POPULATION PROBLEMS IN JAPAN

Institute of Population Problems
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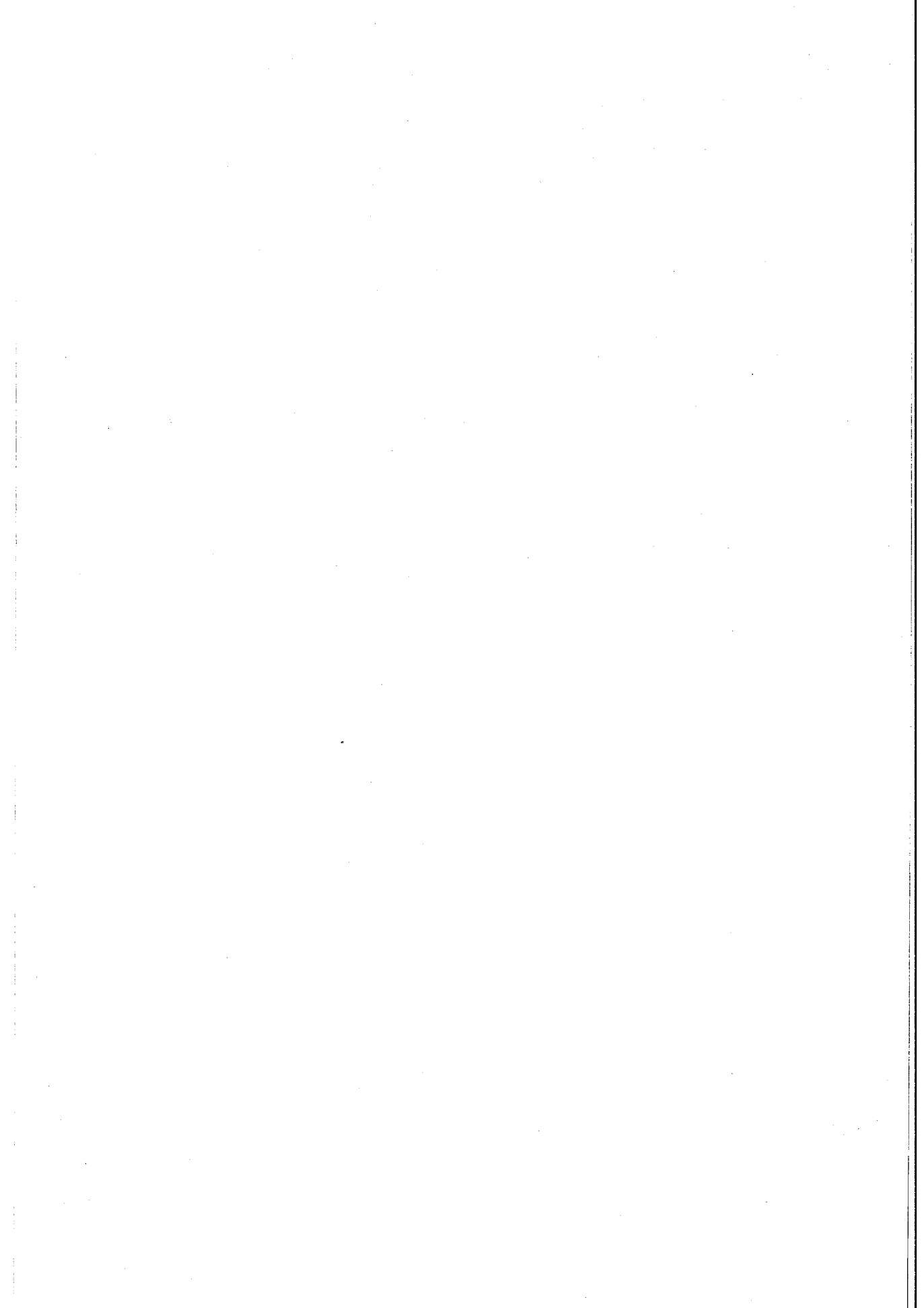
Foreword

This paper is a revision of the English version of a paper written by the late Dr. Minoru Tachi, former Director of this Institute, entitled "Nihon no Jinkomondai" (Population Problems in Japan). The original paper was prepared in 1968 and published in the Institute's Research Series as its No. 190 in March 1968.

As his paper was a comprehensive and compact introduction of the past and current population problems in Japan, it was strongly desired its English version be published for readers in the world, especially, in Asian countries. The translation was made in 1969 by Miss Seiko Takahashi, staff member of this Institute and presently Population Officer at the Population Division of ECAFE in Bangkok.

The lapse of time, however, required Dr. Tachi to bring his paper up to date. As the 1970 population census was approaching, he intended to postpone the revision until obtaining at least partial results of the census. The revision of his paper by himself, however, was unfortunately deprived of its possibility by the sudden death of Dr. Tachi on March 21, 1972.
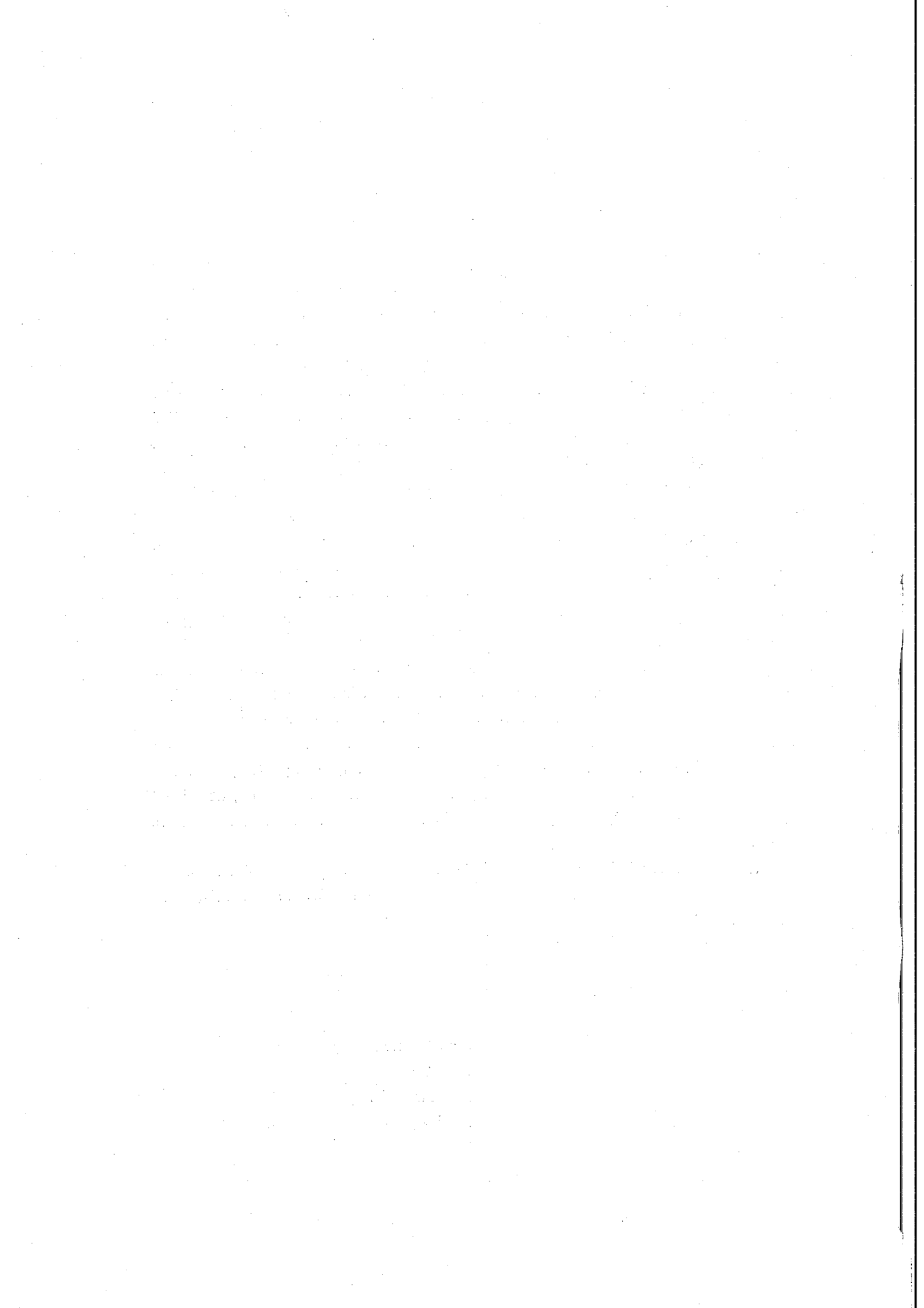
Carrying on Dr. Tachi's will, we have decided to prepare a revision of the English version of his paper and present it at the Second Asian Population Conference to be held at Tokyo on November 1-13, 1972, to the preparation of which Dr. Tachi had most intently devoted himself until his death.

