

# Centenarians in Japan An Overview

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## 1. Trends of the number of centenarians

Since 1963, when the Old-age Welfare Law was introduced, the Ministry of Health and Welfare has been required to present certificates and token gifts in the name of the Prime Minister to those who will become 100 years old between April of one year and March of the following year, and to publish a list of centenarians each year.

In 1983 the scope of presentations was expanded to include those living abroad, in commemoration of 20th anniversary of Old-age Welfare Law. The presentations took place at embassies and consulates under the auspices of the Ministry of Foreign Affairs. The numbers of centenarians in the whole of Japan, in Okinawa Prefecture, where centenarians have the highest rate, and in Honolulu, as an example overseas, are shown in Table 1 for 1963 and 1983 through 1988. The number of centenarians in 1963 was 153 (20 male, 133 female), with a low rate of 0.16 per 100,000 of population. It increased steadily to exceed 1,000 in 1981, when there were 1,072, and reached 1,200 in 1982 with 1.01 per 100,000 (the figures for 1982 are not shown in the table). There were 2,668 in 1988, this was 17 times as many as in 1963, with 2.20 per 100,000.

The number of centenarians will continue to increase and will exceed 5,400 in the year 2000, with probably more than 4 per 100,000. One of the reasons to explain this rapid increase in the number of centenarians is improved mortality of old people. Expectations of Life at Birth and at Age 65 are shown for corresponding years for both sexes in Table 2.

Expectations of Life at Birth in 1963 were 67.21 for males and 72.34 for females, which were much lower than those in Sweden (71.60 for males, 75.70 for females) and in the Netherlands (71.1 for males, 75.9 for females), both for 1961-65; and still lower than those in U.S.A. (white, 67.5 for males, 74.4 for females) in 1963. But improvement in mortality was so outstanding in Japan after 1963 that it became the highest level in the world in 1987, with 75.61 for males and 81.39 for females. Increase of life expectancy was attributable to improvement in the survival of children, in particular a reduced infant mortality, until the 1960s. After 1970 lower mortality in older ages was the major contributor. This fact may be the cause of the steady increase of centenarians.

Table 1 includes the number of centenarians in Honolulu as an example abroad. Comparable figures in 1988 are available for San Francisco (2 male, 7 female, oldest 105 years old), Seattle (1 male, 1 female, oldest 101 years old), Chicago (1 male, 2 female, oldest 105 years old), New York (2 female, oldest 105 years old), Portland (2 female, oldest 104 years old) and Los Angeles (2 male, 7 female, oldest 105 years old).

## 2. Centenarians in Okinawa Prefecture and the Study of Makoto Suzuki

Okinawa Prefecture had by far the highest rate of centenarians in all prefectures at 10.01 per 100,000 population in 1988. Expectations of Life at Birth in Okinawa in 1985 were 75.9 for males and 82.6 for females, the latter being Japan's highest.

Table 1  
Number of Centenarians

Year	Japan			Okinawa Prefecture			Honolulu		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
1963	153 (0.16)	20	133	-	-	-	-	-	-
1983	1354 (1.14)	269	1085	58 (5.1)	12	46	7	3	4
1984	1563 (1.30)	347	1216	68 (5.93)	11	57	19	5	14
1985	1740 (1.45)	359	1381	76 (6.55)	11	65	25	5	20
1986	1851 (1.53)	361	1490	90 (7.65)	22	68	26	6	20
1987	2271 (1.85)	462	1809	97 (8.23)	19	78	27	5	22
1988	2668 (2.20)	562	2106	118 (10.01)	18	100	32	7	25

Note: Figures in parentheses indicate rate per 100,000.

