Commentary on the ratio

The ratios used in this report have been calculated as follows.

The tables for yearly trends for 1970, 1975 and 1980 are based on the final numbers of the National Census for Japanese population as on October 1. Therefore, the figures may differ from the values in the reports for 1970, 1975 and 1980. Moreover, the denominator population used in the calculations is available under "Population" (Appendix to the end of Volume 1 of the Reports until 2016) on e-Stat.

(1) Comprehensive List

$$\text{Live birth rate} = \frac{\text{Number of live births in a year}}{\text{Japanese population on October 1}} \times 1{,}000$$

$$\text{Death rate} = \frac{\text{Number of deaths in a year}}{\text{Japanese population on October 1}} \times 1{,}000$$

$$\text{Infant mortality rate} = \frac{\text{Number of infant deaths in a year}}{\text{Number of live births in a year}} \times 1{,}000$$

$$\text{Neonatal mortality rate} = \frac{\text{Number of neonatal deaths in a year}}{\text{Number of live births in a year}} \times 1{,}000$$

$$\text{Natural change rate} = \frac{\text{Number of foetal deaths in a year}}{\text{(Number of live births in a year - Number of deaths in a year)}} \times 1{,}000$$

$$\text{Foetal death rate} = \frac{\text{umber of natural changes in a year}}{\text{(Foetal death after 12 completed weeks of gestation)}} \times 1{,}000$$

$$\text{Spontaneous foetal death rate} = \frac{\text{Number of spontaneous foetal deaths in a year}}{\text{total number of births in a year}} \times 1{,}000$$

(Number of live births in a year + number of foetal deaths in a year)

$$\text{Artificial foetal death rate} = \frac{\text{Number of artificial foetal deaths in a year}}{\text{total number of births in a year}} \times 1{,}000$$

(Number of live births in a year + number of foetal deaths in a year)

$$\text{Perinatal mortality rate} = \frac{\text{Number of perinatal deaths in a year}}{\text{Number of live births in a year} + \text{Number of foetal deaths after 22 completed weeks of gestation}} \times 1{,}000$$

Foetal death rate after 22 completed weeks of gestation (Total, spontaneous, artificial)

$$= \frac{\text{Number of foetal deaths after 22 completed weeks of gestation (Total, spontaneous, artificial)}}{\text{Number of live births in a year} + \text{Number of foetal deaths after 22 completed weeks of gestation}} \times 1{,}000$$

$$\text{Early neonatal death rate} = \frac{\text{Number of early neonatal deaths in a year}}{\text{(Number of deaths before 1 week (7 days) of birth)}} \times 1{,}000$$

$$\text{Marriage rate} = \frac{\text{Number of marriage in a year}}{\text{Japanese population on October 1}} \times 1{,}000$$

$$\text{Divorce rate} = \frac{\text{Number of divorce in a year}}{\text{Japanese population on October 1}} \times 1{,}000$$

(2) Live Birth

$$\text{Sex ratio} = \frac{\text{Number of male live births in a year}}{\text{Number of female live births in a year}} \times 100$$

Live birth rate by age of mother (Age groups)

$$= \frac{\text{Number of live births by mothers of an age group}}{\text{Number of Japanese women of the age group as of October 1}} \times 1{,}000$$

$$\text{Monthly birth rate (annualized)} = \frac{\text{Number of live births in a month}}{\text{Population at the beginning of the month} \times \text{Annual conversion factor}} \times 1{,}000$$

$$\text{(Note) Annual conversion factor} = \frac{\text{Number of days in a month (30, 31, 28 or 29)}}{\text{Number of days in a year (365 or 366)}}$$

Or, the length of each month, taking the length of a year as 1.

$$\text{Total fertility rate} = \left\{ \frac{\text{Number of live births in a year by mother's age}}{\text{Female population by age as of October 1}} \right\}_{\text{Total of women aged 15 years to 49 years}}$$

(Calculated by five-year age groups for all prefectures and 21 major cities and multiplied by 5. However, total of each age is used from 2015 for years when National Census was conducted.)

The total fertility rate refers to the total of live birth rates by age for women aged 15 years to 49 years. It is equivalent to the number of children a woman would bear in a lifetime at that live birth rate by age.

Moreover, number of live births at 15 years and 49 years respectively include deliveries at 14 years or less and 50 years or more of age.

(Reference)

Total fertility rate is of the following two types.

Period total fertility rate: This value focuses of the fertility situation in a certain period (one year) and is the total of live birth rates of women of each age (15-49 years old). Excluding the differences between age compositions of the female population, this value is used for year-wise, country-wise and region-wise comparisons as "the total fertility rate for that year." The period total fertility rate is calculated using the above formula in the Vital Statistics.

Cohort total fertility rate: This value focuses on the fertility situation of a certain generation and is the cumulative total of the live birth rates from the past of women belonging to each age (15-49 years old) in the same generation (cohort). This is "the total fertility rate for that generation."

Although "the number of children a woman would bear in a lifetime" is the cohort total fertility rate, the period total fertility rate is generally used as an equivalent because the data cannot be obtained until the generation reaches 50 years of age. Moreover, if the live birth rate for each age group is the same for all generations (cohorts) then both "total fertility rates" will give the same value.

However, late marriages and late childbirths are rising and there are differences in marriage and childbirth circumstances in each generation. When the live birth rate for each age differs by generation, it is necessary to note that the period total fertility rate, which is the total of live birth rates for each generation by age, will differ from the cohort total fertility rate.

