The Construction of the Indonesian Life Table Based on the 1996, 1998, and 1999 National Socioeconomic Survey

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Abstract. *Reports on mortality levels in Indonesia, in particular the life expectancy at birth, are usually given based on the conventional Coale-Demeny Life Table. It has been realized that it might not depict mortality patterns in Indonesia accurately. Some researchers are aware of the need to have Indonesian own life table. Therefore the effort was done through this review. The data used are the results of the 1996, 1998, and 1999 National Socioeconomic Survey. The Reed-Merrell method was used to construct the Indonesian life table based on these three surveys. The evaluation of death reporting was done using the Brass growth balance method. The results of the construction of the Indonesian Life Table based on the 1996, 1998, and 1999 SUSENAS show that in 1996 428 out of 10,000 newborn babies in Indonesia would die before they reached age one year. The figure declined to 322 in 1999. The life expectancy at birth was 63.31 for males and 65.88 for females in 1996. This means on average the Indonesian males would be expected to live until aged 63.31 years and the Indonesian females would be expected to live until aged 65.88 years. In 1999 this average age increased to 65.23 for males and to 68.91 for females. Comparison with the Coale-Demeny life table shows that none of the models of the Coale-Demeny life table can exactly depict the Indonesian mortality patterns. Meanwhile, the correction of the quality of death reporting using the Brass method that the completeness of death reporting in the 1996, 1998, and 1999 SUSENAS is between 20 to 43 percent. If it is true this means that the Indonesian life expectancy is far below than it is expected. The figure is about 54 to 58 years. It is around 10 years lower than if the adjustment factor K is not applied. Based on these results it is suggested not to use the adjustment factor K. It is believed that death reporting based on the 1996, 1998, and 1999 is of good quality. The next effort that should be conducted is to have Indonesian mortality model in depicting Indonesian mortality patterns, that is based on the observed age-pattern of mortality. It means it will still depend on the results of the population censuses or surveys.*

Keywords: Life table; model life tables; reed-merrel method; life expectancy; mortality; Indonesia.

1. Introduction

In the past, demographic study in Indonesia was dominated by the studies of the patterns and differentials of and the factors influencing fertility. It was prompted by the fact that fertility level in Indonesia was high and by the need to control it. Later, the study on mortality and migration was increasing. The studies also emphasized the patterns and differentials of these two demographic components as well as the factors affecting them. Indeed, until the 1990s Indonesia experienced a rapid demographic changes where fertility and mortality declined and new migration patterns took place as the results of modernization.

As demographic studies are advancing, it has been realized the need to construct the Indonesian Life Table. In fact, Djodi (1996) already initiated the work. He used the 1980 and 1990 Population Census data to construct the Indonesian life table. There have been many other researchers done this effort. However, their Indonesian Life Tables have not been used widely probably because they are not well known or suffer from drawbacks. As the result, the Coale-Demeny Life Table (1983) is still used to describe the Indonesian mortality condition although it might not be precisely suitable for Indonesia.

In 1997, the Demographic Institute Faculty of Economics, University of Indonesia in collaboration with the Ministry of Health of the Republic of Indonesia constructed an Indonesian Life Table. The construction was based on the information of the number of reported deaths and population from the 1996 National Socioeconomic Survey (*Survei Sosial Ekonomi Nasional* or SUSENAS). The work was welcomed enthusiastically by those who need the "truly" Indonesian Life Table.

However, it is realized there is a need to continue the work above. In particular, since the population is dynamic, the life table is so. In addition, there is also a need to improve the method in constructing the Indonesian Life Table. The Demographic Institute Faculty of Economics, University of Indonesia, therefore, initiated the effort to continue the work by constructing Indonesian Life Table based on the recent data. Data used in this review are the results of the 1998 and 1999 SUSENAS. In addition, the Indonesian Life Table based on the 1996 SUSENAS is also presented.

Therefore this review of the calculation of the Indonesian Life Table based on the 1996, 1998, and 1999 SUSENAS aims to:

a. Construct the 1996, 1998, and 1999 Indonesian Life Table
b. Evaluate the quality of mortality data based on the 1996, 1998, and 1999 National Socioeconomic Survey
c. Compare the Indonesian Life Tables constructed with the Coale-Demeny Life Table
d. Suggest a new method for constructing the Indonesian Life Table in Indonesian settings.

It is hoped that through this continuous effort, the "truly" Indonesian Life Table, that is suited to Indonesia condition, can be accomplished.

This article contains five sections. In Section 1 the background and objectives of the study are presented. Section 2 discusses the methodology to evaluate mortality data and to construct life table. Section 3 describes the results of the evaluation of mortality data quality. The calculation of the Indonesian Life Table is given in Section 4. Section 5 presents the conclusions.

2. Methodology

2.1 Data Sources

Data used in this review come from the results of the 1996, 1998, and 1999 SUSENAS. The key information used is the reported number of deaths of population by age and sex. These surveys were conducted in February. Meanwhile, the period considered for occurrence collected information on the number of deaths from February 1995 to January 1996. Therefore the number of exposed to risk population used to calculate the Age-Specific Death Rate (ASDR) was projected to the middle of reference period (August). To calculate the ASDR using the 1998 SUSENAS, for example, the number of population used was the number of population in August 1997.

To obtain the number of population by age and sex in mid-period, the number of population by age and sex from two successive surveys are needed. For the ASDR based on the 1996 SUSENAS the number of population by age and sex in August 1995 was obtained from the results of the 1995 Intercensal Population Survey (*Survei Penduduk Antar Sensus*/SUPAS) and the results of the 1996 SUSENAS. To obtain the number of population by age and sex in August 1997, the results of the 1997 and 1998 SUSENAS were used. For the August 1998 the information was obtained from the results of the 1998 and 1999 SUSENAS.

The number of population by age and sex in August for each SUSENAS was obtained by first calculating the percentage of population by age and sex in each survey. Then the monthly growth rate in two successive surveys for each percentage was computed. Using this rate, the percentage of population by age and sex was projected to August. Prorating was done to make the total percentage 100. At the same time the monthly growth rate of total number of population was also computed. Using this growth rate the number of total population in August was calculated. Lastly, multiplying the projected percentage of population by age and sex with the projected total population produced the number of population by age and sex in August 1995, 1997, and 1999.

2.2 A Brief Description of the Brass Growth Balance Method

It was debated that not all deaths were reported in the three SUSENAS. This might be true knowing that the surveys based on samples. If deaths were underreported then the death rate can be underestimate. Consequently, if a life table is to be calculated then the survival function, $l(x)$, will fall too slowly as age increases and estimates of life expectancy will be biased upward (United Nations, 1983).

Therefore before the Indonesian life table is calculated, the quality of mortality data in the three surveys was evaluated. This was done using a method proposed by Brass, the Brass growth balance method. A brief description of this method that is based on the description in Manual X (United Nations, 1983) is given here.

The Brass growth balance method is based on two assumptions. The first is the population being studied is stable, that is fertility and mortality is constant for a long period. The second is the completeness of reported deaths is the same at all ages. Although these two assumptions might not be held for Indonesian case recently but an attempt to evaluate the mortality data from the 1996, 1998, and 1999 SUSENAS was done using this method.

The basic data required is the number of reported deaths and population. The method is based on the equation:

$$N(x)/N(x+) = r + D^*(x+)/N(x+) \qquad (1)$$

where $N(x)$ is the number of persons of exact age x; $N(x+)$ is the total number of persons aged x and over; $D^*(x+)$ is the total number of deaths occurring to persons aged x and over; and r is the growth rate. N(x) is estimated as

$$N(x) = ({}_5N_{x-5} + {}_5N_x)/10.0 \qquad (2)$$

Brass proved that the above equation is exact for stable, closed population. Since $N(x+)$ may be thought of as being the number of persons in a year entering the group of those aged x and over, the ratio $N(x)/N(x+)$ can be interpreted as a 'birth rate' for the population aged x and over and $D^*(x+)/N(x+)$ is the death rate corresponding to the same population.

If only a proportion of deaths was recorded, say $D(x+)$, where $D(x+) = C(x)D^*(x+)$, and $C(x)$ is a factor representing the completeness of report of deaths at age x and over then

$$N(x)/N(x+) = r + K(D(x+)/N(x+)) \qquad (3)$$

where $K=1/C$.

Equation (3) suggests that the relationship between $D(x+)/N(x+)$ and $N(x)/N(x+)$ is linear and the slope of the line defined by the points $[D(x+)/N(x+), N(x)/N(x+)]$ is the value of the adjustment factor K. In practice, the points $[D(x+)/N(x+), N(x)/N(x+)]$ seldom fall exactly on a straight line, and K is obtained by selecting the line that best fits the observed points. Given the inaccuracy typically present in the data sets considered the used of other methods of fitting appears to be preferable that is the "mean" line and the "robust line".

