

**TRANSACTIONS OF SOCIETY OF ACTUARIES  
1993-94 REPORTS**

**A CENTURY OF JAPANESE MORTALITY EXPERIENCE**

BRUCE D. SCHOBEL AND ROBERT J. MYERS

ABSTRACT

Japan is widely recognized for its remarkable progress in industrial production and wealth accumulation during the last century. What is not so widely recognized is Japan's equally remarkable progress in the demographic area, especially decreasing mortality rates of its people.

This paper presents an analysis of the mortality experience recorded in the 16 official complete life tables that have been published by the Japanese government, covering about a century. The first table shows the experience during 1891-98, and the last covers 1990. On the whole, Japanese mortality rates were relatively high until about 1950, at which time they began to decrease rapidly at all ages. In 1990, Japan had the highest expectations of life of any nation in the world, surpassing the long-time previous leaders (the Scandinavian countries and the Netherlands), and Japanese mortality rates were lower than the corresponding U.S. rates at all ages except 1-4 for men and 90 and over for both men and women.

I. INTRODUCTION

At the beginning of this century, Japanese mortality rates were higher—and, conversely, expectations of life were lower—than those of most other industrialized nations of the world. Currently, Japan ranks first in this respect, having overtaken the previous leaders: the Scandinavian countries and the Netherlands.

The change in the mortality positions of Japan and of the countries that for many years had the most favorable experience is illustrated in the following table, which shows the expectation of life at birth (in years).

Country	Men		Women	
	Circa 1970	Circa 1990	Circa 1970	Circa 1990
Japan	69.3	75.9	74.7	81.9
Netherlands	71.0	73.7	76.7	79.9
Norway	71.2	73.4	77.3	79.8
Sweden	72.0	74.8	77.0	80.4

Source: Japanese life tables and various issues of *United Nations Demographic Yearbook*.

Even though life expectancy increased significantly over the period shown in the countries that had led the world in this regard, the rise in Japan was much greater, allowing it to advance into the lead.

This paper presents an analysis of the 16 official complete life tables<sup>1</sup> that have been issued by the Statistics and Information Department of the Japanese Ministry of Health and Welfare. The 1st Life Table related to the experience in 1891–98. Subsequently, life tables were issued at various intervals and, beginning in 1955, for single years of experience at quinquennial intervals through 1990. The official life tables are numbered 1 through 6 and 8 through 17; no 7th Life Table was produced because of World War II. The specific periods covered by the various life tables are shown in Table 2 of this paper and in several of the following tables.

The basic analysis is limited to *what* occurred in Japanese mortality experience, not *why* the changes occurred. What occurred can be objectively determined; why it occurred must be, to a great extent, a matter of speculation. The analysis does not attempt to adjust for such fairly trivial matters as the effects of differing definitions of stillbirths on the mortality rate at age 0 or of misstatements of age on the mortality rates at the oldest ages.

The experience was analyzed for age 0 and for each successive quinquennial age through 100 (and also for age 1, which often has distinctly different experience than does age 0). We determined that, on the whole, the experience at ages 0, 1, 20, 40, 60, 70, 80, and 90 is representative of the underlying trends and relationships, although all the published mortality rates are presented in the Appendix for those who wish to delve further into these data.

In addition to analyzing how Japanese mortality experience changed over time, this paper compares the Japanese experience to that of the U.S. over corresponding time periods. The U.S. life tables used are those prepared by the Social Security Administration, as published in *Actuarial Study No. 107*, "Life Tables for the United States Social Security Area, 1900–2080," August 1992. As that report states,

... the life tables in this study differ from the official tables published in conjunction with each decennial census. However, the tables in this study are better suited to studying time trends because, unlike the official decennial tables, they have all been constructed using the same method."

<sup>1</sup>Provisional tables based on estimated population (rather than a census) are currently published annually.

The 1990 U.S. Life Tables are based on the 1988 experience, with minor extrapolation of trends to 1990.

## 2. GENERAL NATURE OF JAPANESE LIFE TABLES

All the Japanese life tables, which are gender-specific, use a radix of 100,000 births. The terminal age at which any survivors remain was 102 for men and 103 for women in the 1st Life Table (1891–98) and was generally 100 and 101, respectively, in the subsequent tables through the 8th Life Table (1947). Thereafter, such age increased slowly until reaching 109 for men and 111 for women in the 17th Life Table (1990).

The age-specific mortality rates were, as in life tables generally, high at age 0 and then much lower at age 1. In all the life tables, the rates continued to decrease, although slowly, after age 1 and generally reached a minimum value around ages 10–12 (age 10 for men and age 12 for women in the 17th Life Table). In the early tables (through the 8th Life Table), a second peak was reached thereafter at about ages 20–24, followed by a decrease to a second relative minimum at about ages 29–34. In the later tables, the rates for men tended to plateau for periods of about 10 years, beginning at about age 25 for the 9th through the 11th Life Tables and at lower ages thereafter (at age 18 in the 17th Life Table). On the other hand, the rates for women in the tables after the 8th Life Table did not ever plateau, although at each age after the second relative minimum their increases were usually very small.

As always occurs when mortality rates at the youngest ages are relatively high, the expectation of life increases after age 0 for several ages in the early life tables. It does not reach a peak until age 4 in the 1st Life Table, for both men and women. Thereafter for the next six tables, the peak is at age 3, while for the next four tables it is at age 1, and finally for the last four tables, a steady decrease occurs after age 0.

## 3. MORTALITY TRENDS IN JAPANESE LIFE TABLES

Table 1 compares the Japanese mortality rates for 1990 (17th Life Table) with those for 1891–98 (1st Life Table). The extent to which mortality rates decreased over this period of almost 100 years is truly amazing. For ages up to 10 for men and 25 for women, the current rates are only about 2–3% of the early rates. For men, this ratio is only about 10% for ages 20–35 and

then rises slowly to about 70% for ages 85 and over. For women, the same trend is evident, although at somewhat lower levels, with a ratio of about 20% at ages 60-70 and 60% at the oldest ages.

TABLE I  
COMPARISON OF JAPANESE MORTALITY RATES, 1ST LIFE TABLE AND 17TH LIFE TABLE

Age	Men			Women		
	Mortality Rate (per Thousand)		Ratio	Mortality Rate (per Thousand)		Ratio
	1st Life Table (1891-98)	17th Life Table (1990)		1st Life Table (1891-98)	17th Life Table (1990)	
0	148.95	4.95	3.3%	133.80	4.17	3.1%
1	44.72	0.78	1.7	41.62	0.64	1.5
5	9.99	0.29	2.9	9.78	0.16	1.6
10	4.51	0.14	3.1	4.41	0.11	2.5
15	5.21	0.34	6.5	5.95	0.17	2.9
20	8.21	0.83	10.1	8.99	0.30	3.3
25	8.80	0.73	8.3	9.84	0.33	3.4
30	8.63	0.78	9.0	10.15	0.42	4.1
35	9.27	0.99	10.7	11.02	0.58	5.3
40	11.19	1.55	13.9	11.79	0.89	7.5
45	14.06	2.54	18.1	12.12	1.34	11.1
50	18.64	4.05	21.7	14.64	2.17	14.8
55	25.56	7.10	27.8	19.72	3.09	15.7
60	36.49	11.32	31.0	28.26	4.81	17.0
65	51.41	16.64	32.4	41.01	7.52	18.3
70	74.45	26.41	35.5	61.54	13.24	21.5
75	107.40	45.42	42.3	92.80	24.35	26.2
80	151.90	80.39	52.9	136.50	47.85	35.1
85	195.70	132.40	67.7	180.00	91.25	50.7
90	278.00	203.23	73.1	265.40	158.76	59.8
95	395.60	292.47	73.9	391.40	249.47	63.7
100	562.40	400.37	71.2	577.10	359.90	62.4

Table 2 presents a more detailed view of how these mortality rates decreased over the years. For men, little, if any, decrease in the mortality rates was reflected in the first five tables, that is, through 1926-30. In fact, the mortality rates in the 4th Life Table (1921-25)—and, to some extent, those in the 5th Life Table (1926-30)—were generally higher than those in the 1st Life Table. The very high mortality experience in the 4th Life Table was due, in part, to the great earthquakes of 1923, which occurred in the eastern part of Japan, including Tokyo. These earthquakes caused an estimated 140,000 deaths, or 2.3% of the roughly 6 million deaths reported for all of Japan during 1921-25.