**Table 2**  
**Life Expectancy at Birth and at Age 65**

Year	at Birth		at Age 65	
	Male	Female	Male	Female
1963	67.21	72.34	12.10	14.70
1981	73.79	79.13	14.85	17.93
1982	74.22	79.66	15.18	18.35
1983	74.20	79.78	15.19	18.40
1984	74.54	80.18	15.43	18.71
1985	74.78	80.48	15.52	18.94
1986	75.23	80.93	15.86	19.29
1987	75.61	81.39	16.12	19.67

Okinawa Prefecture is in the subtropical zone, with average temperatures in Naha higher than 20°C. between April and November, and higher than 16°C. between December and March without any snow fall. This warmer climate is good for health. One of the reasons for high expectation of life of the Japanese in Hawaii (77.74 for males, 81.54 for females in 1980) is the warm climate. Infant mortality in Okinawa in 1988 (5.0) was higher than

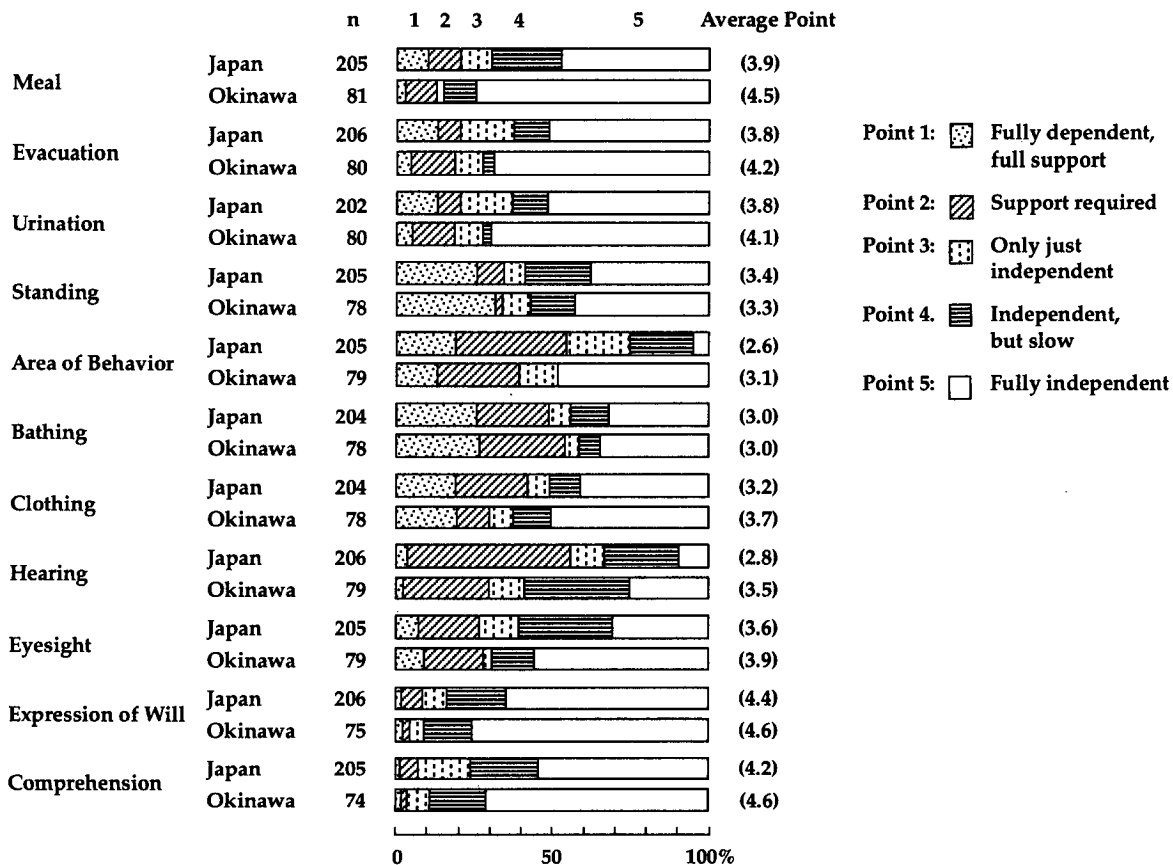
the national average (4.8); however, mortality after birth would be lower than others because of the warm climate. In terms of cause of death mortality rates are low for malignant neoplasm, diabetes mellitus, heart disease, hypertension, cerebrovascular disease, and in particular for stomach cancer.