The "mean" line is defined by the means of the abscissas (horizontal axis values) and ordinates (vertical axis values) of derived points when those points are divided, according to age, into two age groups of approximately equal size. For example, if 15 age groups are used, the values of $D(x+)/N(x+)$ for the first eight values of x are averaged, as are the values for the last eight x values. The middle point is included in both averages. Similarly, mean values are obtained for the first and last eight values of $N(x)/N(x+)$. The desired line is that which passes through the two points defined by the two pairs of mean-coordinates. This fitting procedure gives equal weight to all the derived points.

If distortions are present at the extremes, it is recommended to use trimmed means. The line fitted by using trimmed means is called a "robust" line because trimming makes the fit less sensitive to large deviations from linearity at the extremes of the age range. Trimmed means are a generalization of the usual mean or average. When trimming is performed, the weights applied to different observations are not constant for all observations; dividing it by the sum of the weights used standardizes the sum of weights times observations.

2.3 The Life Table

In this section, the description of the life table is given, based on the reference from the Methods and Materials of Demography (Shryock and Siegel, 1976). The life table is commonly viewed as depicting the lifetime mortality experience of a single cohort of newborn babies, who are subject to the age-specific mortality rates on which the table is based. The cohort of newborn babies, called the radix of the table, is usually assumed to be100,000.

The life table has basic functions that are ${}_nq_x$, l_x, ${}_nd_x$, ${}_nL_x$, T_x, and e_x^o. These six functions are generally calculated and published for every life table. In general, the mortality rate (${}_nq_x$) is the basic function in the table, that is, the initial function from which all other life table functions are derived.

To construct the Indonesian Life Table, the Reed-Merrell method is used. This method is one of the most frequently used short-cut procedures for calculating an abridged life table. In this method the mortality rates are read off from a set of standard conversion tables showing the mortality rates associated with various observed central death rates. The standard tables for ${}_3m_2$, ${}_5m_x$, *and* ${}_{10}m_x$ have been prepared on the assumption that the following exponential equation holds:

$$ {}_nq_x = 1 - exp(-n.{}_nm_x - an^3.{}_nm_x^2) \qquad (4) $$

where n is size of the age interval, ${}_nm_x$ is the central death rate, a is a constant, and e is the base of the system of natural logarithms. Reed and Merrell found that a value of a = 0.008 would produce acceptable results. This value is used in the construction of the Indonesian Life Table.

For x = 0 then

$$ q_o = 1 - exp(-m_o(0.9539 - 0.5509m_o^2)) \qquad (5) $$

For $x = 1$ then

$$ {}_4q_1 = 1 - exp(-4\,{}_4m_1(0.9806 - 2.079\,{}_4m_1)) \qquad (6) $$

Once the mortality rates have been calculated, the construction of the abridged life table continues with the computation of each entry in the survivor column, l_x, and the death column, ${}_nd_x$, along standard lines, using the formulas

$$ l_{x+n} = (1 - {}_nq_x)l_x \qquad (7) $$

$$ {}_nd_x = l_x - l_{x+n} \qquad (8) $$

In the Reed-Merrell method, T_x values are directly determined from the l_x's for ages 10 and over, or 5 and over, by use of the following equations:

$$ T_x = -0.20833\, l_{x-5} + 2.5\, l_x + 0.20833\, l_{x+5} + 5 \sum_{a=1}^{\infty} l_{x+5a} \qquad (9) $$

if the age intervals in the table are 5-year intervals, and

$$ T_x = 4.16667\, l_x + 0.83333\, l_{x+10} + 10 \sum_{a=1}^{\infty} l_{x+10a} \qquad (10) $$

if the age intervals in the table are 10-year intervals.

These equations are based on the assumption that the area under the l_x curve between any two ordinates is approximated by the area under a parabola through these two ordinates and the preceding and following ordinates (equation (9)) or the following ordinate only (equation (10)).

For the ages under 10, Reed and Merrell note that L_x may be determined directly from the following linear equations:

$$ L_0 = 0.276\, l_0 + 0.724\, l_1 \qquad (11) $$
$$ {}_4L_1 = 0.034\, l_0 + 1.184\, l_1 + 2.782\, l_5 \qquad (12) $$
$$ {}_5L_5 = -0.003\, l_0 + 2.242\, l_5 + 2.761\, l_{10} \qquad (13) $$

However, for Indonesia the formula to compute L_0 is:

$$L_0 = 0.460\ l_0 + 0.540\ l_1 \quad \text{; for males} \qquad (14)$$
$$L_0 = 0.506\ l_0 + 0.494\ l_1 \quad \text{; for females} \qquad (15)$$
$$L_0 = 0.479\ l_0 + 0.521\ l_1 \quad \text{; for males and females} \qquad (16)$$

This formula is used based on the contribution of the Neo-natal Death Rate (NNDR) and Post-Neonatal Death Rate (PNNDR) to the Infant Mortality Rate (IMR). The results of the 1997 Indonesia Demographic and Health Survey show that the NNDR for the ten years before the survey was 27.2 for male, 22.7 for female, and 25.0 for male and female. The PNNDR for the same period was 31.8 for male, 22.2 for female, and 27.2 for male and female. The IMR for the same period was 59.1 for male, 44.9 for female, and 52.2 for male and female.

L_0 should be determined from l_0 and l_1 by use of separation factors appropriate for each situation. ${}_nL_x$ for ages 10 and over may be derived by differing the T_x's, and e^o_x is computed as the ratio of T_x to l_x.

3. Evaluation of Mortality Data Based on the 1996, 1998, and 1999 SUSENAS

The results of the 1995 SUPAS show that the number of Indonesian was 194,754,808 as in October 1995. The number increased to 195,524,884 in February 1996 (the results of the 1996 SUSENAS), to 198,675,836 in February 1997 (the results of the 1997 SUSENAS), to 202,605,066 in February 1998 (the results of the 1998 SUSENAS), and to 205,687,055 in February 1999 (the results of the 1999 SUSENAS). Using these figures, the number of population by age and sex in August 1995, 1997, and 1999 for five year interval was obtained.

Using information on the number of reported deaths and projected population from the 1996, 1998, and 1999 SUSENAS the Age-Specific Death Rate (ASDR) can be computed. As can be seen from Figure 1.a – Figure 1.c, the ASDR follows a U-shaped pattern both for males and females. It was high for infants, low for population aged 5 to 54, and high for population aged 55 or above.

Table I.a
NUMBER OF REPORTED DEATHS, PROJECTED POPULATION, AND THE AGE-SPECIFIC DEATH RATE BY AGE GROUP (FIVE-YEAR INTERVAL) AND SEX: INDONESIA, 1996

Age	Number of Deaths			Number of Population			Age-Specific Death Rate		
	Sex			Sex			Sex		
	Male	Female	M+F	Male	Female	M+F	Male	Female	M+F
0-1	95,751	80,491	176,235	1,923,279	1,815,298	3,738,577	50	44	47
1-4	61,649	62,656	124,286	8,560,848	8,169,654	16,730,502	7	8	7
5-9	23,796	21,132	44,924	11,155,316	10,679,369	21,834,685	2	2	2
10-14	15,051	14,127	29,175	12,003,610	11,627,220	23,630,830	1	1	1
15-19	18,744	13,164	31,910	10,246,903	9,985,887	20,232,790	2	1	2
20-24	14,548	13,300	27,846	8,021,715	9,093,969	17,115,685	2	1	2
25-29	13,927	14,663	28,585	7,786,107	8,498,798	16,284,905	2	2	2
30-34	14,349	17,253	31,595	7,238,810	7,681,317	14,920,127	2	2	2
35-39	15,253	14,676	29,926	7,005,907	7,003,500	14,009,407	2	2	2
40-44	24,484	14,891	39,380	5,746,799	5,238,282	10,985,081	4	3	4
45-49	26,264	15,293	41,564	4,157,605	4,069,452	8,227,057	6	4	5
50-54	34,279	18,745	53,034	3,761,726	3,343,114	7,104,840	9	6	7
55-59	32,379	21,427	53,811	2,911,030	3,232,733	6,143,762	11	7	9
60-64	47,407	28,643	76,060	2,298,600	2,859,876	5,158,477	21	10	15
65-69	41,169	22,188	63,370	1,684,109	1,841,133	3,525,242	24	12	18
70-74	38,544	27,559	66,307	1,182,043	1,251,106	2,433,149	33	22	27
75+	60,721	54,601	115,313	965,945	1,141,192	2,107,137	63	48	55
Total/CDR	578,314	454,807	1,033,121	96,650,352	97,531,902	194,182,254	6	5	5