TABLE 2  
RATIO OF JAPANESE MORTALITY RATES IN VARIOUS LIFE TABLES  
TO THOSE IN THE 1ST LIFE TABLE

Life Table*	Years Covered	Age							
		0	1	20	40	60	70	80	90
Men									
1	1891-98	100%	100%	100%	100%	100%	100%	100%	100%
2	1899-1903	105	82	101	93	96	100	103	118
3	1909-13	108	99	108	86	90	94	96	110
4	1921-25	109	108	132	94	107	114	120	134
5	1926-30	94	96	120	86	101	108	112	123
6	1935-36	76	83	121	80	97	103	109	123
8	1947	58	74	94	81	91	101	101	105
9	1950-52	38	26	38	50	68	83	89	99
10	1955	28	13	29	36	63	77	85	92
11	1960	22	8	23	32	60	77	93	97
12	1965	14	5	16	29	55	73	92	104
13	1970	10	4	16	28	48	67	82	96
14	1975	7	3	13	23	38	54	73	87
15	1980	6	2	11	18	34	47	66	83
16	1985	4	2	11	16	31	39	58	78
17	1990	3	2	10	14	31	35	53	73
Women									
1	1891-98	100%	100%	100%	100%	100%	100%	100%	100%
2	1899-1903	105	86	107	97	94	99	101	115
3	1909-13	108	105	120	90	87	92	91	104
4	1921-25	108	114	134	96	93	100	110	133
5	1926-30	93	101	118	85	85	94	101	122
6	1935-36	74	85	107	76	80	87	101	129
8	1947	57	78	77	64	78	85	93	111
9	1950-52	37	28	31	42	60	71	80	99
10	1955	28	13	19	29	51	63	73	86
11	1960	20	8	13	23	47	60	78	90
12	1965	12	4	7	17	40	53	77	92
13	1970	9	3	7	15	35	47	67	85
14	1975	7	3	5	12	27	38	59	81
15	1980	5	2	4	9	23	31	50	74
16	1985	4	2	3	9	19	25	41	67
17	1990	3	2	3	8	17	22	35	60

\*No 7th Life Table was produced because of World War II.

After 1930, steady—and sometimes rapid—decreases in the mortality rates occurred at all ages. Initially, these reductions were greater at the younger ages, but beginning with the 13th Life Table (1970), significant declines began for the oldest ages as well. In the last 10-year period, mortality rates had little room for further reductions at ages 60 and under, but notable declines continued at older ages.

For women, the picture was much the same as that for men. The decreases in the mortality rates were generally somewhat larger in the long run, although they tended to appear later—in the 8th Life Table (1947), rather than in the preceding one. In the last 10-year period, once again, significant decreases continued for ages 60 and over, while the rates at the younger ages continued to be small fractions of the corresponding rates in the early years.

Table 3 compares the Japanese expectations of life for 1990 with those for 1891–98. For men, the increase in the expectation at birth was 77%, while at subsequent ages this was somewhat lower—about 40–45%, for ages 10–40 and 80 and over, and about 50–60% at ages 50–75. Women experienced the same general trend, although with slightly larger increases: 50–55% at ages 5–45 and 85 and over, and about 70–80% at ages 60–80.

TABLE 3  
COMPARISON OF JAPANESE LIFE EXPECTANCIES, 1ST LIFE TABLE AND 17TH LIFE TABLE

Age	Men			Women		
	Life Expectancy (Years)		Ratio	Life Expectancy (Years)		Ratio
	1st Life Table (1891–98)	17th Life Table (1990)		1st Life Table (1891–98)	17th Life Table (1990)	
0	42.80	75.92	177%	44.33	81.91	185%
1	49.20	75.30	153	50.10	81.25	162
5	50.75	71.45	141	51.46	77.37	150
10	47.46	66.53	140	48.12	72.42	151
15	43.45	61.58	142	44.20	67.46	153
20	39.82	56.77	143	40.75	62.54	153
25	36.46	51.98	143	37.61	57.63	153
30	32.98	47.16	143	34.41	52.73	153
35	29.36	42.35	144	31.13	47.84	154
40	25.73	37.58	146	27.82	43.00	155
45	22.20	32.92	148	24.37	38.22	157
50	18.82	28.40	151	20.84	33.51	161
55	15.65	24.06	154	17.42	28.90	166
60	12.77	20.01	157	14.23	24.39	171
65	10.22	16.22	159	11.35	20.03	176
70	8.01	12.66	158	8.83	15.87	180
75	6.19	9.50	154	6.75	12.06	179
80	4.77	6.88	144	5.14	8.73	170
85	3.67	4.94	135	3.89	6.11	157
90	2.63	3.53	134	2.72	4.20	154
95	1.81	2.53	140	1.83	2.90	158
100	1.10	1.83	166	1.20	2.04	170

Table 4 presents a more detailed view of how these increases in the expectation of life occurred over the years. For men—quite naturally, considering the trend in mortality rates discussed previously—little change took place in the expectations at all ages in the first four tables (that is, through 1921–25). This was also the case at ages 20 and over in the next three tables (that is, through 1947). In fact, rather surprisingly, small decreases are shown at almost all ages for the 4th Life Table (1921–25) and at ages 60 and over in the 5th and 6th Life Tables (1926–30 and 1935–36, respectively).

TABLE 4  
RATIO OF JAPANESE LIFE EXPECTANCIES IN VARIOUS LIFE TABLES  
TO THOSE IN THE 1ST LIFE TABLE

Life Table*	Years Covered	Age							
		0	1	20	40	60	70	80	90
Men									
1	1891–98	100%	100%	100%	100%	100%	100%	100%	100%
2	1899–1903	103	104	101	101	100	99	93	84
3	1909–13	103	105	103	104	104	103	98	90
4	1921–25	98	100	98	98	93	89	81	74
5	1926–30	105	104	101	100	96	93	87	82
6	1935–36	110	106	101	102	98	95	88	81
8	1947	117	109	103	104	100	99	97	99
9	1950–52	139	126	117	115	112	110	106	103
10	1955	149	133	122	120	117	114	110	110
11	1960	153	135	123	121	116	111	103	103
12	1965	158	139	126	123	119	112	101	98
13	1970	162	141	129	127	125	119	111	105
14	1975	168	145	134	134	136	132	120	117
15	1980	171	148	137	138	143	140	128	121
16	1985	175	151	140	142	151	150	137	125
17	1990	177	153	143	146	157	158	144	134
Women									
1	1891–98	100%	100%	100%	100%	100%	100%	100%	100%
2	1899–1903	101	102	101	101	101	99	94	87
3	1909–13	101	102	102	104	105	105	102	96
4	1921–25	98	99	99	101	99	96	86	75
5	1926–30	105	104	103	104	103	101	92	82
6	1935–36	112	108	106	107	106	102	91	77
8	1947	122	115	110	109	108	107	99	90
9	1950–52	142	130	122	118	118	117	110	100
10	1955	153	138	128	123	125	124	119	116
11	1960	158	142	131	125	125	122	115	111
12	1965	164	146	135	129	129	126	113	110
13	1970	168	149	138	133	135	133	122	120
14	1975	173	153	142	139	145	145	132	125
15	1980	178	156	146	145	154	155	143	131
16	1985	182	159	150	150	163	169	157	141
17	1990	185	162	153	155	171	180	170	154

\*No 7th Life Table was produced because of World War II.

For women, the expectations of life at ages 70 and under generally did not increase in the first four tables (that is, through 1921-25) but then increased steadily from one table to the next. At the oldest ages—just as for men—the expectations in the 2nd through 8th Life Tables (that is, through 1947) were lower than those in the 1st Life Table but then showed continuing, significant improvements.

Table 5 presents another useful measure of mortality: the probability of survival from age at entry into the labor force to retirement age. Although recognizing that the concept of “retirement age” is really not static under conditions of decreasing mortality and morbidity, we can somewhat arbitrarily select age 20 as the age at entry into the labor force and age 65 as the retirement age.

TABLE 5  
PROBABILITIES OF SURVIVING FROM AGE 20 TO AGE 65  
IN VARIOUS JAPANESE LIFE TABLES

Life Table*	Years Covered	Men	Women
1	1891-98	45%	50%
2	1899-1903	47	51
3	1909-13	49	53
4	1921-25	44	50
5	1926-30	46	54
6	1935-36	48	57
8	1947	49	60
9	1950-52	62	70
10	1955	67	76
11	1960	69	79
12	1965	72	82
13	1970	74	84
14	1975	79	87
15	1980	81	90
16	1985	82	91
17	1990	84	92

\*No 7th Life Table was produced because of World War II.

In this regard, note that the Japanese social security system consists of two parts: one part provides flat benefits for the entire population, while the other part provides earnings-related benefits to workers in manufacturing and commercial enterprises. The normal retirement age (that is, the first age at which unreduced retirement benefits are available) is 65 under the flat-benefits program. Under the earnings-related program, the normal retirement



age is 60 for men and 55 currently for women, increasing to 60 in 2001. Furthermore, the government is urging further increases in the retirement age under the earnings-related program, so that a uniform normal retirement age of 65 will eventually be applicable.