The present revision by this Institute is made mainly for updating statistical data and giving minimum supplementary discussions as far as needed, with least modification of the original style and basic view which Dr. Tachi developed in his paper.

We are greatly indebted to Miss Seiko Takahashi for her English translation of the original paper without which the present form would not have been realized.

August 1, 1972

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Contents

I. Population Size

1. One hundred million population

On July 25th, 1967, the population of Japan is estimated to have passed the one-hundred million mark. According to the recent population estimate by the Bureau of Statistics of the Office of the Prime Minister, the population of Japan as of June 1, 1972 is estimated to be 105,880 thousand*.

One-hundred million population is a gigantic population, standing 6th in the size rank in countries of the world. Mid-1971 estimates of the United Nations[1] indicate the country of the largest population of 760 million being China, followed by India with 550 million, USSR with 243 million, USA with 205 million, Indonesia with 121 million, and Japan with 104 million. According to the recent information, the population of the United States surpassed the 200 million mark in November 1967. It should be noted that among these six gigantic populations, four excluding USSR and USA are countries of Asia. In mid-1970, among the world total population of 3,632 million, 2,075 million, or about 57 per cent of the total were concentrated in Asia.

2. Population density

The area of Japan is only 370 thousand km², which is the space slightly smaller than the State of California of the United States. One hundred and six million population gives the density per 1 km² of 286 persons. There certainly are countries in the world, where population density is higher than that of Japan, as Netherlands of 319 and Belgium of 317 persons respectively in mid-1970.[1] However, while 19 per cent of the total area is cultivable in Japan, about two-thirds of the land are cultivable both in Netherlands and Belgium. With mountaneous topography of Japan taken into consideration, real population density of Japan can be assumed to compare well, if not higher, with the density of Netherlands and Belgium. Thus, the population of Japan is extremely in large size in relation to the available land of the country.

3. Population size and economic size

The Economic Planning Agency reports that the GNP of Japan in the fiscal

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* Provisional and excluding Okinawa Prefecture which reverted to Japan on 15 May 1972. The estimated population of Okinawa was 955 thousand as of May 1, 1972.

1) United Nations, *Demographic Yearbook*, 22nd Edition, 1970, New York, 1971. The population of Pakistan as of mid-1970 was estimated at 114 million, larger than Japan, but the discussion on the size rank is made here in reference to the present territories of countries.

year of 1970 was 203,371 million US dollars. If communistic countries where the system of national income accounts is different are excluded, this GNP of Japan nearly 200,000 million US dollars level stands at the second rank in the world. Viewing in this way, there is no question about the predominant scale of the Japanese economy. However, per caput national income of Japan is lower than that in many of advanced countries, being 15th in rank in the world. In other words, the Japanese economy *per ce* is large scale, but relative to the large-size population, it is still never sufficiently large. Per caput national income is in a way the most crude "economic population density". Thus, the population of Japan can be considered to be extremely large in relation to the national economy supporting the population.

II. Population Growth Rate

The population count on November 1, 1945, immediately after the termination of the War, revealed the population of Japan as 72.2 million. By the 1950 population census, it rapidly increased up to 83.2 million and the annual average increase rate was close to 3 per cent (See Table 1). This apparently abnormal increase during the period is in part due to the "baby boom" in 1947, 1948 and 1949 and the mortality decline, but the major cause was the social increase which amounted over 5 million due to as many as 6,250,000 repatriates from overseas coming back to Japan which were balanced only by 1,200,000 emigrants

Table 1. POST-WAR POPULATION INCREASE IN JAPAN

Date	Population (in 1,000)	Annual average increase rate**(%)
Nov. 1, 1945*	72,200	
Oct. 1, 1950	83,200	2.92
Oct. 1, 1955	89,276	1.42
Oct. 1, 1960	93,419	0.91
Oct. 1, 1965	98,275	1.02
Oct. 1, 1970	103,720	1.08

* Population by population count.
** Compound annual average increase rates.

from Japan. It is appropriate that Ueda pointed out that "these repatriates from overseas would have stayed within the country if the war did not break out. Therefore, it is the part of the population which should have been there returned after temporary stay overseas, and the baby boom is merely the concentration of births in post-war years after 'postponement' of marriages and births which should have taken place otherwise during the war time. Thus, the 15-year increase rate decreased from 24 per cent in 1920-1935 to 22 per cent in 1935-50".[2] In the 1950's, though the decline in mortality was considerable, that in fertility was even more rapid. The annal average increase rate of population for quinquennial period recorded as low as 0.91% for 1955-60. Since then the increase rate has slightly recovered, that is, 1.02% for 1960-65 and 1.08% for 1965-70, due to a continuous decline in death rate and a slight increase in birth rate. The increase rate of population to the whole period of 15 years from 1955

2) Masao Ueda, "Population growth", Institute of Population Problems, *The Journal of Population Problems*, Special Issue in Commemoration of the 100th Number of the Journal, Structure and dynamics of the population of Japan—Part One, No. 100, January 1967, p. 17, (English summary).

to 1970, however, was 1.00% on an annual average. The 1 per cent annual increase rate is approximately half of the annual average increase rate of the world's population of 1963–70, which is 2.0 per cent, and is closer to the European level.[1)]

III. Trends in Mortality and Related Problems

1. Trends in general mortality

Mortality in Japan had been on decrease since the latter part of 19th century after the Meiji Restoration in 1868,[3] and the pre-war level was about 17 per thousand. After the War, this declining trend was clearly accelerated and the rate is remaining stable at about 7 per thousand in recent five years (See Table 2). The present death rate of Japan is one of the lowest in the world, but when the characteristic age distribution of Japan where the ratio of the aged population is smaller compared with developed countries is taken into consideration, the actual mortality status is underevaluated. It may be appropriate to say that the international status of Japan's mortality is more or less in the upper rank wihtin the medium group of developed countries.[4]

The basic composition of the population of Japan as expressed in the distribution by sex and age is still young, but the ageing is, as will be elaborated further in the latter part of this paper, proceeding in very rapid speed. The standardized death rates calculated with the basic population composition of the total country in 1930 as the standard population show that the speed of improvement in mortality in post-war period is more conspicuous than being expressed by crude death rates (See Table 3). Kobayashi obtained the following cubic curve trend for the standardized death rates during the period from 1947 to 1964 :[5]

$$y = 14.748 - 1.7190t + 0.1406t^2 - 0.0041t^3$$

where t denotes the time with 1947 at the origin. The inflection point of the above cubic curve is at the year 1958.37, up to which the curve is upward and changes downward after that time. Kobayashi mentioned that "before that

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3) Yoichi Okazaki, *Population Estimates by Sex and Age from 1870's to 1920*, Research Series of the Institute of Population Problems, No. 145, February 1962, (Japanese).