Figure I.a
THE AGE-SPECIFIC DEATH RATE (ASDR): INDONESIA, 1996

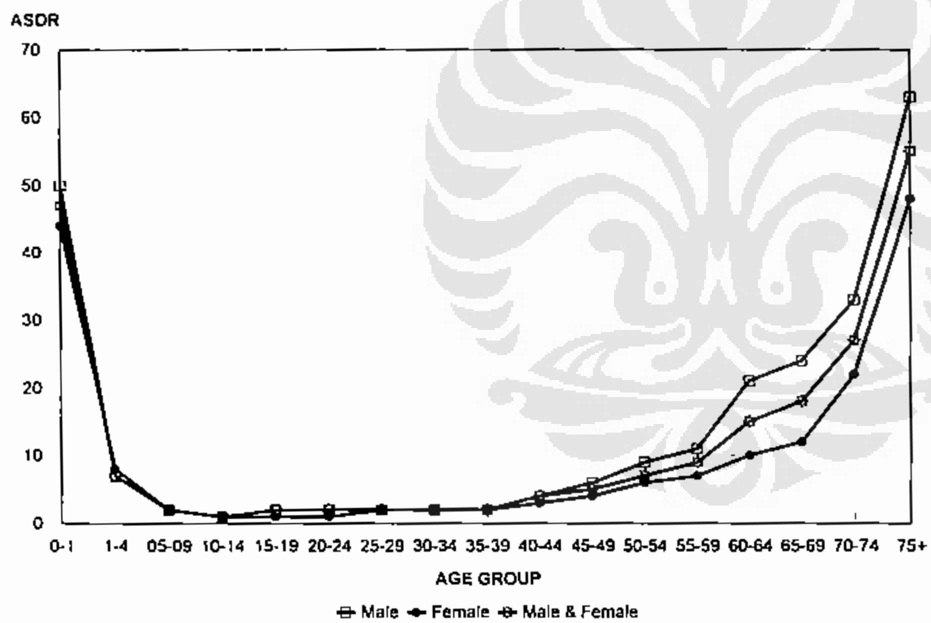


Table 1.b
NUMBER OF REPORTED DEATHS, PROJECTED POPULATION, AND THE AGE-SPECIFIC DEATH RATE BY AGE GROUP (FIVE-YEAR INTERVAL) AND SEX: INDONESIA, 1998

Age	Number of Deaths			Number of Population			Age-Specific Death Rate		
	Sex			Sex			Sex		
	Male	Female	M+F	Male	Female	M+F	Male	Female	M+F
0-1	80,229	59,953	140,182	1,672,395	1,612,469	3,284,864	48	37	43
1-4	42,171	36,757	78,928	7,882,915	7,586,896	15,469,811	5	5	5
5-9	21,791	20,233	42,024	11,311,050	10,543,930	21,854,981	2	2	2
10-14	15,046	11,148	26,194	12,212,124	11,486,824	23,698,948	1	1	1
15-19	14,697	8,672	23,369	10,756,783	10,509,071	21,265,854	1	1	1
20-24	14,244	11,923	26,167	7,972,310	9,141,104	17,113,413	2	1	2
25-29	11,231	11,096	22,327	7,987,267	9,011,863	16,999,130	1	1	1
30-34	11,281	11,949	23,230	7,336,491	7,958,921	15,295,411	2	2	2
35-39	17,461	15,143	32,604	7,433,669	7,755,449	15,189,118	2	2	2
40-44	22,850	14,760	37,610	6,385,238	5,931,187	12,316,425	4	2	3
45-49	23,650	11,836	35,486	4,895,239	4,652,897	9,548,136	5	3	4
50-54	33,771	20,221	53,992	4,016,564	4,048,855	8,065,418	8	5	7
55-59	35,422	14,247	49,669	3,159,929	3,177,509	6,337,438	11	4	8
60-64	45,054	27,027	72,081	2,607,689	2,893,978	5,501,667	17	9	13
65-69	37,364	21,561	58,925	1,782,688	1,930,724	3,713,412	21	11	16
70-74	44,592	21,862	66,454	1,354,328	1,365,185	2,719,513	33	16	24
75+	58,788	47,935	106,723	1,044,110	1,213,182	2,257,292	56	40	47
Total/CDR	529,642	366,323	895,965	99,810,789	100,820,043	200,630,832	5	4	4

Figure 1.b
THE AGE-SPECIFIC DEATH RATE (ASDR): INDONESIA, 1998

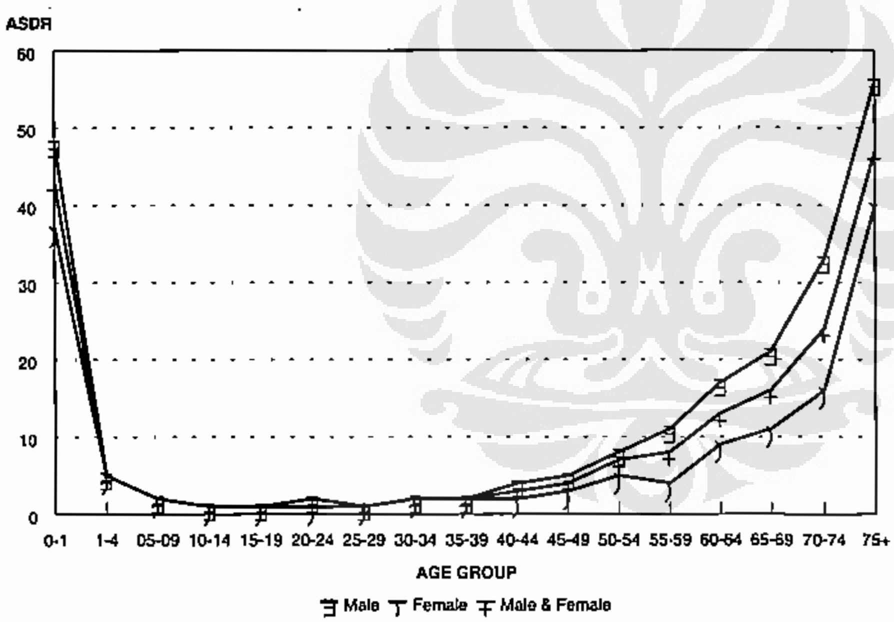


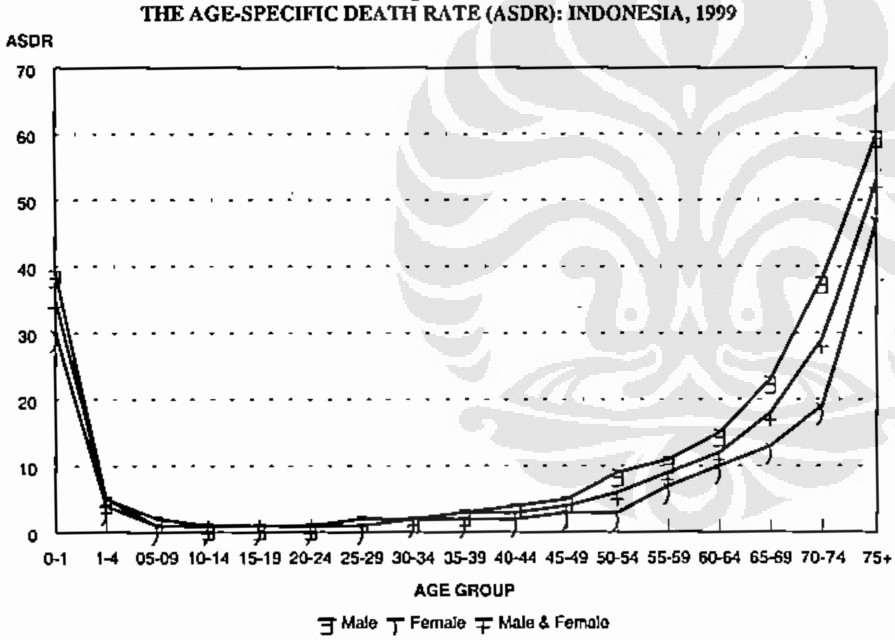
Table 1.c

NUMBER OF REPORTED DEATHS, PROJECTED POPULATION, AND THE AGE-SPECIFIC DEATH RATE BY AGE GROUP (FIVE-YEAR INTERVAL) AND SEX: INDONESIA, 1999