Makoto Suzuki, Faculty of Medicine, University of Ryukus, wrote a book "Science of Centenarians" (1985, Shinchosha) about his continuing study on old people, including centenarians, in Okinawa Prefecture from 1976. The research included medical examinations. The following are his observations.

First, ADL (Activities of Daily Living) of centenarians were observed. ADL was evaluated on a scale of 5 points. 5 points is the maximum ability and 1 point is the minimum ability. Taking "meal" for example: 1 point is "fully dependent, full support"; 2 points is "support required"; 3 points is "only just independent"; 4 points is "independent but slow"; and 5 points is "fully independent".

Suzuki compared the ADL of 81 centenarians in Okinawa from his study between 1976 and 1982 with 214 centenarians in the whole of Japan, who were surveyed by the Japan Institute for Gerontological Research and Development in

**Figure 1**  
**ADL (Activities of Daily Livings)**  
**of Centenarians**



**Table 3**  
**Family History of Centenarians**

Age	Father	Mother	Brother	Sister	Spouse
	(No. of persons)				
≥ 100	0	2	0	2	2
91-99	1	3	6	21	7
81-90	6	14	19	28	12
≥ 80	30	28	88	75	72
Unknown	76	68	20	30	19
Total	114	114	133	156	112

1975. As shown in Figure 1, Okinawa is superior in all aspects, probably because old people can engage in outdoor farming throughout the year.

Second, 114 centenarians were asked about their family history in the survey made between 1976 and 1983. As shown in Table 3, there are too many "unknown" to make a definite conclusion, but their families enjoyed long lives in general. Concerning longevity and family history, I will mention in Section 4 the results of the survey made by the Japan Health Promotion and Fitness Foundation in 1981.

Third, in relation to increasing knowledge about leucocytes, Suzuki studied HLA (Human Leucocyte Antigen) on the 6th chromosome of 59 centenarians, to find only 2 (3.4%) with DRW9. DRW9 is possessed by more than 20% of the Japanese, and is known as a gene to trigger diseases such as rheumatism. Suzuki mentions that the probability of becoming a centenarian is 13.5 times higher for those without DRW9 compared to those with DRW9. In addition, many centenarians in Okinawa have DR1 which is believed to restrict diseases. Thus, centenarians in Okinawa possess genes for longevity.

Fourth, acquired factors were studied. Various amino acids compose protein, and they had been believed to decrease with age, just as protein does. Suzuki found, however, from a medical survey of Okinawans that the levels of amino acids, hardly changed between 20 and 80 years of age among healthy people. Even more, it increased in their 90s, then further increased after 100 to get close to an average healthy adult, proving good nutrition. In general, Okinawans have well-balanced nutrition with more meat and less salt.

Serum lipids of centenarians are lower than those in their 70s, and as low as an average adult. HDL cholesterol and Atherogenic Index for 10-year age groups are also shown in Table 4. Again, centenarians in Okinawa show healthy cholesterol levels and an Atherogenic Index as low as those in their 40s.

### 3. Research by the Ministry of Health and Welfare

A family register system was started in Japan in 1872. The Japanese family register system is one of best of such systems in the world, but it was not quite accurate in its early days in Meiji Era. The Tokyo Metropolitan Institute of Gerontology made a survey in 1972-73 on 117 centenarians in Japan.

Toshihisa Matsuzaki points out 5% errors in their family registrations. The most common errors in family registers are: (1) no registration was made at birth, or an older dead sibling's registration was inherited, (2) error of recording in the register, (3) error caused by rearrangement of the register after destruction by natural calamity.

An example of error (1) is S. Kawada (female) listed on the list of centenarians in 1977 as born on April 2, 1877. She corrected this in 1982, with the information that she inherited her dead elder sister's registration, and her real age was 10 years younger. M. Fujisawa (female), born on April 9, 1876, was the oldest living centenarian on the latest list, however, there is a suspicion that she inherited her sister's registration, and she may have been only 99. The case of S. Akiyama (female) is a bit different. Her date of birth was registered as November 4, 1877 at her marriage. But it was her sister's birth date, and the correct date was December 18, 1883.