In the 1st Life Table, only 45% of the men aged 20 and 50% of the women aged 20 survived to age 65. This proportion rose steadily thereafter for each successive table—except for a dip in the “high-mortality” 4th Life Table—reaching 84% for men and 92% for women in the 17th Life Table (1990). The current situation is an excellent illustration of the so-called “squaring of the mortality curve,” which is a manifestation of modern low mortality.

#### 4. MORTALITY TRENDS BY GENDER IN JAPANESE LIFE TABLES

Table 6 presents data on the relative excess (or, in a few instances, deficit) of the age-specific mortality rates for men over those for women. Such differentials have varied considerably by age and over time as well. At age 0, the differential was 11–14% in all tables through the 10th Life Table (1955) but then rose to 29% for the 13th Life Table (1970) and fell somewhat thereafter. For age 1, the differential was negligible until the 10th Life Table (1955) and about 20% for the 12th Life Table (1965) and later tables.

TABLE 6  
RELATIVE EXCESS OF JAPANESE MORTALITY RATES FOR MEN  
OVER THOSE FOR WOMEN IN VARIOUS LIFE TABLES

Life Table*	Years Covered	Age							
		0	1	20	40	60	70	80	90
1	1891–98	11%	7%	–9%	–5%	29%	21%	11%	5%
2	1899–1903	11	2	–14	–9	32	23	14	7
3	1909–13	11	1	–18	–10	34	23	17	11
4	1921–25	13	2	–11	–7	48	38	22	5
5	1926–30	13	2	–7	–5	52	39	23	6
6	1935–36	14	5	4	–1	56	44	21	–0
8	1947	12	2	11	21	51	44	21	–1
9	1950–52	14	–1	13	13	47	42	23	4
10	1955	13	8	43	19	58	47	29	12
11	1960	22	15	59	34	67	54	33	14
12	1965	27	21	99	58	79	66	33	18
13	1970	29	22	116	76	77	70	35	18
14	1975	27	26	114	84	80	73	37	13
15	1980	26	18	154	83	93	81	47	18
16	1985	15	23	190	79	111	88	56	22
17	1990	19	22	177	74	135	99	68	28

\*No 7th Life Table was produced because of World War II.

At ages 20–40, rather surprisingly, the mortality rates for men were lower than those for women—by as much as 10–18% in some cases—for the tables before the 6th Life Table (1935–36), perhaps because women experienced significant maternity-related mortality then. Subsequently, however, the differential began increasing. In the 16th Life Table (1985), the differential at age 20 was almost 200% (that is, the rate for men was three times as large as the rate for women—possibly due to accidental causes of death). At age 40, the differential in the most recent tables was about 80%.

At ages 60 and 70, the differentials were always significant and increased over the years, from about 25–30% in the early tables to about 100% in the most recent ones. The differentials at age 70 tended to be somewhat smaller than those at age 60, and they were smaller still at higher ages. But even at age 90, the mortality rates of men exceeded those of women by significant amounts—about 20% in recent years (although 28% in 1990).

Table 7 compares the expectations of life for men and women for various ages and time periods. In general, the differential for women's life expectancies over men's increased slowly but steadily over the years. In only a few isolated cases did the male expectation exceed that for women and then not by very much. The expectation at birth for women has been greater by about 6–8% in all recent tables, beginning with the 6th Life Table (1935–36). The same differential trend can be seen at ages 1 and 20. For higher ages, however, larger differentials existed—about 13% at age 40 and 20% at age 60, both remaining relatively level over recent years. Then, at ages 70 and 80, the differentials have been somewhat higher, particularly in recent years, and increasing as well, to 25–27% in the 17th Life Table (1990). Finally, at age 90, the differential was relatively small for many years but then began to increase and was 19% in 1990.

Although the differential of male mortality over female mortality has been large and is continuing to increase (Table 6), the differential of female expectation of life over that for men has not increased very much, over the past 50 years, at the younger ages and only moderately at the older ages. Although this might seem strange at first glance, the explanation lies in the fact that, as mortality rates become very low, the differences in survival rates by no means change proportionately, and the latter more directly affect the expectations of life.

TABLE 7  
RELATIVE EXCESS OF JAPANESE LIFE EXPECTANCIES FOR WOMEN  
OVER THOSE FOR MEN IN VARIOUS LIFE TABLES

Life Table*	Years Covered	Age							
		0	1	20	40	60	70	80	90
1	1891-98	4%	2%	2%	8%	11%	10%	8%	3%
2	1899-1903	2	0	2	8	12	11	9	6
3	1909-13	1	-1	1	8	13	12	12	10
4	1921-25	3	1	3	12	19	19	14	5
5	1926-30	4	2	5	13	20	20	14	4
6	1935-36	6	4	7	13	20	19	11	-2
8	1947	8	7	10	13	20	19	10	-5
9	1950-52	6	5	7	11	17	17	12	1
10	1955	7	6	8	11	18	20	17	8
11	1960	7	7	9	13	20	22	20	11
12	1965	8	7	9	13	21	23	20	16
13	1970	8	7	9	13	21	23	19	18
14	1975	7	7	9	13	19	21	19	11
15	1980	7	7	9	13	20	23	21	12
16	1985	8	8	10	14	20	24	24	16
17	1990	8	8	10	14	22	25	27	19

\*No 7th Life Table was produced because of World War II.

##### 5. SUMMARIZED ANALYSIS OF JAPANESE MORTALITY TRENDS

Table 8 presents a summary of Japanese mortality trends, as shown in the various tables, on the basis of computed aggregate death rates based on a standard population (that of Japan as of October 1, 1989). For each table, the appropriate age- and gender-specific mortality rates were applied to the standard population (tabulated appropriately) to obtain the total tabular deaths by gender and in total. Dividing the tabular deaths by the appropriate population produced the aggregate age-adjusted and age- and sex-adjusted death rates.

TABLE 8

AGE-ADJUSTED\* AND AGE- AND SEX-ADJUSTED\* JAPANESE MORTALITY RATES AND RATIOS TO RATES SHOWN IN THE 1ST LIFE TABLE

Life Table*	Years Covered	Men		Women		Total	
		Age-Adjusted Mortality Rate (per Thousand)	Ratio to 1st Life Table	Age-Adjusted Mortality Rate (per Thousand)	Ratio to 1st Life Table	Age- and Sex-Adjusted Mortality Rate (per Thousand)	Ratio to 1st Life Table
1	1891-98	24.053	100%	25.802	100%	24.943	100%
2	1899-1903	23.637	98	25.775	100	24.725	99
3	1909-13	22.500	94	24.395	95	23.464	94
4	1921-25	26.245	109	27.374	106	26.819	108
5	1926-30	24.282	101	24.795	96	24.543	98
6	1935-36	23.221	97	23.538	91	23.382	94
8	1947	21.386	89	20.997	81	21.188	85
9	1950-52	15.870	66	16.282	63	16.079	64
10	1955	13.924	58	13.757	53	13.839	55
11	1960	13.695	57	13.199	51	13.443	54
12	1965	12.743	53	12.090	47	12.411	50
13	1970	11.504	48	10.760	42	11.126	45
14	1975	9.669	40	9.077	35	9.368	38
15	1980	8.609	36	7.765	30	8.179	33
16	1985	7.674	32	6.570	25	7.112	29
17	1990	6.966	29	5.674	22	6.309	25

\*The standard population used to determine these rates is that of Japan on October 1, 1989. The aggregate figure for the standard population at ages 90 and higher was allocated to ages through 100 and higher using data from the 1985 Census of population in Japan.

†No 7th Life Table was produced because of World War II.

For both men and women, the age-adjusted death rates remained fairly level for the first five tables (that is, through 1926-30); then a steady decline began. By the 17th Life Table (1990), the age-adjusted death rate for men was only 29% of that in 1891-98, while for women the corresponding ratio was 22%. For men and women combined, the aggregate death rate in the 1990 table was only 25% of that in the 1891-98 table—an astounding improvement.

Considering mortality by gender, the age-adjusted death rate for men in the 1891-98 table was, rather surprisingly, 7% lower than that for women. This differential remained negative, although shrinking, through the 6th Life Table (1935-36). This apparent phenomenon occurred because, for the standard population, the number of women greatly exceeds the number of men at the older ages, where the “excess” deaths accumulate. After 1936, the differential became positive and increased to 23% in the 17th Life Table (1990).

## 6. COMPARISON OF JAPANESE AND U.S. MORTALITY EXPERIENCE

Table 9 compares Japanese and U.S. mortality rates, by age and gender, from the life tables for reasonably corresponding time periods. For the period around the turn of the century, the Japanese rates at most ages and for both sexes varied between about 100% and 120% of the corresponding U.S. rates. Over the next 35 years, the excess of Japanese rates over the U.S. ones increased steadily, the ratio being as high as 400% (and even 700% in one instance) at ages 20 and under, and usually at least 20-40%.