Kazumasa Kobayashi, "Trend of mortality", *The Journal of Population Problems*, No. 100, *op. cit.*, pp. 82-84.

4) Mitsuo Segi, Minoru Kurihara and Yasuo Tsukahara, *Mortality for Selected Causes in 30 countries (1950-1961)—Age-Adjusted Death Rates and Age-Specific Death Rates*, Tokyo, 1966, pp. 6-7.

Kiichi Yamaguchi and Seiko Takahashi, *Trends of Population Reproduction in Japan*, Institute of Population Problems English Pamphlet Series, No. 64, November 1966.

Kiichi Yamaguchi, "The population reproductivity of Japan in comparison with other countries", *The Journal of Population Problems*, No. 104, Oct. 1967, pp. 15-38, (English summary).

5) Kazumasa Kobayashi and Takeharu Kaneko, "Trend in mortality in the prewar and postwar periods in Japan", *Annual Reports of the Institute of Population Problems*, No. 11, 1966, pp. 47-50, (English summary).

Table 2. CRUDE VITAL RATES IN JAPAN

Year	Number (in 1,000)			Rate (per 1,000)		
	Birth	Death	Natural increase	Birth	Death	Natural increase
1935–39	2,045	1,216	829	29.3	17.4	11.9
1940–43	2,203	1,170	1,033	30.7	16.3	14.4
1947	2,679	1,138	1,541	34.3	14.6	19.7
1948	2,682	951	1,731	33.5	11.9	21.6
1949	2,697	945	1,751	33.0	11.6	21.4
1950	2,338	905	1,433	28.1	10.9	17.2
1951	2,138	839	1,299	25.3	9.9	15.4
1952	2,005	765	1,240	23.4	8.9	14.4
1953	1,868	773	1,095	21.5	8.9	12.6
1954	1,770	721	1,048	20.0	8.2	11.9
1955	1,731	694	1,037	19.4	7.8	11.6
1956	1,665	724	941	18.4	8.0	10.4
1957	1,567	752	814	17.2	8.3	9.0
1958	1,653	684	969	18.0	7.4	10.6
1959	1,626	690	936	17.5	7.4	10.1
1960	1,606	707	899	17.2	7.6	9.6
1961	1,589	696	894	16.9	7.4	9.5
1962	1,619	710	908	17.0	7.5	9.5
1963	1,660	671	989	17.3	7.0	10.3
1964	1,717	673	1,044	17.7	6.9	10.7
1965	1,824	700	1,123	18.6	7.1	11.4
1966	1,361	670	691	13.7	6.8	7.0
1967	1,936	675	1,261	19.4	6.8	12.7
1968	1,872	687	1,185	18.6	6.8	11.8
1969	1,890	694	1,196	18.5	6.8	11.7
1970	1,934	713	1,221	18.8	6.9	11.9
*1971	2,001	685	1,316	19.2	6.6	12.6

Source: Health and Welfare Statistics Division, Minister's Secretariat, Ministry of Health and Welfare, *Vital Statistics Reports.*
* Provisional.

point, the declining speed is lowered following the function, but after the point, it seems to be accelerated again following the function,[6]" and further, "viewing from the fact that the absolute level of the death rate is already reaching fairly low level, this change into gradual accelerative trend of the decrease rate of mortality should probably be considered as a temporary trend.[7]"[8]

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6) Kazumasa Kobayashi, *ibid.*, p. 86.
7) Kazumasa Kobayashi, *ibid.*, p. 87.
8) "Declining speed" here is dy/dt for $y=f(t)$ and "decrease rate" is $(1/y)(dt/dt)$. (Tachi).

Table 3. STANDARDIZED VITAL RATES IN JAPAN

Year	Birth rate	Death rate	Natural increase rate
1925	35.27⁰/₀₀	20.24⁰/₀₀	15.03⁰/₀₀
1930	32.35	18.17	14.18
1937	29.77	17.35	12.42
1938	26.02	17.99	8.03
1939	25.37	18.22	7.15
1940	27.74	16.80	10.94
1947	30.69	15.32	15.37
1948	30.03	12.31	17.72
1949	29.66	11.88	17.78
1950	25.33	10.97	14.36
1951	22.63	9.88	12.75
1952	20.75	8.86	11.89
1953	18.86	8.85	10.01
1954	17.44	8.16	9.28
1955	16.79	7.67	9.12
1956	15.83	7.86	7.97
1957	14.61	8.01	6.60
1958	15.19	7.14	8.05
1959	14.82	7.02	7.80
1960	14.62	6.99	7.63
1961	14.24	6.71	7.53
1962	14.26	6.64	7.62
1963	14.45	6.10	8.35
1964	14.80	5.91	8.89
1965	15.65	5.97	9.68
1966	11.73	5.55	6.18
1967	16.22	5.42	10.80
1968	15.28	5.35	9.93
1969	14.95	5.22	9.73
*1970	15.30	5.19	10.11

Source: Kiichi Yamaguchi, "Population reproduction rates for all Japan: 1969", *The Journal of Population Problems*, No. 119, July 1971.

* Provisional.

2. Trends in mortality by causes of death

If this rapid mortality decline in post-war Japan is examined by causes of death, the improvement in deaths by acute communicable diseases of bacterial infection is most noteworthy. This can be considered as the result of the introduction of new chemicals—(1) envirommental sanitation chemicals as DDT, (2) modern chemical drugs as sulpha, and (3) antibiotics—and their socialization through public health activities. Group A in Table 4 indicates deaths by bacterial infection, and the declining trend both in death rates and death ratios is extremely notable. Deaths by acute communicable diseases are scarcely significant,

Table 4. DEATH RATES AND DEATH RATIOS BY GROUPINGS OF CAUSES OF DEATH

Year	Total	Group A	Group B	Group C	Group D	Group E
Death rates (per 100,000 population)						
1935	1,677.8	727.8	413.6	130.7	63.0	342.6
1950	1,087.6	387.0	356.1	79.2	61.4	203.9
1955	776.8	158.1	367.0	42.8	64.8	144.0
1960	756.4	121.9	413.5	28.3	65.2	127.6
1965	712.7	84.7	435.9	23.2	57.0	111.9
1970	690.4	65.5	439.2	18.8	59.5	107.5
Death ratios						
1935	100.0	43.4	24.7	7.8	3.8	20.4
1950	100.0	35.6	32.7	7.3	5.6	18.7
1955	100.0	20.4	47.2	5.5	8.3	18.5
1960	100.0	16.1	54.7	3.7	8.6	16.9
1965	100.0	11.9	61.2	3.3	8.0	15.7
1970	100.0	9.5	63.6	2.7	8.6	15.6

Source: Reference materials in note 9), p. 36.

at least from the standpoint of vital trends of population, in present Japan. Further, as shown in Table 5, the eminent success in the control of deaths by tuberculosis must have affected significantly the decline and the pattern change of mortality.