An example of error (2) is Y. Kamata (female), born on February 28, 1876. Her register was wrongly recorded when she transferred it from Chiba Prefecture to Tokyo. The correct year of birth was 1886. S. Izumi (male, 1865.6.29-1986.2.21) is said to be the oldest person in the Guinness Book, however, Matsuzaki believes his age at death was 105 instead of 120.

Thus, family register is not always accurate for the early years. But after the survey of the Ministry of Health and Welfare, N. Kawatomo (female, 1863.8.5-1976.11.16) is most likely to be the oldest person at the age of 113 and 103 days. This is reliable because the record shows N. Komai married to K. Kawamoto on May 26, 1883 at the of 19. And this age at marriage is 100% reliable because both families are well known in the region.

J. F. Fries in U.S.A. studied more than 600 super-centenarians to find Pierre Joubert, a Canadian, as the oldest person who ever lived (1707.7.15-1814.11.16, 113 years and 124 days). W.C. Bowerman confirms Joubert's age in his paper of 1939. But the time he lived is long ago, and A. Comfort mentions in his "A Good Age" (1977) that Joubert believed he was 105 when he was thought to be 113. All considered, I believe N. Kawamoto was the oldest person ever lived.

**Table 4**  
**Average Cholesterol and Atherogenic Index of Okinawa**

Age	No. of Person	Cholesterol Total	Atherogenic HDL	Index
20s	95	171	54	2.3
30s	189	181	49	2.9
40s	298	190	52	3.0
50s	476	205	52	3.2
60s	383	207	51	3.4
70s	223	203	51	3.2
80s	79	201	54	3.0
90s	6	208	43	3.4
100s	64	179	46	3.1

4. Nation-wide Studies on Centenarians

There are three major studies on centenarians in Japan. They are: (1) Tokyo Metropolitan Institute of Gerontology, 1972-73, 117 cases, (2) Japan Institute for Gerontological Research and Development, 1975, 144 cases, (3) Japan Health Promotion and Fitness Foundation, 1980, 1,009 cases. (1) and (2) are general studies on medical, nutritional, psychological and social aspects, and (3) is mainly a nutritional study. The Japan Health Promotion and Fitness Foundation is planning a second study.

The following is a summary of the study by the Japan Health Promotion and Fitness Foundation which is the latest and largest of the three. In 1,009 cases, males were 181 (17.9%) and females were 828 (82.1%). Most of them were females, but ADL were always superior in males.

1. "Always in bed" was 18.2% in males and 27.9% in females, 1.5 times higher in females. Adding "in and out of bed" they become 33.1% in males, and 50.7% in females. "Walk considerably" was 26.0% in males and 12.3% in females, more than twice higher in males.
2. In "meal", "fully dependent, full support" was 6.6% in males and 9.9% in females. Adding "support required" they become 12.1% in males and 17.1% in females, 1.4 times higher in females. While "fully independent" was 62.5% in males and 52.1% in females, 1.2 times higher in males.
3. In "evacuation", "incontinence" was 7.2% in males and 20.8% in females, 2.9 times higher in females. Adding "support required" they become 13.8% in males and 28.3% in females, 2.1 times higher in females. While "fully independent" was 63.0% in males and 44.6% in females, 1.4 times higher in males.
4. In "urination", "incontinence" was 7.2% in males and 21.3% in females, 3 times higher in females. Adding "support required" they become 13.3% in males and 28.1% in females, 2.1 times higher in females. While "fully independent" was 60.2% in males and 42.4% in females, 1.4 times higher in males.
5. In "standing", "incompetent" was 12.7% in males and 30.6% in females, 2.4 times higher in females. Adding "support required" they become 23.2% for males and 40.3% for females, 1.7 times higher in females. While "fully independent" was 48.6% in males and 33.3% in females, 1.4 times higher in males.
6. In "bathing", "incompetent" was 14.4% in males and 28.0% in females, 1.9 times higher in females. Adding "support required" they become 39.8% in males and 55.7% in females, 1.4 times higher in females. While "fully independent" was 39.2% in males and 24.0% in females, 1.6 times higher in males.
7. In "clothing", "incompetent" was 14.9% in males and 24.6% in females, 1.7 times higher in females. Adding

"support required" they become 35.9% in males and 45.7% in females, 1.3 times higher in females. While "fully independent" was 42.0% for males and 30.3% in females, 1.4 times higher in males.