Age	Number of Deaths			Number of Population			Age-Specific Death Rate		
	Sex			Sex			Sex		
	Male	Female	M+F	Male	Female	M+F	Male	Female	M+F
0-1	65,721	47,148	112,869	1,666,652	1,557,757	3,224,409	39	30	35
1-4	38,671	32,012	70,683	7,999,848	7,660,427	15,660,275	5	4	5
5-9	16,917	14,225	31,142	11,258,921	10,454,786	21,713,707	2	1	1
10-14	12,104	9,961	22,065	11,990,164	11,329,797	23,319,961	1	1	1
15-19	16,171	12,028	28,199	11,075,795	10,686,380	21,762,175	1	1	1
20-24	12,015	7,488	19,503	8,221.854	9.168,932	17,390,786	1	1	1
25-29	13,705	10,375	24,080	8.179,218	9,143,132	17,322,349	2	1	1
30-34	14,404	12,389	26,793	7,486,379	8,100,392	15,586,772	2	2	2
35-39	23,656	15,000	38,656	7,530,286	7,922,052	15,452,338	3	2	3
40-44	24,003	11,974	35,977	6,499,287	6,130,773	12,630,060	4	2	3
45-49	26,191	13,652	39,843	5,253,018	4,725,782	9,978,800	5	3	4
50-54	36,887	13,721	50,608	4,105,281	4,382,778	8,488,059	9	3	6
55-59	35,651	21,738	57,389	3,342,646	3,314,097	6,656,743	11	7	9
60-64	41,267	28,882	70,149	2,710,382	3,032,018	5,742,400	15	10	12
65-69	43,101	26,486	69,587	1,861,826	2,055,507	3,917,333	23	13	18
70-74	54,333	27,524	81,857	1,411,677	1,451,295	2,862,972	38	19	29
75+	67,777	61,885	129,662	1,123,733	1,307,373	2,431,106	60	47	53
Total/CDR	542,574	366,488	909,062	101.716,966	102,423,278	204,140,244	5	4	4

Figure 1.c

THE AGE-SPECIFIC DEATH RATE (ASDR): INDONESIA, 1999



The results of the 1996 SUSENAS show that the ASDR ranged from one for population aged 10-14, to 47 for infants, and to 55 for population aged 75 or over. For males the figures were higher. The Infant Mortality Rate (IMR), the number of infant deaths per 1000 live births, was 50 for baby boys while it was 44 for baby girls. For population aged 75 and over the ASDR were 63 for males and 48 for females. Based on the 1998 SUSENAS the ASDR declined for almost all age groups. The IMR declined to 43. For males it declined to 48 and for females it declined to 37. For population aged 75 or over the ASDR declined to 47. For males it declined to 56 and for females it declined to 40. The results of the 1999 SUSENAS show that the ASDR continue to decline for some age groups. For some age groups it increased. For babies it declined to 35 where it declined to 39 for baby boys and to 30 for baby girls. However, for population aged 75 or over it increased to 53 where it increased to 60 for males and to 47 for females. The three SUSENAS gave the Crude Death Rate of Indonesia as much as five in 1996 and four in 1998 and 1999.

The results of the evaluation of mortality data based on the 1999 SUSENAS are summarized in Table 2.a – Table 2.c (see Appendices[•]). Table 2.a presents the number of reported deaths and projected population by age group and sex in 1999. In this table the number of reported deaths from age x *to* $x+5$, ${}_5D_x$, the projected number of population aged x *to* $x+5$, ${}_5N_x$, and the projected number of population aged from x and over, $N(x+)$, are given. Table 2.b displays elements needed to estimate completeness of reported death in 1999. These elements include the number of population at exact age x, $N(x)$, the number of population aged x and over, $N(x+)$, and the number of reported deaths over age x, $D(x+)$. Column 2 of Table 2.b shows the values obtained for all values of x up to 70: no value can be computed for 75 because the open interval begins at that age. $N(x)$ is obtained using formula (2) in Section 2. For example, the number of male aged 10 in 1999 (as in Table 2.b) is obtained as follows:

$$N(10) = ({}_5N_5 + {}_5N_{10})/10.0$$
$$= (11{,}258{,}921 + 11{,}990{,}164)/10$$
$$= 2{,}324{,}908.5$$

The number of female aged 50 and over in 1999 (as in Table 2.b) is:

$$N(50+) = ({}_5N_{50} + {}_5N_{55} + {}_5N_{60} + \ldots + N_{75})$$
$$= 4{,}382{,}778 + 3{,}314{,}097 + 3{,}032{,}018 + \ldots + 1{,}307{,}373$$
$$= 15{,}543{,}069$$

• Tables displayed are the results of 1999. Results of 1996 and 1998 are not enclosed.

The calculation of the number of deaths after an exact age is exactly analogous to that of *N(x+)*. Thus, for example, *D(50+)* for male and female in 1999 (as in Table 2.b) is:

D(50+) = 50,608 + 57,389 + 70,149 + ... + 129,662 = 459,252

Table 2.c gives the partial death and birth rates in 1999. The partial death rates, *D(x+)/N(x+)*, are obtained by simply dividing the entries listed in column (4), (7), and (10) of Table 2.c by the corresponding entries in column (3), (6), and (9) of the same tables. For example, the partial death rate for male aged 15 in 1999 (as in Table 2.c) is:

D(15)/N(15+) = 409,161/68,801,381 = 0.0059

Similarly, the partial birth rates, *N(x)/N(x+)*, are obtained by dividing the entries listed in column (2), (5), and (8) of Table 2.c by the corresponding entries in column (3), (6), and (9) of the same table. Thus, for example, the partial birth rate for female aged 20 in 1999 (as in Table 2.c) is:

N(20)/N(20+) = 1,985,531.2/60,734,132 = 0.0327

Besides observed partial birth and death rates, Table 2.c also present the estimated partial birth and death rates based on the least square method. Regression output for male, female, and for male and female is given below in Table 2.c. The constant (intercept) and *X* coefficient of these output give the estimated value of *N(x)/N(x+)*.

Figure 2 (see Appendices) shows plot of the points of *D(x+)/N(x+)* and observed and estimated *N(x)/N(x+)* for males and females in 1999 (see Appendices). The values of *D(x+)/N(x+)* are plotted on the x-axis (abscissa), while those of *N(x)/N(x+)* appear on the y-axis (ordinate). The same scale has been used to plot both values. The use of equal scales for both axes aids in the assessment of linearity of the plotted points.

Ideally, the points should lie approximately on a straight line. Deviations from linearity, however, inevitably present in empirical data. The possible causes of such deviations are varied. Aside from the possible lack of stability of the population being analyzed, errors in age reporting are undoubtedly present. Yet, the relatively linearity of the central segment of the plotted points for Indonesia in 1999 still warrants an attempt to obtain a rough estimate of the completeness of death reporting.

Table 2.d presents the calculation of the adjustment factor K using the "mean" line in 1999. For this purpose, the points are divided into two equally sized groups, one comprising points for ages ranging from 5 to 35, the other from 40 to 70. The mean abscissa and ordinate values for each group are calculated by summing the observations for each group and dividing the sum by the number of observations in each group. Thus, the mean of the first group of partial death rates $D(x+)/N(x+)$ for male in 1999 (as in Table 2.d), denoted by X_1, is:

$$X_1 = (0.0048 + 0.0052 + \ldots + 0.0104)/7 = 0.0071$$

Once the means of each group have been computed, the slope of the fitted line is calculated according to the equation:

$$K = (Y_2 - Y_1)/(X_2 - X_1) = (0.0809 - 0.0334)/(0.0264 - 0.0071) = 2.458$$

for males in 1999 (as in Table 2.d). The figure is 3.573 for females and 2.923 for males and females. These value of K implies that in 1999 the completeness of death reporting is C = 1.0/K = 0.407 or 40.7 percent for males, 28.0 percent for females, and 34.2 percent for males and females. In 1998 the completeness of death reporting based on the Brass method declined to 37.4 percent for males and 23.3 percent for females. The figure in 1996 is 42.4 percent for males and to 29.9 percent for females.

From the estimate of K, the corresponding value of the growth rate r can be denoted as follows:

$$r = Y_1 - KX_1 = 0.0334 - 2.458(0.0072) = 0.0169$$

for males in Indonesia in 1999 (as below Table 2.d). The figure is 0.0189 for females and 0.0187 for males and females in 1996. This rate of growth is not far from that of 0.0162 for males, 0.0169 for females, and 0.0166 for males and females obtained from the 1990 Population Census and the 1995 Intercensal Population Survey data.

Table 2.e gives the calculation of the adjustment factor K using the "robust" line in 1999. The weights associated with each observation are listed in column (2). The data set has been divided into groups of equal size and those weights are symmetrical with respect to the center. Thus, for females in 1999,

$$X_1^* = ((0.25)(0.048) + (0.50)(0.0052) + \ldots + 0.0104)/5.5 = 0.0058$$

The X^* and Y^* values are the trimmed means of the grouped observations. From them, the calculation of estimates of K, C and r is:

$$K^* = (Y_2^* - Y_1^*)/(X_2^* - X_1^*) = (0.0721 - 0.0272)/(0.0223 - 0.0058) = 2.704$$

for males in 1999. The figure is 3.931 for females and 3.206 for males and females These value of K^* implies that in 1999 the completeness of death reporting is C = 1.0/K = 0.370 or 37.0 percent for males, 25.4 percent for females, and 31.2 percent for males and females. In 1998 the completeness of death reporting based on the Brass method declined to 34.6 percent for males and 21.5 percent for females. The figure in 1996 is 39.5 percent for males and to 27.8 percent for females.