In pre-war times, the peak of TB death rate by age groups was at the age-group of 20–24. In recent years, however, the peak moved to the age-group of 75–79, indicating that deaths from tuberculosis are no longer the deaths in youth but became one of the causes of death in the advanced age.

Table 5. CHANGES IN TUBERCULOSIS MORTALITY

Year	Number of deaths	Death rates (per 100,000 population)
1940	153,154	212.9
1950	121,769	146.4
1955	46,735	52.3
1960	31,959	34.2
1965	22,366	22.8
*1971	13,597	13.0

Source: *Vital Statistics Reports.*
* Provisional.

With this observation of Group A of bacterial infection, totally reversed trend can be seen in Group B which shows deaths by adult diseases. The expansion trend in the death ratio is particularly conspicuous. This fact indi-

cates the "ageing" of Japan's mortality structure. Group C which includes deaths at child bearing and of infants, shows the decline of death rate caused by diseases in infancy. Deaths in Group D which includes accidents and other external causes of death attracts attention in the upward trend in death ratios. Group E is for those causes which are not included in Groups A to D, and the decreasing trend is apparent in death ratios.[9]

3. Trends in mortality by age

Characteristics for the mortality decline by age are well expressed in the simple figures shown in Table 6. Compared with the pre-war level, the improvement in death rate for the age-groups of 0–24 is quite clear recently. For 25 years and over, the degree of mortality decline becomes lower as the age-groups become older.

Reflecting such characteristics of changes in mortality by age, so-called the life span, or expectation of life at birth $\overset{\circ}{e}_0$, has been greatly extended since the

Table 6. COMPARISON OF AGE-SPECIFIC MORTALITY
RATES, 1935 AND 1970

Age	1935	1970*	Index number 1935=100.0
0	0.11480	0.01369	11.9
1– 4	0.02002	0.00108	5.4
5– 9	0.00396	0.00047	11.9
10–14	0.00299	0.00034	11.4
15–19	0.00753	0.00077	10.2
20–24	0.00934	0.00097	10.4
25–29	0.00815	0.00115	14.1
30–34	0.00752	0.00138	18.4
35–39	0.00794	0.00196	24.7
40–44	0.00923	0.00281	30.4
45–49	0.01185	0.00396	33.4
50–54	0.01647	0.00616	37.4
55–59	0.02294	0.01008	43.9
60–64	0.03234	0.01674	51.8
65–69	0.05073	0.02885	56.9
70–74	0.07464	0.04773	63.9
75–79	0.11631	0.07896	67.9
80 and over	0.18949	0.15722	83.0

Note : Deaths are from vital statistics and populations are from censuses. Okinawa prefecture is included in 1935 but excluded in 1970. For both years, deaths of unknown age are prorated in age-specific deaths.
*Provisional.

9) Deaths by groups of causes of death are according to the following data : Society of Health and Welfare Statistics, Inc., *Trends in National Health—Health and Welfare Indices*, Special edition of 1971, Oct. 1971, (Japanese).

pre-war years[10].   As shown in Table 7, the pre-war level of 1935–36 was

10) In analysing the abridged life tables of the Institute of Population Problems in 1950-61,
Kobayashi calculated the participation rate of contribution of the decline in death pro-
babilities of the population under 5 years old for males to the extension of the expectation
of life at birth as 42.1%.

Kazumasa Kobayashi, "An aspect of implications of the increase in expectation of life
at birth of Japanese males in the period of ten years from 1950 to 1960", *The Journal
of the Anthropological Society of Nippon*, Vol. 70, No. 3-4, March 1963, pp. 33-44,
(English summary).

From the fact that the average life expectancy curve is a mono-modal curve, Tachi
previously differentiated this by age x and obtained

$$\frac{d}{dx}\overset{\circ}{e}(x)=\overset{\circ}{e}(x)\mu(x)-1$$

and if the $\overset{\circ}{e}(x)$ takes its ultimate value,

$$\mu(x)\overset{\circ}{e}(x)=1$$

and assumed that x which satisfied this formula was "the maximum average life expect-
ancy age" and that the life expectancy in correspondence to the maximum average life
expectancy age was "the maximum average life expectancy", and on the basis of the
average life expectancy curve and the fact that the maximum average life expectancy age
most usually were in the ages 0-5, applied this as an index to express the characteristics
of infant mortality rate in particular.   He further calculated the maximum average life
expectancy for females from the first life table of 1891-98 to the 9th abridged life table
of the Institute of Population Problems of 1955-56, and compared the results internationally.
It was found out as the result that, along with the improvement in mortality, the maximum
average life expectancy age increasingly approached age 0 and that the maximum average
life expectancy was on continuous prolongation (see the following reference):

Minoru Tachi, "On some patterns of the life expectation curve" (1)-(3), *The Journal of
Population Problems*, Nos. 64, 66 and 67, May and December 1956 and February 1957.
(Japanese).

Minoru Tachi, *Formal Demography—Analytical Techniques of Population Phenomena*,
1960, pp. 650-611, (Japanese).

Minoru Tachi, *Techniques of Population Analyses—Introduction to Formal Demography*,
enlarged 4th edition, 1968, pp. 203-204, (Japanese).

According to these calculations, the maximum average life expectancy ages and the
expectancy were respectively 2.81 years and 49.63 years for 1935–36, and 1.22 years and
67.76 years for 1955–56.

Kobayashi extended the calculation and obtained the following results as shown in:

Kazumasa Kobayashi, "Mortality in life tables", *The Journal of Population Problems*,
No. 100, *op. cit.*, pp. 94-95.

Year	Life tables	Maximum life expectancy age	Maximum life expectancy
		(in years)	
1935–36	6th Life Table of Cabinet Bureau of Statistics	2.81	49.63
1947–48	1st Abridged Life Table of the Institute of Population Problems	2.40	55.32
1955–56	9th, same	1.22	67.76
1956–57	10th, same	1.22	68.76
1960–61	14th, same	1.04	71.05
1965–66	19th, same	0.66	73.64

Table 7. EXPECTATION OF LIFE AT BIRTH AND NUMBERS OF SURVIVORS

Year	Life tables	$\overset{\circ}{e}_0$ (years)		l_{15} (%)		l_{65} (%)		p_{15-65} (%)	
		Male	Female	Male	Female	Male	Female	Male	Female
1935–36	Cabinet Bureau of Statistics, 6th complete	46.9	49.6	79.1	80.1	36.2	43.6	45.8	54.4
1947	Health and Welfare Ministry, 8th complete	50.1	54.0	82.9	84.0	39.8	49.1	48.1	58.5
1950–52	same, 9th complete (revised)	59.6	63.0	90.0	90.8	55.1	62.8	61.2	69.2
1955	same, 10th complete	63.6	67.8	93.2	94.0	61.8	70.6	66.4	75.1
1960	same, 11th complete	65.3	70.2	94.9	95.8	64.8	75.2	68.5	78.5
1965	same, 12th complete	67.7	72.9	96.8	97.5	69.1	80.0	71.4	82.0
1971	Health and Welfare Ministry, abridged	70.2	75.6	97.7	98.3	73.7	83.8	75.4	85.3

about 47 years for males and 50 years for females. By 1971, however, substantial extention of the expectation of life at birth was achieved, when that for males became 70.2 years and for females 75.6 years, or 23 years extention for males and 26.0 years for females respectively, as compared with the pre-war level. Advanced European countries spared the time-span over half a century to achieve this much of extention of life expectancy. Present Japan's expectation of life at birth in international comparison stands at the level of higher medium among developed countries (See Table 8). In a few countries, the expectation of life at birth for males has come to exceed 70 years since 1960.[1]

Table 8. EXPECTATION OF LIFE AT BIRTH IN DIFFERENT COUNTRIES

Country	Year	Male	Female
Japan	1971	70.17	75.58
England & Wales	1967–69	68.7	74.9
France	1968	68.0	75.5
Fed. Rep. of Germany	1966–68	67.55	73.58
Netherlands	1968	71.0	76.4
Sweden	1967	71.85	76.54
United States	1968	66.6	74.0
Australia	1960–62	67.92	74.18

Source: Data for Japan are from Health and Welfare Statistics Division. Ministry of Health and Welfare, *Abridged Life Tables for 1971*, 1972.
Data for other countries are from the reference material in note 1) of the United Nations.