Males showed higher ability in eyesight and hearing as well. In eyesight, "normal" was 32.8% male/female total. In hearing, "normal" was 12.5% male/female total. Hearing ability seems to fade faster than eyesight.

The number of female centenarians is much larger than male, however, male is superior in all abilities. Quantity is for females and quality is for males.

To study the relevance of family history the age at death of parents were surveyed, although this may not have been as exact as the medical research by Makoto Suzuki.

The ages of both parents at death were over 80 for 16.3%, as shown in Table 5. The age of one parent was over 80 for 41.6%. Considering the fact that most of the parents were born before 1860, when the expectation of life at birth was only in the 20s and only 15% would survive the age of 60, they belonged to families of longevity. The age at death of siblings was also surveyed, although the table is omitted. 52.7% were over 70, and 32.5% were over 80, ages which are impressively high.

Table 5  
Parents' Age at Death of Centenarians (1981)

		Father's age at death				Total
		40	60	80		
Mother's age at death	40	10	14	29	20	73
	60	3	35	40	31	109
	80	11	56	144	86	297
Total		11	61	130	133	335
Total		35	166	343	270	814

Only father was over 80 137 persons, 16.8%  
 Only mother was over 80 202 persons, 24.8%  
 Both were over 80 133 persons, 16.3%

Longevity of the parents and siblings may lead to a conclusion that the hereditary is an important factor. In observing the number of centenarians per 100,000 population in different prefectures, Okinawa came first with 10.01, followed by Kochi (6.19), Shimane (6.16), Kagoshima (5.77) and Kagawa (4.40). These regions mostly have a warm climate.

5. Life Table for Centenarians

As shown in Table 6, Kyo Hanada constructed life tables for centenarians born between 1875 and 1878 by using death slips of vital statistics between 1975 and 1986, to report in "The Journal of Population Problems (vol. 190)". Sex differential in life expectancy still exists among centenarians, and females enjoy a lower mortality than males.

**Table 6**  
**Life Tables for Centenarians (born in 1875-1878)**

**Male**

Age $x$	Number Living $l_x$	Number Dying $d_x$	Death Rate $q_x$	Life Expectancy $e_x$	Stationary Population	
					$L_x$	$T_x$
100.0	1,000	443	0.443	1.68	762	1,682
100.5	757	330	0.436	1.66	573	1,253
101.0	557	223	0.401	1.65	433	920
101.5	427	183	0.430	1.59	340	680
102.0	333	153	0.460	1.46	252	487
102.5	243	117	0.479	1.40	180	340
103.0	180	97	0.537	1.31	126	235
103.5	127	67	0.526	1.26	86	160
104.0	83	30	0.360	1.30	63	109
104.5	60	30	0.500	1.24	48	74
105.0	53	37	0.688	0.85	30	45
105.5	30	20	0.667	0.87	17	26
106.0	17	10	0.600	0.94	11	16
106.5	10	7	0.677	0.88	6	9
107.0	7	3	0.500	0.67	4	4
107.5	3	3	1.000	0.71	2	2
108.0	3	3	1.000	0.21	1	1

**Female**

Age $x$	Number Living $l_x$	Number Dying $d_x$	Death Rate $q_x$	Life Expectancy $e_x$	Stationary Population	
					$L_x$	$T_x$
100.0	1,000	404	0.404	1.87	785	1,868
100.5	776	308	0.397	1.84	606	1,427
101.0	596	229	0.385	1.82	472	1,083
101.5	468	187	0.399	1.75	369	821
102.0	367	156	0.425	1.67	282	611
102.5	281	126	0.447	1.61	213	452
103.0	211	99	0.472	1.57	158	330
103.5	155	68	0.441	1.53	116	238
104.0	119	43	0.385	1.55	89	172
104.5	87	39	0.445	1.41	68	123
105.0	68	36	0.530	1.22	48	83
105.5	48	28	0.580	1.13	33	55
106.0	32	18	0.556	1.09	21	35
106.5	20	13	0.618	1.10	14	22
107.0	14	10	0.667	0.95	9	14
107.5	8	5	0.692	1.07	5	8
108.0	5	2	0.400	1.00	3	5

Note: 1.  $d_x, q_x, L_x$  are for one year.