The results of the evaluation of mortality data based on the 1996, 1998, and 1999 SUSENAS show that in 1996 the completeness of death reporting is C = 1.0/K = 0.395 or 39.5 percent for males, 27.8 percent for females, and 33.6 percent for males and females. In 1998 the completeness of death reporting based on the Brass method declined to 34.6 percent for males and 21.5 percent for females. The figures increased in 1999 to 37.0 percent for males and to 25.4 percent for females.

4. The 1996, 1998, and 1999 Indonesian Life Table

In this section the results of the calculation of the Indonesian Life Table based on the 1996, 1998, and 1999 SUSENAS are presented. In addition, the comparison between these life tables with the Coale-Demeny Life Table (1983) is also discussed. This section is closed with the discussion of the corrected life tables, that is the tables that take the adjustment factor K into account.

The results of the construction of the Indonesian Life Table based on the 1996, 1998, and 1999 National Socioeconomic Survey (SUSENAS) are presented in Table 3.a - Table 5.c.

Table 3.a shows that in 1996 450 out of 10,000 newborn baby boys in Indonesia would die before they reached age one year. The figure declined to 435 in 1998 (Table 4.a) and to 361 in 1999 (Table 5.a). The probability of dying before aged one, ${}_1q_0$, for baby girls was 0.0404 in 1996 (Table 3.b) and declined to 0.0341 in 1998 (Table 4.b) and to 0.0280 in 1999 (Table 5.b). For

boys and girls this figure declined from 0.0428 in1996 (Table 3.c) to 0.0389 in 1998 (Table 4.c) and to 0.0322 in 1999 (Table 5.c).

The probability of dying was lowest for those who were in the age interval 10-14 in 1996. The figure was 0.0063, 0.0061, and 0.0062 for males, females, and males and females respectively. This means out of every 100,000 Indonesians alive and that are exactly 10 years old, about 60 would die before reaching their 15th birthday.

In 1998 the probability of dying was lowest for those who were in the age interval 10-14 for males, in the age interval 15-19 for females, and in the age interval 10-19 for males and females. This figure was 0.0061 for males aged 15-19, 0.0041 for females aged 15-19, and 0.0055 for males and females aged 10-19. As in 1996, the probability of dying in 1999 was lowest for those who were in the age interval 10-14; it was 0.0050 for males, 0.0044 for females, and 0.0047 for males and females.

The proportion of dying in the age interval 25-29 was 0.0089 in 1996. This means out every 100,000 males alive and that are exactly 25 years old, 89 would die before reaching their 30th birthday. The figure was lower for female (86). Looking at the l_x, l_{25} equals 89,664 for males in 1996. It means that out of 100,000 newborn baby boys, 89,664 men would survive to exact age 25. Since the probability of dying in this age group was lower for female then the l_{25} for female was higher (90,422). Meanwhile, there would be 799 male deaths between exact ages 25 and 30 (d_{25}=799) to the initial cohort of 100,000 newborn baby boys. The figure was 777 for female. In 1999 the probability of dying in the age interval 25-29 declined to 0.0083 for male and to 0.0057 for female. The number of survivors to exact age 25 increased to 92,063 for male and to 93,657 for female.

The L_{35} equals 439,345 for male and female in 1996 means the 100,000 newborn Indonesian baby would live 439,345 person years between exact ages 35 and 40. The T_{35} equals 3,264,688 means that the 100,000 newborn baby boys would live 3,264,688 person years after their 35th birthday. The L_{35} increased to 449,263 in 1998 and to 454,319 in 1999. Meanwhile T_{35} increased to 3,393,397 in 1998 and to 3,421,898 in 1999.

The life expectancy, the average remaining lifetime (in years) for a person who survives to the beginning of the indicated age interval, varies from 2.25 years for males aged 75 or above to 65.28 years for males aged 1 to 5 years in 1996. For females the figure varies from 2.27 for aged 75 or above to

67.63 for aged 1 to 5. The life expectancy was still highest for aged 1 to 5 in 1999. It was 66.66 for males and 69.87 for females.

The life expectancy at birth was 65.28 for male and 65.88 for female in 1996. It means on average the Indonesian male would live until aged 65.31 years and the Indonesian female would be expected to live until aged 65.88 years. This average age increased to 64.71 in 1998 and 65.23 in 1999 for male and to 68.11 in 1998 and 68.91 in 1999 for female.

The comparison the mortality patterns between the Indonesian life table based on the 1996, 1998, and 1999 SUSENAS with the Coale-Demeny life table shows that at ages 0 and 1, the mortality patterns of Indonesia in 1999 is similar to the West model. At ages 5 to 45 the mortality patterns is similar to all four models of the Coale-Demeny life table. At ages above 45 the Indonesian mortality patterns is similar to the North model. The results suggest that none of the models of the Coale-Demeny life table can exactly depict the Indonesian mortality patterns.

Multiplying the adjustment factor, K, to the number of reported deaths implies that if it is true that the completeness of death reporting in the 1996, 1998, and 1999 SUSENAS is between 20 to 43 percent then the Indonesian life expectancy is far below than it is expected. The figure is about 54 to 58 years. It means it is around 10 years lower than if the adjustment factor is not applied.

Table 3.a

CALCULATION OF THE ABRIDGED LIFE TABLE FOR MALES BY THE REED-MERRELL METHOD: INDONESIA, 1996

Age	m_x	$_nq_x$	l_x	d_x	T_x	L_x	e_x^o
0-1	0.0498	0.0451	100000	4508	6331093	97566	6331
1-4	0.0072	0.0274	95492	2620	6233527	374835	6528
5-9	0.0021	0.0106	92873	986	5858693	460534	6308
10-14	0.0013	0.0063	91887	574	5398158	457967	5875
15-19	0.0018	0.0091	91313	832	4940191	454535	5410
20-24	0.0018	0.0090	90481	817	4485656	450355	4958
25-29	0.0018	0.0089	89664	799	4035301	446335	4500
30-34	0.0020	0.0099	88865	877	3588965	442167	4039
35-39	0.0022	0.0108	87989	953	3146799	437760	3576
40-44	0.0043	0.0211	87035	1836	2709039	430942	3113
45-49	0.0063	0.0311	85200	2652	2278097	419752	2674
50-54	0.0091	0.0446	82547	3683	1858346	403866	2251
55-59	0.0111	0.0542	78864	4275	1454479	384393	1844
60-64	0.0206	0.0984	74589	7337	1070087	355329	1435
65-69	0.0244	0.1156	67252	7773	714758	317172	1063
70-74	0.0326	0.1513	59479	9002	397585	283785	668
75+	0.0629	1.0000	50477	50477	113801	113801	225

Table 3.b

CALCULATION OF THE ABRIDGED LIFE TABLE FOR FEMALES BY THE REED-MERRELL METHOD: INDONESIA, 1996

Age	m_x	$_nq_x$	l_x	d_x	T_x	L_x	e_x^o
0-1	0.0443	0.0404	100000	4038	6588102	98005	65.88
1-4	0.0077	0.0292	95962	2798	6490097	376203	67.63
5-9	0.0020	0.0098	93164	918	6113894	462220	65.62
10-14	0.0012	0.0061	92247	559	5651674	459771	61.27
15-19	0.0013	0.0066	91688	603	5191904	456955	56.63
20-24	0.0015	0.0073	91085	664	4734949	453804	51.98
25-29	0.0017	0.0086	90422	777	4281145	450236	47.35
30-34	0.0022	0.0112	89645	1002	3830909	445750	42.73
35-39	0.0021	0.0104	88643	924	3385160	440954	38.19
40-44	0.0028	0.0141	87719	1239	2944206	435640	33.56
45-49	0.0038	0.0186	86480	1611	2508566	428604	29.01
50-54	0.0056	0.0277	84869	2349	2079962	418699	24.51
55-59	0.0066	0.0326	82520	2693	1661263	406192	20.13
60-64	0.0100	0.0489	79827	3907	1255071	389733	15.72
65-69	0.0121	0.0586	75920	4450	865338	369221	11.40
70-74	0.0220	0.1047	71470	7485	496116	351042	6.94
75+	0.0478	1.0000	63985	63985	145074	145074	2.27

Table 3c
CALCULATION OF THE ABRIDGED LIFE TABLE FOR MALES AND FEMALES BY THE REED-MERRELL METHOD: INDONESIA, 1996

Age	m_x	$_nq_x$	l_x	d_x	T_x	L_x	e_x^0
0-1	0.0471	0.0428	100000	4280	6458137	97770	64.58
1-4	0.0074	0.0283	95720	2706	6360367	375497	66.45
5-9	0.0021	0.0102	93014	952	5984870	461351	64.34
10-14	0.0012	0.0062	92061	567	5523519	458842	60.00
15-19	0.0016	0.0079	91495	719	5064677	455712	55.35
20-24	0.0016	0.0081	90776	736	4608965	452055	50.77
25-29	0.0018	0.0087	90040	787	4156911	448276	46.17
30-34	0.0021	0.0105	89253	940	3708634	443946	41.55
35-39	0.0021	0.0106	88313	939	3264688	439345	36.97
40-44	0.0036	0.0178	87374	1553	2825343	433238	32.34
45-49	0.0051	0.0250	85821	2143	2392105	424063	27.87
50-54	0.0075	0.0367	83678	3070	1968041	410989	23.52
55-59	0.0088	0.0429	80608	3460	1557052	394897	19.32
60-64	0.0147	0.0713	77148	5499	1162155	372561	15.06
65-69	0.0180	0.0863	71650	6180	789594	343393	11.02
70-74	0.0272	0.1277	65469	8358	446201	317062	6.82
75+	0.0547	1.0000	57111	57111	129139	129139	2.26