The "survivors" at age 15, l_{15}, which indicates so to speak the "yields" of children born until they reach the age of 15, was 79.1 per cent for males and 80.1 per cent for females respectively during the pre-war period of 1935–36. Reflecting the rapid improvement in infant mortality since then, this greatly increased to 97.7 per cent for males and 98.3 per cent for females by 1971. The survivors at age 65 which is the time of completion of productive age, was only 36.2 per cent for males and 43.6 per cent for females. Recently, however, this also increased up to 73.7 per cent for males and 83.6 per cent for females. The rise of "survival ratio", $p_{15-65}=l_{65}/l_{15}$, is slightly more gradual than the rise of the number of survivors at age 15. This is due to the fact that the degree of decline in mortality rate after age 25, particularly after age 55 has been relatively slow. Thus, the survival ratio of the population at ages 15–65, which was 45.8 per cent for males and 54.4 per cent for females in pre-war times, is 75.4 per cent for males and 85.3 per cent for females in 1971. These figures explain the fact that the extent of loss by deaths of productive-age population during their productive age was considerably minimized recently compared with the conditions before the war.[11]

4. Some problems in mortality

In spite of such magnificent improvement in mortality in post-war Japan as stated so far, there still remain various problems to be solved from the viewpoint of vital trends of population, some major ones of which are as the following: (A) It goes without saying that, in regard to mortality rate by causes of death, the future trend of mortality by adult diseases and how to combat this problem are important problems to be tackled with in world-wide scale. One of the major characteristics of mortality by causes of death of Japan is that, while in advanced countries the top cause of death is either malignant neoplasms or heart diseases generally, where mortality by vascular lesions is evidently lower than the two, in Japan, the mortality by vascular lesions is the highest and that the rate is clearly higher than that of other developed countries.[12] In this connection, it should also be noted that the high mortality by vascular lesions meaning the numerous numbers of these patients indicates the relative numerity of physically handicapped population in Japan. This implies the im-

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11) For the detailed analyses of death rates by sex, age and causes of death, following paper is to be referred in particular :
   Sadamu Watanabe, "Life expectancy B,—Trends of expectation of life of the Japanese", *Journal of Insurance Medicine*, Vol. 65, 1967, pp. 347–378, (Japanese).
12) Shimako Ogino and Akiko Maruyama, Mortality rates due to selected adult diseases in various countries", *Annual Reports of the Institute of Population Problems*, No. 11, 1966, pp. 51–53, (English summary).

portance and the need of medical rehabilitational services. Mortality rates by malignant neoplasms and heart disease in Japan are still somewhat lower than those in other developed countries, but their future trends should be cautiously watched. Segi and his colleagues calculated the standardized death rates by causes of death and sex for 30 countries of the world for the period of 1950–61, with the standard population obtained by summing the populations by age and sex of 46 countries in and around 1950.[13] Table 9 epitomizes the results of their laborious work and it clarifies the above-mentioned condition.

Mention has been made as to the substantial decrease in tuberculosis mortality as the result of extremest success in tuberculosis control. Table 9 shows, however, that Japan has not as yet gone over the "tuberculous country" stage completely as compared with other advanced countries.

Table 9. STANDARDIZED DEATH RATES BY CAUSES OF
DEATHS IN DIFFERENT COUNTRIES, 1960–1961

(per 100,000 population)

Country	Sex	Tuberculosis (B1, B2)	Malignant neoplasms (B18)	Vascular lesions (B22)	Heart diseases (B25–28)	Accidents (BE47, BE48)
Japan	M	46.1	134.9	226.7	107.3	69.4
	F	23.9	96.1	159.4	81.1	20.0
England & Wales	M	8.3	175.2	100.8	292.9	43.3
	F	2.9	114.0	92.0	173.9	19.6
France	M	25.1	162.4	90.7	155.3	69.9
	F	8.2	102.8	67.1	94.0	27.2
Fed. Rep. of Germany	M	18.6	163.6	119.8	192.5	75.5
	F	5.7	126.7	106.5	119.6	26.6
Netherlands	M	3.0	160.4	69.7	194.0	48.7
	F	1.7	119.4	73.6	131.4	20.0
Sweden	M	6.8	128.7	77.0	238.1	51.8
	F	3.4	111.4	77.3	163.9	20.9
US, white	M	6.2	139.5	81.1	369.6	66.2
	F	2.0	106.5	71.3	201.8	25.9
Australia	M	6.4	132.8	95.7	342.6	71.6
	F	1.9	96.6	95.1	184.9	27.1

Source: Reference material in note 4) by Segi, *et al.*

Another point to be noted here is that in Japan, maternal death rate, or the ratio of "deaths from deliveries and complications of pregnancy, childbirth, and the puerperium" to total livebirths or childbirths (livebirths+still births), is very high compared with other developed countries. As shown in Table 10, the maternal death rate of Japan was about in medium level among

13) Mitsuo Segi *et. al. op. cit.*

developed countries in 1940. In pre-war times, in spite of the fact that general mortality level was high and that the ratio of home deliveries was extremely high in Japan, the maternal death rate was in the medium level of advanced countries.[14] However, although the maternal death rate has come down, it still is very high compared with that of advanced countries. In other words, in comparison with the degree of decline in maternal death rate in other advanced countries, that in Japan has been very gradual. In causes of deaths shown in

Table 10. MATERNAL DEATH RATES IN DIFFERENT COUNTRIES

(per 100,000 live births)

Country	1940	1950	1960	1965	1967
Japan	239.6	176.1	130.6	87.6	70.5
Fed. Rep. of Germany	..	206.2	105.7	69.4*	..
Belgium	276.0	148.3	40.7	23.2	17.7
France	181.2	86.1	51.8	32.2	32.1
Netherlands	235.9	105.5	39.4	26.9	26.0
England & Wales	277.9	88.2	39.5	18.0	20.8
Sweden	216.1	61.5	37.2	13.8	13.9
Australia	407.6	109.1	52.5	57.0	23.2
United States	376.0	83.3	37.1	31.6	27.9

Source: Maternal and Child Health Section, Children and Families Bureau, Ministry of Health and Walfare ed., *Statistics Relating to Maternal and Child Health in Japan, 1966* and *1969*.
* 1964.

Table 11, the top cause in Japan is toxaemias, followed by haemorrhage, and pyrexia is relatively less since pre-war times up to the present. It is an important problem whether or not the gradual declining speed in maternal death rate in Japan is related in some ways to the relatively widely practised "induced abortions" in post-war period, but researches and studies to sufficiently prove such definited relation do not seem to exist. Shinozaki in his analysis of characteristics of causes of death in Japan points out, for example, as to the classification of groups of causes of death shown in above Table 4 that to include maternal deaths of 'complications of pregnancy, childbirth and the puerperium' and infant deaths of congenital malformations and diseases peculiar to early infancy in a similar group in Group C seems to be a fundamental contradiction from the nature of these causes.[15]

Deaths by external causes as shown in Group D in Table 4 indicate notable

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14) Naotake Kasama, "Statistical observation of maternal deaths in our country", *The Journal of Population Problems*, Vol. 2, No. 11, November 1941, (Japanese).