TABLE 9  
RATIO OF JAPAN MORTALITY RATES TO U.S. MORTALITY RATES  
FOR CORRESPONDING TIME PERIODS

Years Covered		Age							
Japanese	U.S.	0	1	20	40	60	70	80	90
Men									
1899-1903	1900	107%	97%	129%	97%	120%	120%	114%	121%
1909-13	1910	134	162	169	94	111	113	107	118
1921-25	1920	189	257	213	128	158	148	139	147
1926-30	1930	216	396	263	126	134	140	134	140
1935-36	1940	214	640	408	150	133	137	130	138
1950-52	1950	173	471	174	129	100	122	125	124
1960	1960	113	198	115	97	92	113	130	126
1970	1970	66	127	63	78	75	101	121	128
1980	1980	59	99	47	68	68	81	109	121
1990	1990	49	105	54	49	72	70	92	108
Women									
1899-1903	1900	118%	99%	157%	116%	101%	108%	107%	119%
1909-13	1910	148	171	236	131	101	103	99	109
1921-25	1920	213	268	226	144	116	117	121	143
1926-30	1930	240	434	311	161	110	119	121	140
1935-36	1940	238	705	503	196	124	121	125	147
1950-52	1950	195	570	301	167	116	126	125	132
1960	1960	121	197	192	115	106	126	128	122
1970	1970	65	117	86	76	89	116	134	133
1980	1980	58	103	58	68	68	88	122	132
1990	1990	50	98	58	64	54	62	92	113

Then, beginning with the Japanese 9th Life Table (1950-52), the ratios began to decrease, and by 1970, the Japanese rates were generally lower than the U.S. rates (by 20-35% at ages 40 and under), except at ages 1 and 70-90, where the differential was generally 20-30% in the other direction. Subsequently, Japanese mortality continued to decrease more rapidly than U.S. mortality, and the ratios fell to as low as 50% at many ages, although they remained slightly above 100% at ages 1-4 for men and 90 for both men and women.

As noted above, Japanese mortality rates in 1970 were still higher than the U.S. ones at ages 70-90 for both men and women. By 1980, this situation occurred only at ages 80-90, and by 1990, it was true only at age 90. If this trend continues, the tables for 2000 will likely show no age (except perhaps ages 1-4 for men) at which Japanese mortality rates are higher than U.S. rates.

Table 10 compares Japanese and U.S. expectations of life, by age and gender, for various corresponding life tables. As would be expected from the preceding discussion of relative mortality rates, the expectations at all ages at the turn of the century were lower for both sexes for Japan than for the U.S.—by about 5% at the young and middle ages, with the difference increasing thereafter, becoming as much as 20% at age 90. Correspondingly, the deficit of the Japanese expectations as compared to the U.S. ones steadily increased over the years until the 1935-36 period, when they were generally about 20% (only 10% at a few middle ages, but 25% at age 0).

Following 1935-36, a significant reversal began, and the Japanese expectations at all ages and for both genders more nearly equalled the U.S. ones. By 1970, equality had resulted at ages 60 and under for men and at ages 40 and under for women. Thereafter, the Japanese expectations continued to increase more rapidly than the U.S. ones, and in 1990, they were about 5-10% higher for all ages through 70, although slightly lower at ages 80 and 90.

TABLE 10  
RATIO OF JAPAN LIFE EXPECTANCIES TO U.S. LIFE EXPECTANCIES  
FOR CORRESPONDING TIME PERIODS

Years Covered		Age							
Japanese	U.S.	0	1	20	40	60	70	80	90
Men									
1899-1903	1900	95%	96%	97%	95%	90%	89%	89%	79%
1909-13	1910	88	92	96	97	94	93	92	83
1921-25	1920	77	84	88	86	80	77	74	66
1926-30	1930	77	84	89	89	83	80	77	72
1935-36	1940	77	81	86	89	85	82	79	72
1950-52	1950	91	93	95	96	91	87	84	80
1960	1960	98	98	99	99	94	86	82	79
1970	1970	103	102	103	104	99	91	84	78
1980	1980	105	104	105	106	106	100	90	84
1990	1990	106	106	107	108	110	108	99	92
Women									
1899-1903	1900	92%	94%	96%	98%	96%	94%	92%	82%
1909-13	1910	83	88	93	98	99	98	98	90
1921-25	1920	77	83	90	93	91	88	81	69
1926-30	1930	76	82	89	94	92	88	81	73
1935-36	1940	76	80	86	91	90	87	79	68
1950-52	1950	89	91	92	93	90	88	83	76
1960	1960	96	96	96	95	91	86	85	82
1970	1970	100	99	99	98	92	87	81	78
1980	1980	102	101	101	101	99	93	85	79
1990	1990	104	104	105	106	108	104	96	90

## 7. CONCLUSIONS

In recent years, the Japanese have been widely respected for their economic development, and their management practices have been emulated by American businesses, particularly those involved in manufacturing. American automobile manufacturers, for example, have adopted Japanese methods in many of their new facilities, and these have generally been very successful. While these contributions to the business world have been substantial, perhaps the Japanese experience in the area of mortality could provide even more important benefits. After all, the nearly universal human desire to live a long time is more basic and fundamental than the desire to be productive in a work environment.

Over the last century, the Japanese have successfully reduced their mortality rates by huge percentages, for both sexes and at all ages. Life expectancies at birth have risen to the point that the Japanese are now the longest-living population on Earth. Interestingly, the second oldest *authenticated* age for any human being was set by a Japanese man. Shigechiyo

Izumi was born on June 29, 1865. We have confidence in that reported date of birth because it was recorded in the first Japanese census, in 1871, when Mr. Izumi was a 6-year-old. He died at home on the island of Tokunoshima, 820 miles southwest of Tokyo, on February 21, 1986, at the age of 120 years, 237 days.<sup>2</sup>

We do not know all the steps that Japan has taken to accomplish so much in this area; in fact, the Japanese themselves cannot attribute all the observed declines in mortality directly to specific actions. Still, our knowledge of the Japanese way of life suggests some possibilities. Japan has universal availability of high-quality medical care. The Japanese have historically had an unusually low-fat diet, although this may be changing today as American fast-food chains become increasingly popular there. Finally, Japan's well-known economic accomplishments have led to a high standard of living for most Japanese, and high living standards are ordinarily associated with low mortality. Americans may be able to learn much more from the Japanese experience and apply those lessons here.

<sup>2</sup>This information is from *The Guinness Book of World Records 1993*. New York, NY: Bantam Books, April 1993.



## APPENDIX

## TABLE A-1

JAPANESE MORTALITY RATES FOR MEN BY LIFE TABLE  
(PER THOUSAND)