Table 4.a
CALCULATION OF THE ABRIDGED LIFE TABLE FOR MALES BY THE REED-MERRELL METHOD: INDONESIA, 1998

Age	m_x	$_nq_x$	l_x	d_x	T_x	L_x	e_x^o
0-1	0.0480	0.0435	100000	4352	6470666	97650	64.71
1-4	0.0053	0.0205	95648	1964	6373016	377277	66.63
5-9	0.0019	0.0096	93684	898	5995738	464979	64.00
10-14	0.0012	0.0061	92786	570	5530760	462448	59.61
15-19	0.0014	0.0068	92216	628	5068311	459561	54.96
20-24	0.0018	0.0089	91588	815	4608750	455904	50.32
25-29	0.0014	0.0070	90773	636	4152846	452249	45.75
30-34	0.0015	0.0077	90137	691	3700596	449044	41.06
35-39	0.0023	0.0117	89446	1045	3251553	444803	36.35
40-44	0.0036	0.0177	88402	1569	2806749	438301	31.75
45-49	0.0048	0.0239	86833	2074	2368449	429379	27.28
50-54	0.0084	0.0412	84758	3495	1939070	415547	22.88
55-59	0.0112	0.0546	81263	4439	1523523	395820	18.75
60-64	0.0173	0.0830	76824	6379	1127703	368715	14.68
65-69	0.0210	0.0999	70445	7037	758988	335323	10.77
70-74	0.0329	0.1527	63409	9683	423665	302562	6.68
75+	0.0563	1.0000	53725	53725	121104	121104	2.25

Table 4.b
CALCULATION OF THE ABRIDGED LIFE TABLE FOR FEMALES BY THE REED-MERRELL METHOD: INDONESIA, 1998

Age	m_x	$_nq_x$	l_x	d_x	T_x	L_x	e^o_x
0-1	0.0372	0.0341	100000	3411	6810881	98315	68.11
1-4	0.0048	0.0186	96589	1800	6712566	381465	69.50
5-9	0.0019	0.0096	94789	905	6331100	470692	66.79
10-14	0.0010	0.0048	93884	455	5860408	468174	62.42
15-19	0.0008	0.0041	93429	385	5392234	466216	57.71
20-24	0.0013	0.0065	93045	605	4926018	463748	52.94
25-29	0.0012	0.0061	92440	567	4462269	460796	48.27
30-34	0.0015	0.0075	91872	687	4001473	457709	43.55
35-39	0.0020	0.0097	91185	886	3543764	453798	38.86
40-44	0.0025	0.0124	90299	1117	3089966	448750	34.22
45-49	0.0025	0.0126	89181	1128	2641216	443308	29.62
50-54	0.0050	0.0247	88054	2174	2197908	434996	24.96
55-59	0.0045	0.0222	85880	1906	1762911	424983	20.53
60-64	0.0093	0.0457	83974	3838	1337929	410789	15.93
65-69	0.0112	0.0544	80136	4361	927140	390197	11.57
70-74	0.0160	0.0772	75775	5849	536942	377913	7.09
75+	0.0395	1.0000	69926	69926	159030	159030	2.27

Table 4.c

CALCULATION OF THE ABRIDGED LIFE TABLE FOR MALES AND FEMALES BY THE REED-MERRELL METHOD: INDONESIA, 1998

Age	m_x	${}_nq_x$	l_x	d_x	T_x	L_x	e_x^o
0-1	0.0427	0.0389	100000	3893	6636062	97972	66.36
1-4	0.0051	0.0196	96107	1884	6538090	379321	68.03
5-9	0.0019	0.0096	94224	902	6158769	467767	65.36
10-14	0.0011	0.0055	93322	514	5691003	465240	60.98
15-19	0.0011	0.0055	92807	509	5225763	462804	56.31
20-24	0.0015	0.0076	92299	703	4762959	459754	51.60
25-29	0.0013	0.0065	91595	600	4303205	456475	46.98
30-34	0.0015	0.0076	90996	689	3846730	453333	42.27
35-39	0.0021	0.0107	90307	964	3393397	449263	37.58
40-44	0.0031	0.0152	89343	1355	2944134	443464	32.95
45-49	0.0037	0.0184	87988	1621	2500671	436198	28.42
50-54	0.0067	0.0330	86367	2847	2064473	425050	23.90
55-59	0.0078	0.0385	83520	3215	1639423	410035	19.63
60-64	0.0131	0.0636	80306	5105	1229388	389295	15.31
65-69	0.0159	0.0765	75201	5753	840093	362228	11.17
70-74	0.0244	0.1155	69447	8024	477865	338774	6.88
75+	0.0473	1.0000	61423	61423	139091	139091	2.26

Table 5.a

CALCULATION OF THE ABRIDGED LIFE TABLE FOR MALES BY THE REED-MERRELL METHOD: INDONESIA, 1999

Age	m_x	$_nq_x$	l_x	d_x	T_x	L_x	e_x^0
0-1	0.0394	0.0361	100000	3609	6523407	98051	65.23
1-4	0.0048	0.0186	96391	1792	6425356	380701	66.66
5-9	0.0015	0.0075	94599	708	6044656	470197	63.90
10-14	0.0010	0.0050	93891	473	5574459	468265	59.37
15-19	0.0015	0.0073	93418	680	5106194	465432	54.66
20-24	0.0015	0.0073	92738	675	4640762	462021	50.04
25-29	0.0017	0.0083	92063	768	4178741	458435	45.39
30-34	0.0019	0.0096	91294	874	3720306	454420	40.75
35-39	0.0031	0.0156	90420	1410	3265886	448733	36.12
40-44	0.0037	0.0183	89010	1630	2817154	441131	31.65
45-49	0.0050	0.0246	87380	2154	2376023	431959	27.19
50-54	0.0090	0.0440	85227	3751	1944064	417191	22.81
55-59	0.0107	0.0520	81476	4240	1526873	397182	18.74
60-64	0.0152	0.0735	77236	5678	1129691	372738	14.63
65-69	0.0231	0.1098	71558	7856	756953	339307	10.58
70-74	0.0385	0.1763	63702	11229	417645	299734	6.56
75+	0.0603	1.0000	52473	52473	117911	117911	2.25

Table 5.b

CALCULATION OF THE ABRIDGED LIFE TABLE FOR FEMALES BY THE REED-MERRELL METHOD: INDONESIA, 1999

Age	m_x	$_nq_x$	l_x	d_x	T_x	L_x	e_x^o
0-1	0.0303	0.0280	100000	2797	6890558	98618	68.91
1-4	0.0042	0.0161	97203	1566	6791940	384550	69.87
5-9	0.0014	0.0068	95637	649	6407390	475740	67.00
10-14	0.0009	0.0044	94988	417	5931650	473875	62.45
15-19	0.0011	0.0056	94571	531	5457775	471523	57.71
20-24	0.0008	0.0041	94041	383	4986252	469245	53.02
25-29	0.0011	0.0057	93657	530	4517007	467030	48.23
30-34	0.0015	0.0076	93127	710	4049977	463934	43.49
35-39	0.0019	0.0094	92418	871	3586044	459948	38.80
40-44	0.0020	0.0097	91547	890	3126095	455597	34.15
45-49	0.0029	0.0143	90657	1301	2670498	450135	29.46
50-54	0.0031	0.0155	89356	1389	2220363	443628	24.85
55-59	0.0066	0.0323	87967	2842	1776735	433268	20.20
60-64	0.0095	0.0466	85125	3967	1343467	416175	15.78
65-69	0.0129	0.0626	81159	5077	927292	393714	11.43
70-74	0.0190	0.0908	76082	6908	533579	376494	7.01
75+	0.0473	1.0000	69174	69174	157085	157085	2.27