15) Nobuo Shinozaki, "Causes of death", *The Journal of Population Problems*, No. 100, *op. cit.*, p. 108.

Table 11. MATERNAL DEATH RATES BY CAUSES OF DEATH IN DIFFERENT COUNTRIES, 1967

Country	All causes (640–689)	Sepsis (640, 641, 651, 681, 682, 684)	Toxaemias (642, 652, 685, 686)	Haemorriage (643, 644, 670, 671, 672)	Abortion (650)	Others
Japan	70.5	2.6	25.1	20.0	2.1	20.8
Belgium	17.7	..	4.1	2.7	4.1	6.8
France	32.1	4.4	6.0	4.1	3.8	13.9
Netherlands	26.0	5.4	2.9	3.8	1.7	12.2
England & Wales	20.8	3.4	5.6	1.5	2.1	8.3
Sweden	13.9	0.8	3.3	3.3	0.8	5.7
Australia	23.2	7.0	3.9	3.1	0.9	8.3
United States	27.9	6.5	5.4	4.0	1.5	10.4

Source: same as Table 10

increasing trend both in the rate and the ratio. External causes of death, particularly the increase in death rate of traffic accidents among "accidents" has become a common problem in every advanced countries. Although it has come to show relatively stable trend in recent years in many of the advanced countries, this is still on increasing trend in Japan and requires particular attention.

(B) Observing Japan's mortality by age, though the recent improvement is quite notable, death probabilities of infants and in advanced age are particularly high compared with other developed countries. Table 12 compares Japan with Sweden which is one of the countries where infant death probabillities are the lowest in the world. The death probabilities of the ages 0–5, before school-age, in Japan are still higher than the data for Sweden.

Table 12. INFANT DEATH PROBABILITIES, JAPAN AND SWEDEN

(‰)

Age	Japan (1967)		Sweden (1961–1965)	
	Male	Female	Male	Female
0	17.4	13.6	16.6	12.9
1	2.0	1.8	1.0	0.9
2	1.3	1.0	0.9	0.6
3	1.1	0.7	0.7	0.5
4	0.9	0.7	0.5	0.5
5	0.8	0.5	0.7	0.4
10	0.4	0.3	0.4	0.3
15	0.7	0.4	0.6	0.4

Source: For Japan, Division of Health and Welfare Statistics, Ministry of Health and Welfare, *Abidged Life Table of 1967*, 1968 and for Sweden, material by United Nations in note 1).

In Table 13, death probabilities in the advanced ages in Japan are compared with Norway where the probabilities are one of the lowest in the world. In ages 50 and over, the Japanese figures are much higher both in males and females.

Table 13. DEATH PROBABILITIES IN ADVANCED AGES,
JAPAN AND NORWAY

(‰)

Age	Japan (1967)		Norway (1956–1960)	
	Male	Female	Male	Female
50	6.7	4.3	5.4	3.3
55	11.2	6.6	9.2	5.2
60	18.5	10.5	14.9	8.7
65	30.3	17.3	23.1	14.6
70	49.3	30.3	35.9	27.0
75	79.5	53.7	57.4	47.0
80	127.8	94.9	92.7	83.7

Source: Same as Table 12.

Neonatal mortality rate, or the ratio of deaths within 4 weeks after birth to live births, has also been considerably improved since the end of the war.[16] Perinatal mortality rate, or the ratio of the sum of late still-births of more than 29th week of pregnancy and early neonatal deaths within 1 week after birth to live births, is also on declining trends but the speed is gradual and the rate is the highest at present among developed countries except Italy (See Table 14). One of the characteristics of perinatal mortality in Japan is the larger percentage of late foetal deaths.[17]

Above statements may be summarized as follows: Although the improve-

Table 14. PERINATAL MORTALITY RATES IN DIFFERENT COUNTRIES

Country	1952	1955	1965
Japan	45.6	43.9	30.1
Fed. Rep. of Germany	48.8	44.1	29.0
France	31.0	29.6	24.3
Netherlands	31.5	29.3	23.4
England & Wales	38.8	38.3	27.3
Sweden	31.5	28.4	19.9
Italy	51.3	46.2	37.3
New Zealand	31.2	28.2	22.5
United States	32.0	30.4	28.5

Source: Reference material in note 9), p. 53.

16) For example see: Society of Health and Welfare Statistics, Inc., *op. cit.*, p. 61.
17) *ibid.*, pp. 61–68.

ment in mortality in post-war Japan has been tremendously successful, mortality in infancy and in advanced age, particularly the latter, leaves much room for further improvement. Among the problems of causes of death by bacterial infection, tuberculosis death rate should still be lowered to catch up with the level of developed countries. Participating in the world-wide efforts for the improvement in adult disease mortality, Japan should also make intensive effort for the improvement of vascular lesion deaths in particular. Viewing from the present status of infant mortality, maternal mortality, perinatal mortality and spontaneous stillbirth ratio of which a mention will be made later, the enhancement in maternal and child health is an urgent problem to be tackled with in Japan.

IV. Trends in Fertility and Related Problems

1. Major stages of changing fertility after the war

During the latter half of the period of "economic take-off", from the end of of Meiji Era (1868–1912) toward the beginning of Taisho Era (1912–1925), birth rate of Japan changed from its upward trend to modern declining trend.[18] Fertility decline in pre-war times was rather gradual but the post-war fertility decline proceeded in very rapid speed.

Post-war fertility change in Japan can be observed in the following four major periods: namely, (A) period of "baby-boom" in 1947–49, (B) period of rapid fertility decline in 1950–57, (C) period of low fertility in 1958–64, and (D) period of confusion due to "hinoeuma" in 1965–67. (E) period of slightly rising fertility. (A) The pre-war level of numbers of births was roughly 2.1 million per year and the crude birth rate was 31 per thousand. It is a common practice that "marriage boom" occurs followed by "baby boom" after any big war and post-war Japan experienced the same practice of having "baby boom" for three years in 1947, 1948 and 1949. The numbers of birth increased up to 2.7 million per year and the birth rate exceeded the pre-war level reaching 33 or 34 per thousand (See Table 2). However, even in the midst of the baby boom, illegal induced abortions were often practised. According to the analysis of the changes

18) For example see:

Yuzo Morita, *Analysis of Population Increase*, 1944, pp. 353–447, (Japanese).

Tatsuo Honda, "Review of Japan's vital statistics since around the Meiji Restoration", *Annual Reports of the Institute of Population Problems*, No. 6, 1961, pp. 1–5, (English summary).

Yoichi Okazaki, *Population Estimates by Sex and Age from 1870's to 1920*, op. cit.

Masaaki Yasukawa, "Estimate of births and general fertility rate in Japan, 1890–1920—in relation to the rule of 'population transition'—", *Mita Journal of Economics*, Vol. 55, No. 5, May 1962, pp. 1–13, (Japanese).

Yoichi Okazaki, *Labour Force Problems in Japan*, Present Economy and Society Series Nos. 1 and 2, 1966, pp. 5–16, 11, (Japanese).

Concerning the significance in the process of demographic transition, see the following:

Minoru Tachi, "Japanese modernization in the demographic transition process", Publishing Group of Commemorative Papers in Celebration of the 77th Birthday of Dr. Shigemi Hijikata ed., *Economic System and Economic Structure—Commemorative Papers in Celebration of the 77th Birthday of Dr. Shigemi Hijikata*, 1967, pp. 74 fg., (Japanese).