Age	Life Table*															
	1	2	3	4	5	6	8	9	10	11	12	13	14	15	16	17
0	148.95	156.86	160.50	162.04	140.10	113.03	85.98	56.69	41.83	33.33	20.71	14.81	11.10	8.26	5.87	4.95
1	44.72	36.86	44.10	48.45	43.12	36.99	33.16	11.53	5.76	3.72	2.17	1.67	1.40	1.05	0.86	0.78
2	29.56	25.91	23.57	26.11	22.37	20.45	19.17	8.90	4.63	2.89	1.64	1.25	1.01	0.80	0.62	0.57
3	20.11	17.00	14.73	16.55	15.00	13.49	11.03	6.58	3.64	2.25	1.28	0.99	0.76	0.62	0.44	0.42
4	13.84	11.19	10.27	10.50	9.81	9.11	7.01	4.61	2.80	1.77	1.05	0.82	0.62	0.50	0.34	0.33
5	9.99	7.87	7.10	7.04	6.44	6.48	5.13	3.10	2.13	1.42	0.91	0.73	0.55	0.43	0.30	0.29
6	7.79	5.85	5.39	5.34	4.85	4.60	3.83	2.24	1.67	1.17	0.81	0.66	0.50	0.39	0.28	0.25
7	6.35	4.75	4.49	4.58	3.98	3.61	3.08	1.79	1.37	0.98	0.71	0.56	0.44	0.34	0.26	0.22
8	5.40	4.12	3.91	3.92	3.35	3.00	2.59	1.51	1.12	0.83	0.61	0.47	0.37	0.29	0.24	0.18
9	4.81	3.64	3.49	3.41	2.86	2.61	2.23	1.26	0.92	0.72	0.53	0.41	0.32	0.24	0.20	0.15
10	4.51	3.31	3.20	3.17	2.63	2.40	1.96	1.09	0.79	0.64	0.47	0.38	0.28	0.21	0.18	0.14
11	4.22	3.16	3.06	3.07	2.44	2.26	1.78	1.01	0.73	0.58	0.44	0.39	0.28	0.20	0.18	0.15
12	4.12	3.17	3.12	3.14	2.51	2.34	1.70	0.96	0.73	0.55	0.44	0.40	0.27	0.20	0.17	0.16
13	4.27	3.54	3.58	3.57	2.90	2.63	1.83	0.98	0.73	0.57	0.47	0.42	0.29	0.23	0.20	0.18
14	4.65	4.14	4.27	4.52	3.70	3.43	2.13	1.04	0.77	0.66	0.55	0.51	0.39	0.32	0.28	0.23
15	5.21	4.75	4.99	5.97	5.02	4.79	2.61	1.23	0.90	0.83	0.68	0.69	0.56	0.46	0.42	0.34
16	5.95	5.51	5.88	7.66	6.49	6.35	3.29	1.55	1.12	1.06	0.84	0.93	0.75	0.63	0.60	0.50
17	6.67	6.33	6.82	9.20	8.00	7.82	4.28	1.94	1.45	1.33	0.98	1.14	0.92	0.77	0.77	0.66
18	7.38	7.13	7.69	10.32	9.11	8.88	5.51	2.39	1.81	1.57	1.11	1.27	1.02	0.85	0.88	0.78
19	7.84	7.81	8.40	10.83	9.71	9.50	6.74	2.82	2.13	1.77	1.22	1.31	1.05	0.88	0.91	0.84
20	8.21	8.30	8.87	10.80	9.82	9.96	7.69	3.14	2.40	1.92	1.33	1.32	1.05	0.89	0.90	0.83
21	8.44	8.60	9.09	10.60	9.72	10.16	8.33	3.39	2.62	2.06	1.43	1.33	1.06	0.88	0.86	0.81
22	8.66	8.72	9.11	10.39	9.52	10.09	8.82	3.67	2.79	2.18	1.52	1.32	1.07	0.87	0.82	0.78
23	8.77	8.70	8.99	10.20	9.26	9.88	9.24	3.96	2.87	2.27	1.57	1.30	1.07	0.85	0.79	0.76
24	8.81	8.56	8.78	9.91	8.96	9.50	9.55	4.11	2.91	2.32	1.60	1.30	1.06	0.85	0.78	0.75
25	8.80	8.38	8.54	9.51	8.61	9.22	9.60	4.19	2.94	2.33	1.60	1.34	1.05	0.85	0.79	0.73
26	8.76	8.18	8.29	9.11	8.25	8.84	9.30	4.26	2.92	2.32	1.60	1.39	1.04	0.86	0.80	0.71
27	8.71	8.00	8.07	8.79	8.02	8.54	8.96	4.26	2.87	2.31	1.61	1.45	1.04	0.89	0.81	0.71
28	8.67	7.89	7.92	8.51	7.75	8.22	8.72	4.33	2.85	2.28	1.66	1.49	1.06	0.91	0.81	0.73
29	8.63	7.85	7.80	8.32	7.53	7.91	8.54	4.43	2.86	2.26	1.74	1.51	1.10	0.93	0.80	0.75

TABLE A-1—Continued

Age	Life Table*															
	1	2	3	4	5	6	8	9	10	11	12	13	14	15	16	17
30	8.63	7.87	7.73	8.23	7.39	7.69	8.44	4.37	2.89	2.26	1.82	1.54	1.16	0.96	0.80	0.78
31	8.66	7.95	7.71	8.23	7.29	7.59	8.45	4.24	2.91	2.28	1.90	1.59	1.22	1.00	0.83	0.80
32	8.73	8.08	7.74	8.22	7.33	7.53	8.53	4.25	2.97	2.36	2.00	1.67	1.31	1.05	0.90	0.83
33	8.86	8.25	7.81	8.32	7.46	7.57	8.62	4.33	3.09	2.48	2.12	1.80	1.39	1.12	0.99	0.87
34	9.03	8.45	7.94	8.42	7.60	7.51	8.55	4.39	3.20	2.61	2.24	1.97	1.47	1.21	1.08	0.92
35	9.27	8.69	8.10	8.71	7.70	7.60	8.53	4.49	3.27	2.72	2.35	2.14	1.59	1.32	1.17	0.99
36	9.55	8.96	8.29	8.97	7.78	7.63	8.63	4.70	3.33	2.83	2.47	2.32	1.74	1.45	1.26	1.07
37	9.90	9.27	8.54	9.31	8.03	7.82	8.74	4.86	3.46	2.96	2.62	2.51	1.92	1.59	1.37	1.17
38	10.29	9.61	8.84	9.63	8.46	8.11	8.84	5.01	3.65	3.16	2.82	2.71	2.12	1.72	1.51	1.29
39	10.72	9.99	9.19	10.07	9.01	8.46	8.95	5.25	3.86	3.39	3.02	2.92	2.34	1.87	1.66	1.40
40	11.19	10.40	9.59	10.53	9.58	8.91	9.10	5.61	4.06	3.62	3.21	3.12	2.59	2.05	1.83	1.55
41	11.68	10.87	10.02	10.98	10.03	9.33	9.37	5.91	4.29	3.85	3.41	3.32	2.87	2.25	2.02	1.72
42	12.21	11.38	10.51	11.53	10.61	9.81	9.78	6.21	4.62	4.08	3.66	3.54	3.18	2.49	2.22	1.88
43	12.77	11.94	11.04	12.24	11.31	10.50	10.28	6.60	5.06	4.38	3.98	3.79	3.49	2.77	2.42	2.06
44	13.38	12.58	11.61	12.97	12.00	11.13	10.71	7.10	5.53	4.77	4.34	4.07	3.78	3.11	2.66	2.28
45	14.06	13.28	12.24	13.71	12.69	11.85	11.08	7.49	6.02	5.21	4.72	4.38	4.04	3.53	2.95	2.54
46	14.81	14.04	12.92	14.42	13.50	12.47	11.53	7.98	6.63	5.70	5.18	4.70	4.31	3.99	3.29	2.84
47	15.64	14.87	13.67	15.28	14.38	13.48	12.27	8.73	7.30	6.28	5.70	5.06	4.60	4.44	3.66	3.15
48	16.56	15.77	14.49	16.32	15.40	14.74	13.10	9.45	7.94	6.95	6.27	5.52	4.91	4.84	4.08	3.44
49	17.56	16.73	15.40	17.55	16.41	16.06	13.94	10.05	8.56	7.67	6.83	6.07	5.29	5.18	4.56	3.72
50	18.64	17.75	16.40	18.62	17.50	17.25	14.82	10.73	9.23	8.47	7.39	6.66	5.73	5.51	5.10	4.05
51	19.79	18.87	17.50	19.76	18.76	18.29	15.89	11.54	10.00	9.34	8.03	7.28	6.18	5.89	5.70	4.46
52	21.04	20.09	18.68	21.01	20.15	19.45	17.29	12.56	10.95	10.28	8.82	7.94	6.67	6.35	6.29	4.95
53	22.41	21.41	19.98	22.69	21.68	21.04	18.68	13.65	12.05	11.31	9.80	8.70	7.23	6.86	6.86	5.57
54	23.90	22.88	21.38	24.36	23.41	22.51	19.81	14.81	13.15	12.45	10.85	9.60	7.90	7.39	7.43	6.30
55	25.56	24.48	22.91	26.27	24.95	23.98	21.22	16.10	14.15	13.74	11.99	10.67	8.72	7.96	7.98	7.10
56	27.40	26.24	24.57	28.53	26.89	25.90	23.39	17.62	15.19	15.14	13.27	11.86	9.71	8.58	8.54	7.91
57	29.43	28.16	26.38	31.03	29.07	28.17	25.80	19.58	16.63	16.73	14.68	13.11	10.74	9.34	9.10	8.73
58	31.64	30.27	28.36	33.72	31.45	30.60	28.08	21.53	18.67	18.42	16.27	14.45	11.74	10.29	9.76	9.54
59	33.99	32.56	30.51	36.57	33.91	33.15	30.35	22.99	20.90	20.19	18.08	15.93	12.75	11.35	10.54	10.40

\*No 7th Life Table was produced because of World War II.