2. These tables are constructed on 300 male and 1,379 female deaths of centenarians.

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## From The Past

### *First Annual Meeting – 1890*

*The only paper reported from the First Annual Meeting was by Dr. C. Bernacki of Germania Life Insurance Co.:*

#### INFLUENCE ON LONGEVITY OF THE USE OF LARGE QUANTITIES OF BEER

He said that his paper was based particularly on Professor Oertel's work on the "Therapy of Disorders of the Circulation, especially with reference to the consumption of large quantities of Beer." This was published in 1885, before which time physicians who had studied in Germany had thought that the use of beer—even in larger quantities—was not dangerous, but was beneficial, and accordingly had recommended it in this country, and had given testimonials that the working people in the breweries who drank a great deal of beer were robust, strong and long-lived. Professor Oertel had shown that in Munich hospitals, out of a thousand post-mortem examinations, 32 men and 14 women—that is to say, 4.6%—have died of dilatation and hypertrophy of the heart; and in addition to that, that 23 men and 14 women—or 3.3%—had died of some other disease with dilatation and hypertrophy of the heart as accessory causes. A further examination of 2000 post-mortems by Bollinger had given the same result, so that about 8% of the deaths in the Munich hospital were due to this condition of the heart.

The mechanical explanation of this pathological condition was described. The heart acted as a pump, forcing the arterial blood into the general circulation and the venous blood through the lungs to be oxygenated. All the fluid ingested is absorbed into the circulation and carried by the veins to the right side of the heart. If the influx by the veins is too great and cannot be eliminated in the usual time, then it piles up on the right ventricle of the heart and causes disorders in the circulation and the most serious consequences to the organism. The proportion of the weight of the blood to the total body weight is as 1 to 13. A person, therefore, who weighs 170 pounds possesses about 13 pounds of blood. If, from time to time, one-half or one-third of the weight of the person's blood (by the absorption of the beer consumed) is suddenly added to the right heart dilatation and hypertrophy must in time follow. This over-work would be much greater if there was any organic imperfection in the heart itself, such as valvular disease or fatty degeneration, etc., or if the lungs were not healthy, as in emphysema, chronic interstitial pneumonia, etc.

In Munich it is not uncommon for people in the evening, in two or three hours' time, to take from six to eight pints of beer, and during the day from twelve to twenty pints. Working brewers take from thirty-six to forty pints. This enormous quantity of beer absorbed into the circulation is eliminated from the system only after the greatest heart effort, this effort producing dilatation, especially of the right ventricle.

As to the bearing of this fact upon life insurance, he said that many of the helpers in breweries were young, strong, healthy men, sons of robust parents, educated in schools where gymnastic exercises are commenced at an early age, brought up on black bread, pork, sausages, beans, peas, etc. They can stand the abuse of beer for fifteen or twenty years; but by that time they become bloated, heavy and affected with many disorders, so that they are unfit to continue the business and are obliged to seek other employment. The ease with which other employment is obtained in America makes it difficult to secure accurate statistics; but, as the disorders induced by beer drinking increase every year, life insurance companies should take risks on such men only on short endowments and not at advanced ages. There were, of course, some exceptions to this rule and much depended upon the honest report of the examiner. In conclusion he said that the moderate use of wine or whiskey was not deleterious, but that beer—on account of the large quantity consumed and its mechanical effect—was the most injurious of all alcoholic beverages.

Reprinted from: Abstract of the Proceedings of the Association of Life Insurance Medical Directors of America from Organization to and including the Sixteenth Annual Meeting. The Knickerbocker Press, New York, 1906.