Toshio Kuroda "Demographic transition in Japan", *Analysis of Japan's Population*, Statistical Association of Japan ed., Yuzo Morita supervised, New Statistical Book Series No. 6, 1963, pp. 1–12 (Japanese).

Toshio Kuroda, "Japan's demographic transition", *Annual Report of the Institute of Population Problems*, 1968, No. 13, 1968, pp. 1–4, (English summary).

in age-specific fertility rate of married females by Yamaguchi he justifiably mentions that "the marriage boom occurred among relatively young men and women and this presented a factor for the promotion of the baby boom by suddenly raising the fertility at younger ages."[19]   This analysis further indicates the notable decrease in the fertility of married females in the latter part of the "reproductive ages" of 15–49, such as in the age groups of 35 years and over, immediately after the baby boom.   This supports the assumption of the practice of illegal induced abortions. In 1948, "Eugenic Protection Law" was enforced as an unusual parliamentary law with the objective "to prevent the increase of the inferior descendants from the eugenic points of view and to protect the life and health of the mother as well".   This law provides for fundamental provisions concerning the guidance in "eugenic operations" and contraception on one hand, and dismisses the illegality of abortions provided for in the Criminal Code, under specified conditions of "artificial interruption of pregnancy under physician's approval" on the other.

(B)   In some developed countries, the post-war baby boom continued for 5 or 6

Table 15.   AGE SPECIFIC FERTILITY RATES OF FEMALES

Year	15–19	20–24	25–29	30–34	35–39	40–44	45–49	General fertility
	$^o/_{oo}$	$^o/_{oo}$	$^o/_{oo}$	$^o/_{oo}$	$^o/_{oo}$	$^o/_{oo}$	$^o/_{oo}$	$^o/_{oo}$
1930	31.51	200.58	249.07	217.39	163.39	71.76	7.93	137.38
1950	13.26	160.68	236.24	174.67	104.37	35.89	2.12	109.80
1955	5.89	111.50	180.57	112.12	49.42	12.61	0.70	74.32
1956	5.11	106.88	176.35	100.73	43.27	10.61	0.57	69.90
1957	4.33	99.26	169.61	89.76	35.64	8.34	0.51	64.46
1958	4.02	106.35	181.31	89.01	32.54	7.51	0.43	66.79
1959	4.02	107.07	179.01	83.53	28.15	6.44	0.39	64.50
1960	4.26	106.63	181.13	79.74	23.85	5.18	0.34	63.51
1961	4.34	100.50	181.59	78.12	20.86	4.51	0.28	62.52
1962	4.07	99.73	185.74	77.76	19.02	3.87	0.25	62.13
1963	3.76	98.06	191.05	80.77	18.71	3.46	0.21	62.07
1964	3.30	101.99	195.42	82.64	18.62	3.23	0.18	62.69
1965	3.30	112.34	203.10	86.44	19.29	3.04	0.17	65.27
1966	3.54	90.65	144.39	61.97	15.99	2.68	0.17	47.94
1967	4.32	108.65	217.08	91.29	19.97	2.74	0.15	67.26
1968	4.23	98.47	206.45	87.36	20.04	2.74	0.17	64.28
1969	4.34	92.23	205.76	86.08	20.08	2.67	0.16	64.26
*1970	4.56	96.63	210.25	85.84	19.80	2.70	0.16	65.94

Source :   Kiichi Yamaguchi, *Trends of Population Reproductivity in Japan*, Institute of Population Problems Research Series, No. 172, December 1966, and other.
        *Provisional.

19)   Kiichi Yamaguchi, "Nuptiality and marital status structure affecting fertility", *The Journal of Population Problems*, No. 100, *op. cit.*, pp. 64–71.

years, whereas in Japan it lasted for 3 years only and since 1950, the number of birth started to decrease suddenly in spite of the increase of "female population of reproductive age", reaching already the lowest of 1.57 million in 1957. The crude birth rate in 1950 was 28.1 per thousand and reached down to 17.2 thousand in 1957. The standardized birth rate also shows a similar trend (See Tables 2 and 3). Such rapid fertility decline never took place even in developed countries in the past.[20] The fertility decline in Germany after the 1st world war until 1932 was often taken up as the example of the fastest decline but the fertility decline in post-war Japan exceeded this by far in its rapidity.

General fertility, or the ratio of the number of birth against reproductive-age female population, decreased to 80 per cent of the 1930 level in 1950, and about 54 per cent by 1955. Examining this fertility decline during this period by female fertility rate by 5-year age groups, the decline in fertility rates of each age group was nominal in 1955, as compared with the rates in either 1930 or 1950, but particularly notable decline was observed in the age group of under 20 and 35-49 years[21] (See Table 15).

Table 16. FERTILITY RATES BY BIRTH ORDER

(per 1,000 female population at ages 10-49)

Year	First child	Second child	Third child	Fourth child	Fifth child	Sixth and after
1950	24.8	25.6	15.0	9.7	6.2	10.0
1955	20.5	16.3	11.8	6.9	3.2	3.1
1956	21.1	16.2	10.3	6.0	2.8	2.6
1957	20.4	15.9	8.9	4.7	2.3	2.0
1958	22.5	16.9	8.7	4.0	1.9	1.7
1959	23.0	16.7	7.8	3.2	1.5	1.4
1960	23.4	17.1	7.2	2.6	1.1	1.0
1961	23.2	17.4	6.7	2.2	0.9	0.8
1962	24.3	17.9	6.3	1.8	0.7	0.6
1963	24.7	18.6	6.1	1.6	0.5	0.5
1964	25.5	19.5	6.1	1.4	0.5	0.4
1965	26.7	21.1	6.3	1.4	0.4	0.3
1966	21.6	14.1	4.4	1.0	0.3	0.1
1967	27.0	23.5	6.5	1.2	0.3	0.2
1968	26.1	22.2	6.5	1.2	0.5	
1969	25.7	22.3	7.0	1.2	0.5	
*1970	26.5	22.7	7.4	1.2	0.5	

Source: *Vital Statistics Reports.*

20) Kiichi Yamaguchi and Shigemi Kono, "Levels and trend of fertility", *The Journal of Population Problems*, No. 100, *op. cit.*, p. 50.
21) Kiichi Yamaguchi and Shigemi Kono, *ibid.*, pp. 50-52.

General decline is also seen in specific fertility rate by birth order during this period, but particularly notable is the decline in the fertility rate after the third child[22] (See Table 16).

According to Table 17, immediately after the war, the standard of living of Japan as measured by per caput real national income was approximately half of her pre-war level. It was in 1955 that Japan restored her pre-war level of living. Not necessarily speaking from economic determinism, making the years around 1955 when the pre-war level of living was restored as the turning point, with a few years time lag, major changes to make an epoch seem to have come to be observed both in fertility trend and in motives and means of fertility

Table 17. PER CAPUT NATIONAL INCOME

Year	Nominal income (1,000 yen)	Real income	
		in yen	index
1934–36	0.2	210	100.0
1946	4.8	109	51.9
1947	12.4	112	53.3
1948	24.5	128	60.9
1949	33.5	144	68.6
1950	40.7	168	80.0
1951	53.6	182	86.7
1952	59.3	197	93.8
1953	66.1	206	98.1
1954	68.3	207	98.6
1955	81.8	250	119.0
1956	90.6	263	125.2
1957	103.7	289	137.6
1958	104.8	295	140.5
1959	118.9	324	154.3
1960	142.0	367	174.8
1961	167.1	432	205.7
1962	186.3	450	214.3
1963	214.4	502	239.0
1964	240.5	514	244.8
1965	265.4	541	257.6
1966	307.4	597	284.3
1967	361.7	676	321.9
1968	423.1	763	363.3
1969	486.3	835	397.6
1970	569.3	921	438.6

Note: Index numbers are with the average of 1934–36 as 100.0. Data provided by the Economic Planning Agency and years denote fiscal years starting on April 1.