TABLE A-1—Continued

Age	Life Table*																
	1	2	3	4	5	6	8	9	10	11	12	13	14	15	16	17	
60	36.49	35.06	32.84	39.15	36.71	35.54	33.25	24.77	22.97	22.04	19.97	17.67	13.93	12.45	11.44	11.32	
61	39.09	37.78	35.35	41.96	39.77	38.05	36.65	27.29	25.02	24.07	22.04	19.70	15.34	13.62	12.37	12.28	
62	41.85	40.74	38.05	44.93	43.54	40.26	40.07	31.16	27.29	26.49	24.51	21.95	17.01	14.98	13.37	13.23	
63	44.78	43.97	40.99	48.64	47.29	44.41	43.48	34.07	29.88	29.18	27.30	24.43	18.89	16.54	14.55	14.24	
64	47.96	47.46	44.16	52.77	51.21	48.00	47.16	37.21	32.64	32.19	30.20	27.11	20.98	18.25	15.92	15.36	
65	51.41	51.21	47.60	57.05	54.86	51.91	51.10	40.59	35.63	35.57	33.05	30.03	23.51	20.15	17.42	16.64	
66	55.25	55.22	51.35	61.30	58.98	56.09	55.28	44.22	39.57	39.10	36.10	33.25	26.49	22.31	19.23	18.05	
67	59.46	59.52	55.44	65.94	63.28	60.63	59.77	48.12	43.78	42.76	39.56	36.83	29.75	24.86	21.39	19.68	
68	64.06	64.14	59.88	71.66	68.26	65.56	64.52	52.32	47.81	46.94	43.83	40.70	33.10	27.85	23.79	21.60	
69	69.07	69.10	64.66	78.17	73.99	70.89	69.64	56.86	52.06	51.62	48.85	44.94	36.55	31.20	26.30	23.82	
70	74.45	74.45	69.78	84.80	80.35	76.68	75.06	61.70	57.04	56.96	54.36	49.57	40.24	35.01	29.08	26.41	
71	80.22	80.22	75.21	91.19	87.28	82.89	80.89	66.95	62.54	62.90	60.07	54.62	44.53	39.16	32.32	29.46	
72	86.38	86.40	80.98	98.51	93.62	89.66	87.05	72.52	68.76	69.51	66.03	60.38	49.58	43.77	36.23	32.92	
73	92.94	92.96	87.00	106.49	101.02	96.92	93.67	78.57	74.93	76.56	72.45	66.73	55.07	48.69	40.84	36.79	
74	99.92	99.84	93.23	115.17	108.94	104.72	100.63	85.02	81.60	84.09	79.55	73.58	60.94	53.92	46.05	40.95	
75	107.40	107.50	101.32	124.46	117.53	113.26	108.15	91.97	87.86	92.16	87.82	81.06	67.00	59.81	52.04	45.42	
76	115.40	115.80	108.38	134.48	126.61	122.32	116.06	99.37	95.10	100.80	96.85	88.99	73.65	66.48	58.66	50.55	
77	123.90	124.70	116.67	145.27	136.46	132.12	124.50	107.34	102.81	109.70	106.33	96.95	81.37	74.02	65.71	56.61	
78	132.80	134.30	125.64	156.94	146.97	142.70	133.43	115.83	111.01	119.79	116.61	104.97	90.10	82.09	72.84	63.67	
79	142.20	144.70	135.31	169.27	158.15	153.98	143.04	124.95	119.72	130.26	127.83	113.54	99.80	90.85	80.20	71.48	
80	151.90	155.80	145.72	182.74	170.20	166.15	153.09	134.68	128.96	140.84	139.79	123.85	110.39	100.36	88.12	80.39	
81	161.50	167.80	156.92	197.05	182.98	179.20	163.82	145.07	138.77	152.44	152.55	135.33	121.61	110.01	97.17	89.97	
82	171.00	180.70	169.00	212.34	196.67	193.16	175.06	156.19	149.17	163.40	165.44	147.25	132.72	120.13	107.72	99.97	
83	180.10	194.60	182.00	228.59	211.36	208.21	187.10	167.95	160.18	174.33	178.53	159.70	144.07	131.04	118.98	110.32	
84	188.40	209.60	196.00	245.79	226.57	223.86	199.73	180.54	171.84	185.48	192.30	172.43	156.18	142.73	130.62	121.06	
85	195.70	225.80	211.08	264.60	243.20	240.96	213.21	193.89	184.16	197.12	207.47	185.42	169.57	154.64	143.31	132.40	
86	210.00	243.20	227.32	284.27	260.67	258.78	225.48	208.10	197.17	209.58	222.14	199.80	183.84	169.59	156.30	144.72	
87	225.30	261.90	244.81	304.68	278.88	278.39	243.74	223.38	210.90	222.98	235.59	215.60	198.51	184.81	170.16	158.47	
88	241.70	282.10	263.64	327.07	298.21	297.66	257.83	238.81	225.37	237.44	252.34	232.41	213.45	200.31	184.93	173.09	
89	259.30	303.80	283.93	351.16	318.32	320.10	273.54	256.18	240.59	253.15	269.67	245.83	228.41	216.07	200.64	188.16	

TABLE A-1---Continued

Age	Life Table*																
	1	2	3	4	5	6	8	9	10	11	12	13	14	15	16	17	
90	278.00	327.20	305.77	372.76	341.41	342.75	291.63	273.92	256.59	270.23	287.75	266.44	242.25	232.10	217.34	203.23	
91	298.50	352.40	329.30	400.00	361.20	363.90	309.15	292.65	273.36	288.87	306.58	285.03	259.05	248.37	235.06	219.57	
92	320.30	379.50	354.63	426.67	387.43	391.89	328.77	311.76	290.95	309.09	326.17	304.46	275.13	264.89	253.81	236.65	
93	343.60	408.70	381.91	453.49	410.26	416.30	346.94	333.33	309.33	331.19	346.50	324.73	291.54	281.64	273.62	254.49	
94	368.70	440.20	411.29	483.28	436.23	444.16	369.79	354.70	328.52	355.19	367.56	345.83	308.29	298.62	294.51	273.10	
95	395.60	474.00	442.93	510.59	462.72	470.32	386.94	377.48	348.52	381.31	389.33	367.75	325.37	315.80	316.47	292.47	
96	424.40	510.60	477.01	540.87	488.04	500.00	410.89	398.94	369.30	409.65	411.77	390.46	342.75	333.18	339.52	312.59	
97	455.40	549.80	513.70	573.30	519.63	529.31	433.64	424.78	390.86	440.40	434.85	413.93	360.42	350.74	363.63	333.47	
98	488.60	592.20	553.22	602.45	546.69	560.44	456.97	446.15	413.16	473.60	458.53	438.12	378.38	368.47	388.78	355.07	
99	521.80	637.80	595.78	634.26	574.25	589.58	480.66	472.22	436.18	509.15	482.75	462.98	396.60	386.34	414.93	377.38	
100	562.40	686.90	641.62	666.24	604.84	621.32	505.73	503.12	459.87	546.87	507.44	488.44	415.05	404.35	442.01	400.37	
101	603.40	739.80	690.98	---	632.65	651.47	---	530.47	484.17	586.45	532.54	514.43	433.73	422.47	469.96	423.99	
102	647.40	796.70	744.14	---	663.89	683.08	---	558.35	509.02	627.49	557.97	540.86	452.59	440.69	498.69	448.21	
103	694.60	858.10	---	---	---	713.59	---	586.57	534.35	669.45	583.62	567.64	471.63	458.98	528.08	472.96	
104	745.20	924.20	---	---	---	---	---	1000.00	560.07	---	609.40	594.65	490.81	477.32	558.00	498.19	
105	799.60	995.30	---	---	---	---	---	---	586.08	---	---	621.76	510.09	495.68	588.31	523.81	
106	857.80	1000.00	---	---	---	---	---	---	---	---	---	---	529.46	514.05	618.82	549.74	
107	920.40	---	---	---	---	---	---	---	---	---	---	---	548.87	532.40	649.35	575.89	
108	987.50	---	---	---	---	---	---	---	---	---	---	---	568.29	550.70	---	602.15	
109	1000.00	---	---	---	---	---	---	---	---	---	---	---	---	---	---	628.42	

\*No 7th Life Table was produced because of World War II.