Table 5.c

CALCULATION OF THE ABRIDGED LIFE TABLE FOR MALES AND FEMALES BY THE REED-MERRELL METHOD: INDONESIA, 1999

Age	m_x	$_nq_x$	l_x	d_x	T_x	L_x	e_x^o
0-1	0.0350	0.0322	100000	3219	6702320	98323	67.02
1-4	0.0045	0.0174	96781	1682	6603997	382555	68.24
5-9	0.0014	0.0071	95099	680	6221442	472868	65.42
10-14	0.0009	0.0047	94419	446	5748573	470968	60.88
15-19	0.0013	0.0065	93974	607	5277606	468367	56.16
20-24	0.0011	0.0056	93367	522	4809239	465535	51.51
25-29	0.0014	0.0069	92844	643	4343703	462670	46.78
30-34	0.0017	0.0086	92201	789	3881033	459136	42.09
35-39	0.0025	0.0124	91412	1137	3421898	454319	37.43
40-44	0.0028	0.0141	90275	1277	2967579	448312	32.87
45-49	0.0040	0.0198	88998	1761	2519267	440856	28.31
50-54	0.0060	0.0294	87237	2565	2078411	430151	23.82
55-59	0.0086	0.0423	84672	3578	1648260	414883	19.47
60-64	0.0122	0.0594	81094	4816	1233377	394037	15.21
65-69	0.0178	0.0853	76277	6505	839340	366068	11.00
70-74	0.0286	0.1339	69772	9344	473273	336737	6.78
75+	0.0533	1.0000	60429	60429	136536	136536	2.26

5. Conclusions

The constructed Life Table based on the 1996, 1998, and 1999 National Socioeconomic Survey (SUSENAS) show that the Age-Specific Death Rate (ASDR) of Indonesia follows a U-shaped pattern both for males and females. It was high for infants, low for population aged 5 to 54, and high for population aged 55 or above.

The results of the 1996 SUSENAS show that the ASDR ranged from one for population aged 10-14, to 47 for infants, and to 55 for population aged 75 or over. For males the figures were higher. The Infant Mortality Rate (IMR), the number of infant deaths per 1000 live births, was 50 for baby boys while the figure was 44 for baby girls. For population aged 75 or over the ASDR were 63 for males and 48 for females. Based on the 1998 SUSENAS the ASDR declined for almost all age groups. The IMR declined to 43. For males it declined to 48 and for females it declined to 37. For population aged 75 or over the ASDR declined to 47. For males it declined to 56 and for females it declined to 40. The results of the 1999 SUSENAS show that the ASDR continue to decline for some age groups. For some age groups it increased. For babies it declined to 35 where it declined to 39 for baby boys and to 30 for baby girls. However, for population aged 75 or over it increased to 53 where it increased to 60 for males and to 47 for females. The three SUSENAS gave the Crude Death Rate of Indonesia as much as five in 1996 and four in 1998 and 1999.

The results of the construction of the Indonesian Life Table based on the 1996, 1998, and 1999 National Socioeconomic Survey (SUSENAS) show that in 1996 450 out of 10,000 newborn baby boys in Indonesia would die before they reached age one year. The figure declined to 435 in 1998 and to 361 in 1999. The probability of dying before aged one for baby girls was 0.0404 in 1996 and declined to 0.0341 in 1998 and to 0.0280 in 1999. For boys and girls this figure declined from 0.0428 in1996 to 0.0389 in 1998 and to 0.0322 in 1999.

The probability of dying was lowest for those who were in the age interval 10-14 in 1996. The figure was 0.0063, 0.0061, and 0.0062 for males, females, and males and females respectively. This means out of every 100,000 Indonesians alive and that are exactly 10 years old, about 60 would die before reaching their 15th birthday.

In 1998 the probability of dying was lowest for those who were in the age interval 10-14 for males, in the age interval 15-19 for females, and in the age interval 10-19 for males and females. This figure was 0.0061 for males aged 15-19, 0.0041 for females aged 15-19, and 0.0055 for males and females aged 10-19. As in 1996, the probability of dying in 1999 was lowest for those who were in the age interval 10-14; it was 0.0050 for males, 0.0044 for females, and 0.0047 for males and females.

The life expectancy, the average remaining lifetime (in years) for a person who survives to the beginning of the indicated age interval, varies from 2.25 years for males aged 75 or above to 65.28 years for males aged 1 to 5 years in 1996. For females the figure varies from 2.27 for aged 75 or above to 67.63 for aged 1 to 5. The life expectancy was still highest for aged 1 to 5 in 1999. It was 66.66 for males and 69.87 for females.

The life expectancy at birth was 65.28 for males and 65.88 for females in 1996. This means on average the Indonesian males would be expected to live until aged 65.31 years and the Indonesian females would be expected to live until aged 65.88 years. This average age increased to 64.71 in 1998 and 65.23 in 1999 for males and to 68.11 in 1998 and 68.91 in 1999 for females.

The comparison with the Coale-Demeny life table shows that at ages 0 and 1, the mortality patterns of Indonesia in 1999 is similar to the West model. At ages 5 to 45 the mortality patterns is similar to all four models of the Coale-Demeny life table. At ages above 45 the Indonesian mortality patterns is similar to the North model. The results suggest that none of the models of the Coale-Demeny life table can exactly depict the Indonesian mortality patterns.

The correction of the quality of death reporting using the Brass method that the completeness of death reporting in the 1996, 1998, and 1999 SUSENAS is between 20 to 43 percent. If it is true this means that the Indonesian life expectancy is far below than it is expected. The figure is about 54 to 58 years. It means it is around 10 years lower than if the adjustment factor is not applied.

Based on these results it is suggested not to use the adjustment factor K. It means it is suggested to believe that death reporting based on the 1996, 1998, and 1999 is of good quality. The next effort that should be conducted is to have Indonesian mortality model in depicting Indonesian mortality patterns.

that is based on the observed age-pattern of mortality. It means it will still depend on the results of the population censuses or surveys.

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APPENDICES

Table 2.a
POPULATION AND DEATHS BY AGE AND SEX: INDONESIA, 1999

Age	Male			Female			Male and Female		
	Reported deaths 5Dx	Reported population 5Nx	Population aged from x to 75 N(x to 75)	Reported deaths 5Dx	Reported population 5Nx	Population aged from x to 75 N(x to 75)	Reported deaths 5Dx	Reported population 5Nx	Population aged from x to 75 N(x to 75)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
0-1	65,721	1,666,652	100,593,233	47,148	1,557,757	101,115,905	112,869	3,224,409	201,709,138
1-4	38,671	7,999,848	98,926,581	32,012	7,660,427	99,558,149	70,683	15,660,275	198,484,729
5-9	16,917	11,258,921	90,926,733	14,225	10,454,786	91,897,721	31,142	21,713,707	182,824,454
10-14	12,104	11,990,164	79,667,812	9,961	11,329,797	81,442,935	22,065	23,319,961	161,110,747
15-19	16,171	11,075,795	67,677,648	12,028	10,686,380	70,113,138	28,199	21,762,175	137,790,786
20-24	12,015	8,221,854	56,601,853	7,488	9,168,932	59,426,759	19,503	17,390,786	116,028,611
25-29	13,705	8,179,218	48,379,999	10,375	9,143,132	50,257,827	24,080	17,322,349	98,637,825
30-34	14,404	7,486,379	40,200,781	12,389	8,100,392	41,114,695	26,793	15,586,772	81,315,476
35-39	23,656	7,530,286	32,714,402	15,000	7,922,052	33,014,303	38,656	15,452,338	65,728,704
40-44	24,003	6,499,287	25,184,116	11,974	6,130,773	25,092,250	35,977	12,630,060	50,276,366
45-49	26,191	5,253,018	18,684,829	13,652	4,725,782	18,961,478	39,843	9,978,800	37,646,306
5054	36,887	4,105,281	13,431,811	13,721	4,382,778	14,235,696	50,608	8,488,059	27,667,507
55-59	35,651	3,342,646	9,326,530	21,738	3,314,097	9,852,918	57,389	6,656,743	19,179,448
60-64	41,267	2,710,382	5,983,885	28,882	3,032,018	6,538,820	70,149	5,742,400	12,522,705
65-69	43,101	1,861,826	3,273,503	26,486	2,055,507	3,506,802	69,587	3,917,333	6,780,305
70-74	54,333	1,411,677	1,411,677	27,524	1,451,295	1,451,295	81,857	2,862,972	2,862,972
75+	67,777	1,123,733	-	61,885	1,307,373	-	129,662	2,431,106	-
Total	542,574	101,716,966		366,488	102,423,278		909,062	204,140,244	

