 2.5 billion by 1950, and again increased almost four-fold to 6.7 billion people by 2000, at an annual rate of about 1.3%. It is predicted that population growth will taper in the 21st century, and at some point during this century come to a standstill. Since the beginning of the 20th century, the average life expectancy, which was in the 40s in developed countries and the 20s in many developing countries, significantly increased, rising to 70 or over in developed countries and even to 80 years in many of them, and to the 60s in developing countries except for African countries, and the 70s even in some of them. Even in Africa, the average life expectancy rose to over 50 years.

For the whole world, or humankind as a whole, the demographic transition commenced in the 20th century, particularly during the latter half of the century, and it can be said that this transition will be complete by the latter half of the 21st century.

Nevertheless, the circumstances are extremely complicated. What is clear is the worldwide dramatic fall in the death rate due to progress in medical care and public health in the latter half of the 20th century (in Africa, AIDS and other infectious diseases delayed this progress). This resulted in phenomenal population growth from 1950 to the 1960s, which came to be known as the "population explosion." This phenomenal growth then gradually subsided. At present, it can be said that the world as a whole is in the second phase of a demographic transition.

However, if we take a look at countries individually, the circumstances are varied and we can see the following types of countries in the world:

1. Countries where the demographic transition is complete, and which have reached a stationary population,
2. Countries where the demographic transition has "gone too far," and the fertility rate has fallen to an abnormal level and the population is declining,

3. Countries where the TFR is falling to 2.0 and the demographic transition is coming to an end,
4. Countries that are maintaining a high fertility rate with a TFR of 4 or over, and population growth is continuing.

Therefore, while population trends in the world as a whole may look something like a continuous process, the movement in population in each country is disparate. For example, it is predicted that India's population will overtake that of China by 2030, and population superpower countries in Asia and Africa will move up in the population ranks, while Japan's population will fall to 13th place after the Philippines. From the 19th century to the latter half of the 20th century, the size of a country's population was generally equated with national power, and in international society it was believed that the bigger the population the better. While in the latter half of the 20th century, there was a view that a large population meant high "population pressure", and that a smaller population was more advantageous. Since it is improbable that a declining population will be equated with an increase of national power, a significant change in the population ratio will ultimately have an impact on the international power relationship.

Another important factor is the aging of the population. Due to declining fertility rates and increases in the average life expectancy, the population structure in all countries of the world is aging. While this fact itself should be considered as a natural consequence of demographic transition, there are significant differences among countries in the pace at which it progresses. The ratio of the aged population of 65 and over is more than 20% in Japan, Germany and Italy, while in many developing countries including India it is 5% or less.

Furthermore, it is believed that this gap will rapidly widen in the future and will exceed 30% in Japan by 2030. It is also forecast that aging will progress rapidly in both China and Korea. Moreover, extreme population aging is likely to have a significant negative impact on the national capability of those countries, particularly on their economic growth potential. This will be due to not only the shortage of the labor force, particularly the young labor force, but also to the fact that the substantial part of the labor force is required for the support of the aged population (sustenance, nursing care, and medical care). In countries where the fertility rate has significantly fallen during the past 30 years in particular, with a fall in the cost of raising the juvenile population, people born during the period of high fertility rate prior to that (the baby boomers) have contributed to production and brought about economic growth which is sometimes called a "demographic bonus," and now are reaching old age. Consequently, not only is this demographic dividend disappearing but also the burden of an aging population is increasing. The phenomenal economic growth in China during the past 20 years is also believed to be attributable to some extent to such a "demographic bonus." However, this gain is rapidly dwindling at the moment.

Uneven development in the world will create pressure for global population migrations. During the 19th century, mass migrations from Europe to North and South America and Oceania served as "outlets" for burgeoning populations in Europe, and at the same time brought development to those countries and regions. In the 20th century, however, barriers for accepting migrants increased, and mass migrations ceased. During the latter half of the 20th century, migration from developing countries to developed countries in Europe and America increased.

In the future, if aging, wealthy countries with declining populations are to coexist with poorer countries with a large ratio of young people and growing populations, it will be only natural for pressure to increase for population migration from the latter to the former countries. Unlike migrants from Europe during the 19th century, who were generally considered settlers of “virgin land” (even though this was not actually the case, and native populations were forcibly removed from their land), however, there is concern that the inflow of migrants in large numbers from countries with different historical and cultural backgrounds will create serious frictions.

The unevenness of patterns and speeds of the demographic transition of the countries of the world may become a factor contributing to chaos in the world.