TABLE A-2  
JAPANESE MORTALITY RATES FOR WOMEN BY LIFE TABLE  
(PER THOUSAND)

Age	Life Table*															
	1	2	3	4	5	6	8	9	10	11	12	13	14	15	16	17
0	133.80	140.92	145.04	144.00	124.14	99.17	76.64	49.73	36.89	27.39	16.32	11.49	8.71	6.58	5.10	4.17
1	41.62	35.98	43.70	47.57	42.10	35.27	32.45	11.63	5.32	3.23	1.80	1.37	1.11	0.89	0.70	0.64
2	28.24	26.02	23.86	26.27	22.65	19.96	18.95	8.79	4.34	2.44	1.29	0.97	0.78	0.62	0.47	0.42
3	19.46	17.32	14.73	17.41	15.57	13.61	10.91	6.47	3.45	1.85	0.95	0.71	0.56	0.43	0.31	0.27
4	13.56	11.68	10.37	11.46	10.60	9.32	6.79	4.49	2.67	1.42	0.73	0.55	0.42	0.32	0.22	0.19
5	9.78	8.10	7.57	7.76	7.09	6.57	4.79	2.94	1.95	1.12	0.61	0.46	0.35	0.27	0.19	0.16
6	7.43	5.96	5.81	5.75	5.21	4.55	3.48	2.02	1.34	0.90	0.52	0.40	0.30	0.24	0.17	0.16
7	6.03	4.81	4.86	4.90	4.12	3.51	2.75	1.53	0.93	0.71	0.43	0.34	0.25	0.20	0.15	0.14
8	5.17	4.22	4.32	4.15	3.45	2.93	2.27	1.22	0.73	0.57	0.36	0.30	0.22	0.18	0.13	0.13
9	4.66	3.91	4.03	3.75	3.04	2.60	1.99	1.05	0.64	0.49	0.31	0.27	0.20	0.15	0.12	0.12
10	4.41	3.77	3.96	3.73	3.00	2.54	1.83	0.95	0.62	0.46	0.28	0.25	0.18	0.14	0.12	0.11
11	4.32	3.85	4.18	3.86	3.10	2.68	1.74	0.92	0.62	0.44	0.27	0.24	0.18	0.13	0.12	0.10
12	4.46	4.21	4.75	4.35	3.45	3.16	1.76	0.95	0.62	0.42	0.28	0.24	0.19	0.13	0.12	0.10
13	4.83	4.81	5.58	5.62	4.32	4.06	2.00	1.04	0.62	0.41	0.30	0.25	0.20	0.13	0.14	0.11
14	5.28	5.56	6.53	7.26	5.88	5.44	2.45	1.12	0.65	0.43	0.33	0.28	0.22	0.16	0.16	0.14
15	5.95	6.38	7.55	9.01	7.32	6.95	3.05	1.29	0.72	0.49	0.36	0.32	0.25	0.20	0.18	0.17
16	6.65	7.24	8.56	10.26	8.62	8.07	3.72	1.51	0.84	0.61	0.40	0.37	0.28	0.24	0.21	0.20
17	7.38	8.06	9.45	11.15	9.49	8.74	4.46	1.81	1.03	0.78	0.46	0.43	0.33	0.28	0.25	0.24
18	8.08	8.76	10.12	11.67	10.09	9.10	5.34	2.17	1.27	0.95	0.52	0.50	0.38	0.31	0.28	0.27
19	8.63	9.29	10.56	11.99	10.44	9.34	6.27	2.53	1.49	1.09	0.59	0.56	0.44	0.34	0.30	0.29
20	8.99	9.64	10.79	12.08	10.59	9.60	6.94	2.77	1.68	1.21	0.67	0.61	0.49	0.35	0.31	0.30
21	9.25	9.85	10.84	12.14	10.60	9.70	7.31	2.96	1.83	1.31	0.75	0.66	0.52	0.36	0.31	0.31
22	9.50	9.94	10.78	12.05	10.43	9.67	7.51	3.25	1.96	1.39	0.82	0.69	0.55	0.37	0.32	0.32
23	9.66	9.96	10.65	11.81	10.19	9.60	7.68	3.55	2.06	1.45	0.88	0.72	0.57	0.37	0.33	0.33
24	9.77	9.95	10.48	11.47	9.93	9.39	7.78	3.71	2.11	1.48	0.93	0.75	0.59	0.39	0.35	0.33
25	9.84	9.92	10.31	11.17	9.64	9.06	7.65	3.77	2.16	1.51	0.97	0.78	0.60	0.43	0.37	0.33
26	9.89	9.90	10.14	10.91	9.42	8.67	7.36	3.84	2.21	1.54	1.03	0.81	0.60	0.46	0.38	0.32
27	9.93	9.90	10.01	10.81	9.23	8.37	7.20	3.95	2.28	1.57	1.06	0.84	0.61	0.49	0.40	0.34
28	9.98	9.90	9.91	10.68	9.05	8.18	7.21	3.95	2.35	1.59	1.08	0.87	0.64	0.50	0.43	0.36
29	10.06	9.93	9.84	10.54	8.94	8.09	7.28	3.97	2.40	1.61	1.11	0.88	0.68	0.52	0.46	0.39

TABLE A-2 *Continued*

Age	Life Table <sup>b</sup>															
	1	2	3	4	5	6	8	9	10	11	12	13	14	15	16	17
30	10.15	9.98	9.83	10.45	8.94	8.06	7.26	3.99	2.46	1.65	1.15	0.91	0.72	0.54	0.48	0.42
31	10.27	10.06	9.84	10.43	8.91	8.02	7.15	4.00	2.53	1.72	1.20	0.96	0.75	0.57	0.51	0.44
32	10.42	10.17	9.89	10.43	8.98	8.09	7.08	4.03	2.57	1.80	1.27	1.02	0.79	0.62	0.54	0.45
33	10.60	10.31	9.98	10.49	9.05	8.08	7.04	4.08	2.63	1.89	1.36	1.10	0.84	0.67	0.58	0.49
34	10.81	10.48	10.09	10.58	9.14	8.10	7.00	4.14	2.72	1.96	1.44	1.18	0.89	0.72	0.62	0.53
35	11.02	10.67	10.21	10.73	9.26	8.24	7.00	4.22	2.85	2.04	1.51	1.25	0.95	0.77	0.67	0.58
36	11.23	10.87	10.34	10.92	9.43	8.43	7.02	4.31	2.98	2.13	1.60	1.33	1.02	0.82	0.72	0.63
37	11.43	11.05	10.46	11.07	9.55	8.59	7.10	4.41	3.08	2.26	1.69	1.42	1.10	0.89	0.79	0.68
38	11.59	11.21	10.55	11.23	9.74	8.71	7.18	4.60	3.17	2.42	1.79	1.52	1.20	0.97	0.86	0.73
39	11.72	11.32	10.62	11.32	9.95	8.79	7.29	4.77	3.30	2.58	1.91	1.64	1.30	1.04	0.94	0.79
40	11.79	11.38	10.65	11.34	10.05	9.01	7.51	4.95	3.41	2.71	2.03	1.77	1.41	1.12	1.02	0.89
41	11.83	11.39	10.65	11.29	10.07	9.02	7.82	5.09	3.55	2.81	2.18	1.93	1.54	1.22	1.12	0.99
42	11.85	11.38	10.63	11.20	10.05	9.00	8.02	5.23	3.76	2.94	2.36	2.10	1.68	1.33	1.23	1.09
43	11.88	11.35	10.62	11.12	10.00	9.06	8.07	5.36	4.01	3.15	2.58	2.26	1.81	1.46	1.34	1.17
44	11.96	11.38	10.66	11.19	10.03	9.21	8.05	5.58	4.27	3.45	2.84	2.42	1.94	1.60	1.44	1.25
45	12.12	11.49	10.76	11.30	10.17	9.49	8.20	5.90	4.50	3.79	3.11	2.60	2.10	1.75	1.56	1.34
46	12.39	11.71	10.97	11.58	10.32	9.71	8.52	6.29	4.83	4.15	3.42	2.81	2.30	1.92	1.68	1.47
47	12.78	12.04	11.29	11.83	10.77	10.15	8.97	6.73	5.34	4.51	3.74	3.10	2.53	2.11	1.83	1.63
48	13.29	12.51	11.72	12.27	11.34	10.70	9.62	7.24	5.89	4.89	4.09	3.45	2.77	2.32	2.01	1.80
49	13.91	13.10	12.30	13.04	11.94	11.40	10.39	7.68	6.35	5.26	4.42	3.80	3.02	2.55	2.23	1.98
50	14.64	13.80	12.96	13.82	12.62	12.11	11.11	8.04	6.71	5.67	4.73	4.12	3.30	2.79	2.46	2.17
51	15.43	14.58	13.72	14.55	13.32	12.81	11.71	8.67	7.09	6.17	5.08	4.43	3.62	3.04	2.69	2.34
52	16.37	15.44	14.56	15.26	14.12	13.56	12.31	9.46	7.65	6.73	5.52	4.79	3.96	3.26	2.90	2.48
53	17.37	16.37	15.46	16.01	15.04	14.40	12.90	10.12	8.31	7.34	6.04	5.25	4.30	3.48	3.10	2.64
54	18.48	17.39	16.44	17.09	15.99	15.12	13.55	10.69	8.92	7.88	6.59	5.78	4.64	3.76	3.30	2.85
55	19.72	18.52	17.50	18.39	16.86	15.90	14.39	11.46	9.47	8.42	7.17	6.34	5.00	4.10	3.52	3.09
56	21.11	19.77	18.65	19.74	17.89	16.95	15.64	12.46	10.14	9.09	7.83	6.90	5.44	4.48	3.79	3.38
57	22.67	21.18	19.90	21.29	19.18	18.10	16.97	13.89	11.11	9.97	8.56	7.43	5.94	4.87	4.13	3.69
58	24.38	22.77	21.29	22.87	20.71	19.28	18.34	15.10	12.34	10.99	9.37	8.05	6.48	5.29	4.51	4.03
59	26.25	24.53	22.83	24.47	22.34	20.85	19.93	15.88	13.50	12.10	10.22	8.88	7.08	5.82	4.94	4.41

