Definitions and Measures of Fertility and Mortality

1. Calculation of Age

Since the SPC was a multi – round survey, all changes in household composition and events concerning births, deaths, in – migration and out – migration were recorded as of the interview date for the household. Age as of the time of interview and the time of occurrence of an event was calculated as follows :

1.1 Age at Date of First Interview

Refers to the age of a person as of the time of the first interview, which may not necessarily be the first round of survey. Age at date of first interview, therefore, was the difference between the date of firs interview and date of birth for each individual.

1.2 Age as of Survey Round

Refers to the age of a person as of a specific round of interview, e.g. age as of Round 1 was the difference between date of the first interview and date of birth. Age of mid – year population in Table 1 was obtained from age as of survey round.

1.3 Age of Mother at Birth of Child

Obtained by taking the difference between the birth date of child within the survey round and the birth date of mother.

1.4 Age of Decedent

Age of decedent was the difference between the date of death within the survey round and birth date of the decedent.

2. Calculation of Mid – Year Population

The mid – year population is the average population during the first and fifth round of the survey and was obtained as follows :

$$\text{Mid - Year Population} = \frac{\text{Round 1 population} + \text{Round 5 population}}{2}$$

3. Fertility Measures

3.1 Crude Birth Rate (CBR)

The number of births occurring in a year per 1,000 population. The rate is crude in that it related to the total population without regard to age and sex.

$$CBR = \frac{B}{P} \times 1{,}000$$

where

B = total births for a given area and year

P = total mid – year population of the area

The CBR for each region, whole kingdom and each area is estimated as follows :

3.1.1 The estimate of crude birth rate for each region is calculated by

$$CBR_h = \sum_{i=1}^{2} W_{hi}\ CBR_{hi} \qquad \text{.....(1)}$$

where CBR_{hi} = the estimate of crude birth rate in the i^{th} area for the h^{th} region

$$CBR_h = \frac{\sum_{j=1}^{n_{hi}} B_{hij}}{\sum_{j=1}^{n_{hi}} p_{hij}} \times 1{,}000 = \frac{B_{hij}}{P_{hij}} \times 1{,}000$$

B_{hij} = total births during the year in the j^{th} sample blocks or villages in the i^{th} area for the h^{th} region

P_{hij} = total mid – year population in the j^{th} sample blocks or villages in the i^{th} area for the h^{th} region

n_{hi} = total number of sample blocks or villages in the i^{th} area for the h^{th} region

W_{hi} = the weight in the i^{th} area for the h^{th} region

$$\sum_{i=1}^{2} W_{hi} = 1$$

i =
1 for municipal area
2 for non–municipal area

h =
1 for the Bangkok Metropolis
2 for the Central Region (Excluding the bangkok metropolis)
3 for the Northeastern Region
4 for the Southern Region
5 for the Northern Region

3.1.2 The estimate of crude birth rate for each area is calculated by

$$CBR_i = \sum_{h=1}^{5} W_{hi} \, CBR_{hi} \qquad \text{.....(2)}$$

where W_{hi} = the weight in the i^{th} area for the h^{th} region

$$\sum_{h=1}^{5} W_{hi} = 1$$

3.1.3 The estimate of crude birth rate for the whole kingdom is calculated by

$$CBR = \sum_{i=1}^{2} W_i \, CBR_i \qquad \text{.....(3)}$$

where W_i = the weight for the i^{th} area

$$\sum_{i=1}^{2} W_i = 1$$

3.2 Age – Specific Fertility Rate (ASFR)

The number of births occurring annually (or in a specified period) per 1,000 women of specific age (usually in terms of 5 – year age groups within the childbearing ages, i.e. 15 – 49 years).

$$n^f x = \frac{n^B x}{n^F x} \times 1{,}000$$

where $n^f x$ = age – specific fertility rate for age group x to x + n

$n^B x$ = number of births occurring to women in the age group x to x + n

$n^F x$ = number of females in the age group x to x + n

3.3 General Fertility Rate (GFR)

The number of births occurring annually per 1,000 women of childbearing ages (usually 15-44 years or 15-49 years).

$$GFR = \frac{B}{F_{(15-49)}} \times 1{,}000$$

where B = total births for a given area and year

$F_{(15-49)}$ = number of women age 15 – 49 years

3.4 Standardized GFR.

For comparison of general fertility rates of the population in different areas, the standardized method is used in order to avoid the effects of differences in the age composition of each subgroup of population.