Table 2.b

ELEMENTS NEEDED TO ESTIMATE COMPLETENESS OF REPORTED DEATH: INDONESIA, 1999

Age	Male			Female			Male and Female		
	Population at exact Age x N(x)	Population aged x And over N(x+)	Reported deaths Over age x D(x+)	Population at exact Age x N(x)	Population aged x And over N(x+)	Reported deaths Over age x D(x+)	Population at exact Age x N(x)	Population aged x And over N(x+)	Reported deaths Over age x D(x+)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
5	2,092,542.2	92,050,466	438.182	1.967.297.0	93.205.094	287.328	4.059.839.1	185.255.560	725.510
10	2,324,908.5	80.791,545	421.265	2.178.458.3	82.750.308	273.103	4.503.366.8	163.541.853	694.368
15	2,306,595.9	68.801.381	409.161	2.201.617.7	71.420.511	263.142	4.508.213.6	140,221.892	672.303
20	1.929,764.9	57.725,586	392.990	1.985.531.2	60.734.132	251.114	3.915.296.1	118.459.717	644.104
25	1.640,107.2	49.503.732	380.975	1.831.206.4	51.565.200	243.626	3.471.313.5	101,068.931	624,601
30	1.566.559.7	41.324.514	367,270	1.724.352.4	42.422.068	233.251	3.290.912.1	83.746.582	600.521
35	1,501.666.5	33,838.135	352.866	1.602.244.5	34.321.676	220.862	3.103.911.0	68.159.810	573.728
40	1.402.957.3	26,307.849	329,210	1,405.282.5	26,399.623	205.862	2.808.239.8	52.707.472	535.072
45	1,175.230.5	19.808,562	305,207	1.085.655.4	20.268,851	193.888	2.260,885.9	40.077.412	499.095
50	935.829.8	14.555.544	279,016	910,856.0	15,543.069	180.236	1.846.685.8	30.098.613	459.252
55	744.792.6	10,450.263	242,129	769,687.5	11,160,291	166.515	1,514,480.2	21,610.554	408.644
60	605,302.7	7,107,618	206,478	634,611.5	7,846,193	144.777	1.239.914.3	14.953.811	351.255
65	457,220.7	4,397,236	165,211	508,752.5	4,814,175	115.895	965,973.3	9.211.411	281.106
70	327,350.3	2,535.410	122,110	350,680.2	2,758,668	89.409	678,030.5	5,294.079	211.519

Table 2.c
PARTIAL DEATH AND BIRTH RATES FOR MALES, FEMALES, AND MALES AND FEMALES: INDONESIA, 1999

Age	Male			Female			Male and Female		
	Partial death rate D(x+)/N(x+)	Partial birth rate N(x)/N(x+) (observed)	Partial birth rate N(x)/N(x+) (estimated)	Partial death rate D(x+)/N(x+)	Partial birth rate N(x)/N(x+) (observed)	Partial birth rate N(x)/N(x+) (estimated)	Partial death rate D(x+)/N(x+)	Partial birth rate N(x)/N(x+) (observed)	Partial birth rate N(x)/N(x+) (estimated)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
5	0.0048	0.0227	0.0292	0.0031	0.0211	0.0297	0.0039	0.0219	0.0293
10	0.0052	0.0288	0.0303	0.0033	0.0263	0.0304	0.0042	0.0275	0.0302
15	0.0059	0.0335	0.0320	0.0037	0.0308	0.0317	0.0048	0.0322	0.0317
20	0.0068	0.0334	0.0340	0.0041	0.0327	0.0333	0.0054	0.0331	0.0335
25	0.0077	0.0331	0.0361	0.0047	0.0355	0.0353	0.0062	0.0343	0.0356
30	0.0089	0.0379	0.0388	0.0055	0.0406	0.0380	0.0072	0.0393	0.0384
35	0.0104	0.0444	0.0424	0.0064	0.0467	0.0412	0.0084	0.0455	0.0419
40	0.0125	0.0533	0.0473	0.0078	0.0532	0.0459	0.0102	0.0533	0.0467
45	0.0154	0.0593	0.0540	0.0096	0.0536	0.0520	0.0125	0.0564	0.0532
50	0.0192	0.0643	0.0627	0.0116	0.0586	0.0590	0.0153	0.0614	0.0610
55	0.0232	0.0713	0.0720	0.0149	0.0690	0.0704	0.0189	0.0701	0.0713
60	0.0291	0.0852	0.0857	0.0185	0.0809	0.0826	0.0235	0.0829	0.0841
65	0.0376	0.1040	0.1055	0.0241	0.1057	0.1019	0.0305	0.1049	0.1038
70	0.0482	0.1291	0.1302	0.0324	0.1271	0.1306	0.0400	0.1281	0.1302

Table 2.d
FITTING OF A STRAIGHT LINE BY GROUP MEANS, MALES, FEMALES, AND MALES AND FEMALES: INDONESIA, 1999

Age (1)		Male: Partial death rate D(x+)/N(x+) (2)		Male: Partial birth rate N(x)/N(x+) (3)		Female: Partial death rate D(x+)/N(x+) (4)		Female: Partial birth rate N(x)/N(x+) (5)		Male and Female: Partial death rate D(x+)/N(x+) (6)		Male and Female: Partial birth rate N(x)/N(x+) (7)
		(a) Group I				(a) Group I				(a) Group I		
5		0.0048		0.0227		0.0031		0.0211		0.0039		0.0219
10		0.0052		0.0288		0.0033		0.0263		0.0042		0.0275
15		0.0059		0.0335		0.0037		0.0308		0.0048		0.0322
20		0.0068		0.0334		0.0041		0.0327		0.0054		0.0331
25		0.0077		0.0331		0.0047		0.0355		0.0062		0.0343
30		0.0089		0.0379		0.0055		0.0406		0.0072		0.0393
35		0.0104		0.0444		0.0064		0.0467		0.0084		0.0455
Total		0.0497		0.2339		0.0309		0.2338		0.0402		0.2338
Mean	X1	0.0071	Y1	0.0334	X1	0.0044	Y1	0.0334	X1	0.0057	Y1	0.0334
40		0.0125		0.0533		0.0078		0.0532		0.0102		0.0533
45		0.0154		0.0593		0.0096		0.0536		0.0125		0.0564
50		0.0192		0.0643		0.0116		0.0586		0.0253		0.0614
55		0.0232		0.0713		0.0149		0.0690		0.0189		0.0701
60		0.0291		0.0852		0.0185		0.0809		0.0235		0.0829
65		0.0376		0.1040		0.0241		0.1057		0.0305		0.1049
70		0.0482		0.1291		0.0324		01271		0.0400		0.1281
Total		0.1850		0.5665		0.1188		0.5480		0.1507		0.5570
Mean	X2	0.0264	Y2	0.0809	X2	0.0170	Y2	0.0783	X2	0.0215	Y2	0.0796

Table 2.e

ESTIMATION AN ADJUSTMENT FACTOR, K, BY USE OF TRIMMED MEANS, MALES, FEMALES, AND MALES AND FEMALES: INDONESIA, 1999

Age	Weights		Male				Female				Male and Female		
			Partial death rate D(x+)/N(x+)		Partial birth rate N(x)/N(x+)		Partial death rate D(x+)/N(x+)		Partial birth rate N(x)/N(x+)		Partial death rate D(x+)/N(x+)		Partial birth rate N(x)/N(x+)
(1)	(2)		(3)		(4)		(5)		(6)		(7)		(8)
			(a) Group 1				(a) Group 1				(a) Group 1		
5	0.25		0.0048		0.0227		0.0031		0.0211		0.0039		0.0219
10	0.50		0.0052		0.0288		0.0033		0.0263		0.0042		0.0275
15	0.75		0.0059		0.0335		0.0037		0.0308		0.0048		0.0322
20	1.00		0.0068		0.0334		0.0041		0.0327		0.0054		0.0331
25	1.00		0.0077		0.0331		0.0047		0.0355		0.0062		0.0343
30	1.00		0.0089		0.0379		0.0055		0.0406		0.0072		0.0393
35	1.00		0.0104		0.0444		0.0064		0.0467		0.0084		0.0455
Weighted total	5.50		0.0316		0.1497		0.0195		0.1504		0.0255		0.1501
eighted mean		X1*	0.0058	Y1*	0.0272	X1*	0.0036	Y1*	0.0273	X1*	0.0046	Y1*	0.0273
40	1.00		0.0125		0.0533		0.0078		0.0532		0.0102		0.0533
45	1.00		0.0154		0.0593		0.0096		0.0536		0.0125		0.0564
50	1.00		0.0192		0.0643		0.0116		0.0586		0.0153		0.0614
55	1.00		0.0192		0.0713		0.0149		0.0690		0.0189		0.0701
60	0.75		0.0232		0.0852		0.0185		0.1057		0.0235		0.0829
65	0.50		0.0291		0.1040		0.0241		0.1271		0.0305		0.1281
70	0.25		0.0482		0.1291		0.0324		0.3796		0.0400		0.3878
Weighted total	5.50		0.1229		0.3964		0.0779		0.0690		0.0996		0.0705
eighted mean		X2*	0.0223	Y2*	0.0721	X2*	0.0142	Y2*		X2*	0.0181	Y2*	

Figure 2
PLOT OF PARTIAL BIRTH RATES, N(X)/N(X+), AGAINST PARTIAL DEATH RATES, D(X)/N(X+), FOR MALES AND FEMALES, INDONESIA, 1999