(3) Death rate

$$\text{Death rate by sex} = \frac{\text{Number of male deaths in a year}}{\text{Number of female deaths in a year}} \times 100$$

Death rate (total, male, female) by age (age groups)

$$= \frac{\text{Number of deaths at a certain age (age group) in a year (total, male, female)}}{\text{Population of Japanese people of the age (age group as of October 1)}} \times 1{,}000$$

$$\text{Monthly death rate (annualized)} = \frac{\text{Number of deaths in a month}}{\text{Population at the beginning of the month} \times \text{Annual conversion factor}} \times 1{,}000$$

$$\text{(Note) Annual conversion factor} = \frac{\text{Number of days in a month (30, 31, 28 or 29)}}{\text{Number of days in a year (365 or 366)}}$$

Or, the length of each month, taking the length of a year as 1.

$$\text{Death rate by cause (annual)} = \frac{\text{Number of deaths in a year by cause}}{\text{Population of Japanese people as of October 1}} \times 100{,}000$$

$$\text{Age-standardized death rate} = \frac{\left\{\left[\begin{array}{c}\text{Sum total for each age (age group) of (Death rate}\\ \text{of each age(age group) in a group under observation}\end{array}\right] \times \left[\begin{array}{c}\text{Population of the same age}\\ \text{(age group)}\end{array}\right]\right\} \text{ in the standard population group}}{\text{Total number of standard population groups}}$$

(Reference)

Since the death rate differs by age, the age-standardized death rate is useful for country-wise comparisons or observation of yearly trends as it excludes the differences in age composition.

The standard population used for age-standardized death was the total population in 1935 by sex until 1989 (prefectures used the total population in 1960). However, this was far removed from the actual population composition. Therefore, 1985 model population (per 1,000 people after correcting extreme changes during baby boom and other periods, based on the population in the National Census of 1985) is being used since 1990.

Moreover, the "death rate of each age (age group) in a group under observation" in the equation is multiplied by 1,000 (multiplied by 100,000 when calculating by cause).

Standard population —1985 model population—

Age	Standard population	Age	Standard population
0～4years	8 180 000	50～54	7 616 000
5～9	8 338 000	55～59	6 581 000
10～14	8 497 000	60～64	5 546 000
15～19	8 655 000	65～69	4 511 000
20～24	8 814 000	70～74	3 476 000
25～29	8 972 000	75～79	2 441 000
30～34	9 130 000	80～84	1 406 000
35～39	9 289 000	85years～	784 000
40～44	9 400 000	Total	120 287 000
45～49	8 651 000		

(4) Infant mortality

$$\text{Infant mortality rate by sex} = \frac{\text{Number of male infant deaths in a year}}{\text{Number of female infant deaths in a year}} \times 100$$

$$\text{Perinatal mortality rate by sex} = \frac{\text{Number of male perinatal deaths in a year}}{\text{Number of female perinatal deaths in a year}} \times 100$$

$$\text{Infant mortality rate by age in days (age in months) by sex} = \frac{\text{Death rate of male infants of a certain age in days (in months)}}{\text{Death rate of female infants of the age in days (in months)}} \times 100$$

$$\text{Monthly infant mortality rate (annualized conversion rate) (before 1994)} = \frac{\text{Number of Infant deaths in that month}}{\text{Number of live births in the past one year including that month} \times \frac{\text{Number of days in the month}}{\text{Number of days in the past one year including that month}}} \times 1{,}000$$

$$\text{Monthly infant mortality rate (annualized conversion rate) (from 1995 onwards)} = \frac{\text{Number of Infant deaths in a month}}{\text{Number of live births in a year} \times \text{annual conversion factor}} \times 1{,}000$$

$$\text{(Note) Annual conversion factor} = \frac{\text{Number of days in a month (30, 31, 28 or 29)}}{\text{Number of days in a year (365 or 366)}}$$

Or, the length of each month, taking the length of a year as 1.

$$\text{Infant mortality rate by death cause or infant mortality rate by age} = \frac{\text{Number of Infant deaths in a year by death cause (or Number of Infant deaths in a year by age)}}{\text{Number of live births in a year}} \times 100{,}000$$

$$\text{Neonatal mortality rate by death cause} = \frac{\text{Number of neonatal deaths in a year by cause}}{\text{Number of live births in a year}} \times 100{,}000$$

(5) Foetal Death

$$\text{Foetal deaths by sex} = \frac{\text{Number of male foetal deaths in a year}}{\text{Number of female foetal deaths in a year}} \times 100$$

$$\text{Monthly foetal death rate (total, spontaneous, artificial)} = \frac{\text{Number of foetal deaths in a month (total, spontaneous, artificial)}}{\text{Number of births in a month (number of live births in a month + number of foetal deaths in a month)}} \times 1{,}000$$

$$\text{Monthly feotal death rate after 22 completed weeks of gestation (total, spontaneous, artificial)} = \frac{\text{Number of feotal deaths in a month after 22 completed weeks of gestation (total, spontaneous, artificial)}}{\text{Number of live births in a month + Number of feotal deaths in a month after 22 completed weeks of gestation}} \times 1{,}000$$

(6) Perinatal mortality

$$\text{Monthly perinatal mortality rate} = \frac{\text{Number of perinatal deaths in a month}}{\text{Number of live births in a month + Number of feotal deaths in a month after 22 completed weeks of gestation}} \times 1{,}000$$

(7) Maternal mortality

$$\text{Maternal mortality rate} = \frac{\text{Number of maternal deaths in a year}}{\text{Number of births in a year (number of live births in a year + number of foetal deaths in a year) (or number of live births in a year)}} \times 100{,}000$$

$$\text{Late maternal mortality rate} = \frac{\text{Number of late maternal deaths in a year}}{\text{Number of births in a year (number of live births in a year + number of foetal deaths in a year)}} \times 100{,}000$$

Note: Please refer to “Commentary on the term” for information on maternal deaths.