TABLE A-2—Continued

Age	Life Table*															
	1	2	3	4	5	6	8	9	10	11	12	13	14	15	16	17
60	28.26	26.50	24.56	26.40	24.16	22.74	22.07	16.90	14.54	13.17	11.18	9.98	7.72	6.44	5.42	4.81
61	30.42	28.69	26.47	28.42	26.08	24.46	24.47	18.57	15.86	14.35	12.34	11.22	8.47	7.16	5.97	5.22
62	32.74	31.10	28.60	30.98	28.54	26.27	26.74	20.28	17.61	15.74	13.72	12.50	9.36	7.89	6.63	5.67
63	35.25	33.76	30.98	33.80	31.06	28.76	28.27	21.79	19.47	17.42	15.24	13.75	10.41	8.70	7.38	6.19
64	37.99	36.68	33.61	36.77	34.06	31.28	30.79	25.05	21.15	19.35	16.99	14.99	11.62	9.62	8.21	6.81
65	41.01	39.87	36.54	39.77	37.08	34.08	33.53	27.46	22.99	21.56	18.96	16.52	13.10	10.63	9.10	7.52
66	44.37	43.37	39.78	43.03	40.31	37.16	36.63	30.09	25.69	24.00	21.20	18.44	14.77	11.80	10.05	8.34
67	48.09	47.17	43.34	46.76	43.87	40.59	39.93	32.98	28.80	26.58	23.70	20.63	16.57	13.20	11.11	9.30
68	52.18	51.30	47.28	51.34	48.17	44.42	43.59	36.16	31.94	29.49	26.43	23.06	18.50	14.90	12.37	10.44
69	56.68	55.81	51.61	56.28	52.68	48.61	47.63	39.65	35.28	32.85	29.35	25.91	20.69	16.92	13.83	11.76
70	61.54	60.72	56.57	61.57	57.67	53.33	52.03	43.51	38.79	36.91	32.70	29.22	23.26	19.34	15.47	13.24
71	66.87	66.05	61.58	67.04	62.41	58.46	56.84	47.70	43.48	41.72	36.84	33.14	26.33	22.13	17.34	14.95
72	72.60	71.83	66.88	73.19	68.03	64.21	62.14	52.37	47.92	47.03	41.59	37.65	30.00	25.19	19.56	16.94
73	78.80	78.11	72.43	80.05	73.84	70.55	67.89	57.42	52.75	52.69	46.70	42.62	33.97	28.50	22.25	19.17
74	85.50	84.94	78.27	87.60	81.35	77.59	74.24	63.00	57.99	58.62	52.39	47.80	38.39	32.13	25.36	21.61
75	92.80	92.00	84.46	95.85	88.92	85.30	81.17	69.12	63.67	65.01	59.18	53.60	43.31	36.27	29.21	24.35
76	100.60	99.65	91.08	104.83	97.20	93.82	88.71	75.79	69.83	72.33	66.93	60.34	48.89	41.05	33.82	27.57
77	109.00	107.90	98.26	114.80	106.23	103.25	96.98	83.13	76.49	80.27	75.56	67.63	55.37	46.73	38.88	31.45
78	117.90	116.90	106.09	125.58	116.15	113.64	105.97	91.13	83.70	88.82	84.91	75.02	62.98	53.10	44.30	36.16
79	127.10	126.60	114.69	137.38	126.82	124.97	115.78	99.89	91.51	97.32	94.73	82.83	71.47	60.40	50.09	41.56
80	136.50	137.20	124.10	150.26	138.54	137.53	126.43	109.45	99.94	106.14	105.41	92.00	80.73	68.41	56.43	47.85
81	145.90	148.60	134.65	164.26	151.28	151.18	138.05	119.84	109.05	116.39	117.55	102.42	90.99	77.27	63.73	55.02
82	155.10	160.90	145.79	179.41	165.16	166.29	150.64	131.23	118.87	126.54	129.93	113.77	101.57	86.98	72.10	63.02
83	163.90	174.30	157.85	196.06	180.06	182.59	164.35	143.56	129.46	137.26	141.71	126.26	111.88	97.61	81.44	71.76
84	172.20	188.80	170.91	213.89	196.18	200.52	179.05	156.99	140.87	148.72	152.60	139.73	122.89	109.02	91.86	81.19
85	180.00	204.50	185.04	233.15	213.72	220.00	195.05	171.58	153.14	160.85	163.95	153.43	135.50	121.55	103.21	91.25
86	194.50	221.50	200.34	253.94	232.48	241.01	212.37	187.26	166.31	173.95	177.03	167.31	149.34	135.01	116.02	102.49
87	210.20	239.90	216.91	276.53	252.96	263.74	230.79	204.37	180.45	188.09	192.78	181.36	164.16	148.88	130.83	114.98
88	227.20	259.80	234.85	299.81	274.41	288.31	250.88	222.69	195.59	203.37	210.32	195.44	179.96	163.14	146.49	128.56
89	245.60	281.40	254.27	326.23	297.58	314.65	272.17	242.51	211.78	219.92	226.99	210.20	197.09	179.00	162.03	143.27

TABLE A-2—Continued

Age	Life Table*															
	1	2	3	4	5	6	8	9	10	11	12	13	14	15	16	17
90	265.40	304.80	275.30	353.51	322.69	343.32	294.70	263.59	229.06	237.83	244.53	225.50	213.97	197.28	177.70	158.76
91	286.80	330.10	298.07	380.85	349.04	373.61	319.52	286.48	247.48	257.22	262.96	241.22	230.49	214.55	193.47	175.17
92	310.00	357.60	322.73	412.37	375.73	403.54	344.69	310.77	267.07	278.10	282.28	257.35	247.18	232.82	210.95	192.22
93	335.10	387.30	349.41	443.86	407.52	438.94	371.65	336.29	287.84	300.71	302.50	273.89	266.12	252.11	230.26	210.44
94	362.10	419.50	378.31	477.39	433.86	474.12	401.00	363.82	309.83	325.03	323.63	290.83	282.07	272.43	251.53	229.72
95	391.40	454.40	409.60	511.07	470.09	510.07	430.96	392.57	333.03	351.23	345.63	308.15	299.47	293.78	274.88	249.47
96	423.00	492.10	443.47	547.33	500.88	547.95	463.24	422.87	357.45	379.39	368.51	325.86	316.99	316.19	300.42	270.02
97	457.10	533.00	480.15	583.64	537.10	585.86	495.21	456.22	383.05	409.63	392.23	343.93	334.62	339.62	328.23	291.35
98	494.10	577.30	519.86	620.09	569.47	625.61	528.46	483.05	409.81	441.96	416.76	362.35	352.34	364.07	358.35	313.46
99	534.00	625.30	562.85	656.32	606.38	664.50	562.64	524.59	437.67	476.29	442.04	381.11	370.14	389.50	390.79	336.31
100	577.10	677.30	609.40	693.98	642.34	702.91	597.90	551.72	466.56	512.47	468.02	400.17	388.00	415.86	425.52	359.90
101	623.70	733.60	659.79	728.42	677.58	741.83	—	591.94	496.37	550.27	494.61	419.52	405.91	443.11	462.41	384.17
102	674.10	794.60	714.37	—	713.28	777.22	—	627.83	526.98	589.39	521.75	439.13	423.85	471.15	501.30	409.09
103	728.50	860.70	—	—	—	813.07	—	663.76	558.24	629.42	549.31	458.97	441.80	499.90	541.91	434.61
104	787.30	932.20	—	—	—	—	—	1000.00	589.99	669.90	577.20	479.01	459.74	529.24	583.86	460.65
105	850.90	1000.00	—	—	—	—	—	—	622.01	710.26	605.27	499.22	477.67	559.05	626.71	487.16
106	919.60	—	—	—	—	—	—	—	—	—	633.40	519.56	495.54	589.18	669.88	514.05
107	993.90	—	—	—	—	—	—	—	—	—	—	539.99	513.36	619.46	712.72	541.22
108	1000.00	—	—	—	—	—	—	—	—	—	—	560.47	531.09	649.70	754.52	568.57
109	—	—	—	—	—	—	—	—	—	—	—	580.96	548.72	679.73	—	596.00
110	—	—	—	—	—	—	—	—	—	—	—	—	566.22	—	—	623.39
111	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	650.60

\*No 7th Life Table was produced because of World War II.