$$\text{Standardiz ed GFR} = \frac{\sum\left[{}_n f_x \times {}_n F_x(\text{Std.Pop.})\right]}{\sum {}_n F_x(\text{Std.Pop.})}$$

where ${}_n f_x$ = age – specific fertility rate for age group x to x + n of a subgroup of population

${}_n F_x$ (Std.Pop) = number of females in the same age group in the standard population. The standard used was the number of females in the Whole Kingdom population

3.5 Total Fertility Rate (TFR)

The sum of annual age – specific fertility rates computed for each age group in the childbearing period. This measure indicated the number of children that would be born to a hypothetical cohort of 1,000 women who follow a set of a current schedule of age – specific fertility rates, assuming that none of the women die before reaching the end of the childbearing period.

$$TFR = \left[n \sum \left({}_n f_x\right)\right] \times 1{,}000$$

Where ${}_n f_x$ = age – specific birth rate for age group x to x + n

n = number of years in the age interval (5 years)

3.6 Gross Reproduction Rate (GRR)

The average number of daughters born to a cohort of 1,000 women who follow a set of a current schedule of age – specific fertility rates, assuming that none of the women die before reaching the end of childbearing period.

$$GRR = \left[n \sum \left(n\ ^{f}\ x\right)\right] \times \frac{B(f)}{B}$$

$n\ ^{f}x$ = age – specific birth rate for one mother in the age group x to x + n

n = number of years in the interval (5 years)

$\frac{B(f)}{B}$ = proportion of female births

3.7 Net Reproduction Rate (NRR)

The average number of daughters that a hypothetical cohort of females starting life together would bear if they experienced a given set of age – specific mortality and fertility rates.

$$NRR = \frac{\sum}{x}\left[\left(nF^{f}x\right)\frac{\left(n^{L}x\right)}{l_0}\right]$$

$nF^{f}x$ = Each five – year age – specific fertility rate including only female live births

$n^{L}x$ = The number of person – years lived between exact ages x and x + n

l_0 = Radix of the life table (100,000 people)

4. Mortality Measures

4.1 Crude Death Rate (CDR)

The number of deaths occurring in a year per 1,000 average or mid – year population within a given or population group. As with the crude Birth Rate, it related to the total population without regard to age and sex.

$$CDR = \frac{D}{P} \times 1{,}000$$

where

D = total deaths for a given area and year

P = total mid – year population of the area

The CDR for each region, whole kingdom and each area are obtained by the same procedures as for the CBR.

4.2 Age – Specific Death Rate (ASDR)

The number of deaths occurring annually (or in a specified period) per 1,000 population of specific age (usually in terms of 5 years age group).

$$ {}_nM_x = \frac{{}_nD_x}{{}_nP_x} \times 1{,}000 $$

where

${}_nM_x$ = age – specific death rate for age group x to x + n

${}_nD_x$ = number of deaths in the age group x to x + n

${}_nP_x$ = number of population in the age group x to x + n

4.3 Infant Mortality Rate (IMR)

The number of infant deaths (death occurring within 1 year after birth) per 1,000 live births for the given year.

$$ IMR = \frac{D_0}{B} \times 1{,}000 $$

Where

D_0 = number of infant deaths occurring within a year

B = number of live births for a given year

5. Life Table Computation

The Life Table was computed by using ELT program.[1/] The data in the life table were computed as follows :

1/ Arriaga Eduardo, Patricia Anderson, Larry Haligman. Computer Programs for Demographic Analysis, U.S. Department of Commerce, Bureau of the Census.

Therefore, ${}_nq_x$ the proportion of person alive at age x and dying between age x and x + n was obtained by the following formula :

$${}_nq_x = 1 - \frac{l_{x+n}}{l_x}$$

l_x = number of survivors at age x,

l_{x+n} = number of survivors at age x + n,

$= l_x - {}_nd_x$

${}_nd_x$ = number of deaths between age x and x + n,

${}_nL_x$ = the stationary population during the age interval x to x + n

T_x = the stationary population during a certain age interval and all subsequent age intervals was obtained by the formula :

$= T_{x+n} + {}_nL_x$

and e_x = the average remaining life time or expectation of life, was calculated as follows :

$$e_x = \frac{T_x}{l_x}$$