22) Kiichi Yamaguchi and Shigemi Kono, *ibid.*, pp. 52–53. This paper presents the analysis of specific fertility rate by age of mother and parity. pp. 53–55.

control.

As it is reported in the public opinion survey by the Population Problems Research Council of the Mainichi Newspapers, the most dominant motives of limiting the number of children during the period of 1950–57 was economic

Table 18. NUMBERS OF CASES OF INDUCED ABORTIONS AND EUGENIC OPERATIONS REPORTED UNDER THE PROVISION OF EUGENIC PROTECTION LAW

(1=1,000)

Year	Induced abortion	Eugenic operation
1950	489	11
1951	638	16
1952	806	22
1953	1,068	33
1954	1,143	38
1955	1,170	43
1956	1,159	44
1957	1,122	44
1958	1,128	42
1959	1,099	40
1960	1,063	39
1961	1,035	35
1962	985	32
1963	955	33
1964	879	29
1965	843	27
1966	808	23
1967	747	21
1968	757	19
1969	744	17
1970	732	16

Source: Health and Welfare Statistics Division, Minister's Secretariat, Ministry of Health and Welfare, *Statistical Report on Eugenic Protection, 1970*, 1971.

difficulty. Before and during the war when the family planning movement was still immature and the dissemination of contraception was extremely limited, induced abortion was widely practised as the means of birth control. The number of cases reported according to the provisions of the Eugenic Protection Law rose steadily until it reached the peak of 1.17 million in 1955 (See Table 18). Also, the number of eugenic operations, protecting the life and health of others, reached the peak one or two years after the peak of induced abortions (See Table 19). It was during this period, since around 1952 in particular, that the family planning dissemination policy was taken up by the government with the

purpose of protection of maternal health. In fact, however, major part of the controlled births seems to have been by means of induced abortions rather than by contraceptions in these days. According to the estimate worked out by Aoki the ratios of contraceptions and induced abortions in the practised birth control in 1966 was 3 versus 7.[23]

Table 19. ESTIMATED RATIOS OF CONTRACEPTIONS, INDUCED ABORTIONS AND DELIVERIES

Year	Contraceptions	Induced abortions	Deliveries	Ratio contraception: abortion
	%	%	%	
1955	17.7	37.4	44.9	3 : 7
1960	29.8	31.4	38.8	5 : 5
1965	39.9	20.8	39.3	7 : 3

Source: Reference material in note 23), *Selected Statistics Concerning Fertility Regulation in Japan*, p. 58.

(C) During the period of 1958–64 when the level of living restored the prewar level following the rapid improvement, crude birth rate fluctuated in the low level of roughly 17–18 per thousand (See Table 2), and the standardized birth ratio also showed a similar trend (See Table 3).

As shown in Table 15, in the 5-year age-group specific fertility rates of females, further decline down to one half of the pre-war level reaching 45.6 per cent in 1964 is observed in general fertility, as compared with the rate in 1955. Decline is all the more evident in the age groups of under 25 and 30–49, but the change into rapid increase in fertility rate of the age-group of 25–29 since 1958 needs attention. Whereas the specific fertility rate during this period underwent further decline, the "bunched birth" trend or concentration of births in the age group of 25–29 could be noticed.[24] This may imply that the change in the specific fertility rate of the age group of 25–29 will bear definite import-ance in determining the future fertility trend of this country.

23) Hisao Aoki, "Effects of family planning practice upon fertility", *The Journal of Popu-lation Problems*, No. 100. *op. cit.*, pp. 76–81.

Hisao Aoki, *Selected Statistics Concerning Fertility Regulation in Japan*, Institute of Population Problems Research Series No. 181, December 1967, (English summary).

For the years of 1925, 1937, 1950, 1955 and 1958, there is a study made by Honda :

Tatsuo Honda, "An analysis of the birth control effect in the marital fertility in pre- and post-war Japan, with special reference to the effectiveness of control by induced abortion and contraceptive practice", *The Journal of Population Problems*, No. 78, December 1959, pp. 1–19, (Japanese).

24) Kiichi Yamaguchi and Shigemi Kono, "Levels and trend of fertility", *op. cit.*

The trend of the fertility rate by birth order shows the change into sharp upward trend in the rate of first child, the change into gradual upward trend in that of second child, stagnancy in that of the third child, and after the fourth child fertility further declines in each of the categories (See Table 16).

Substantial change is also noted in the motives and means of fertility control during this period. According to the results of public opinion surveys by the Population Problems Research Council of the Mainichi Newspapers since 1955, apparent change can be noticed in the motives, i.e., so to speak "cultural needs" such as to give better education to the limited numbers of children or to protect the health of mothers came to motivate with increased significance rather than economic difficulties.

It was also during this period that contraceptions were disseminated widely among people. The public opinion surveys by the Population Problems Research Council of the Mainichi Newspapers show that the "current practice rate" which indicates the ratio of married couples who are practicing contraception at the time of the survey was 33.6 per cent in 1955. This ratio was greatly raised to 51.9 per cent by 1965. Including the ones who responded to have "ever practised" which occupied 15.4 per cent, the total ratio of experienced couples was 67.3 per cent, running very close to the level of developed countries. Further mention is appropriate here that the difference in the current practice rate of contraception between urban and rural areas almost disappeared during this period (See Table 20).

As afore mentioned, the number of cases of induced abortion reported in accordance with the Eugenic Protection Law changed into considerable rapid declining trend after the peak in 1955. The number of cases of eugenic operation also changed into rapid decline (See Table 18).

In referring to the study by Aoki cited above again, the ratio of contraceptions and induced abortions in fertility control, which was 3 versus 7 in 1955, became half and half in 1960 and then completely conversed the ratio in 1965 to become 7 versus 3 (See Table 19).

Above facts and figures seem to lead to the conjecture that the decreasing tendency of the number of cases of induced abortion since 1956 was not a little due to the dissemination of contraception. Although the presented number of cases of induced abortion is limited to those legally reported in accordance with the Eugenic Protection Law and additional cases of so-called "black-market abortions" can be assumed, it may not commit a big mistake if we assume that these also are decreasing proportionately with the decrease of reported cases of induced abortion. In spite of the fairly substantial decrease in the number of

Table 20. DISSEMINATION OF CONTRACEPTION IN JAPAN ACCORDING TO THE PUBLIC OPINION SURVEYS ON FAMILY PLANNING BY THE POPULATION PROBLEMS RESEARCH COUNCIL OF MAINICHI NEWSPAPERS

Item	1950 (1st)	1955 (3rd)	1960 (5th)	1965 (8th)
1) By practice				
Currently practising	19.5%	33.6%	42.5%	51.9%
Ever practised	9.6	18.9	20.2	15.4
Never practised	63.6	41.5	33.0	31.4
Unknown	7.3	6.0	4.3	1.2
2) By localities				
6 metropolitan cities	23.7%	37.7%	47.0%	51.5%
Large cities	} 23.6	} 34.0	46.3	50.7
Medium & small cities			41.1	52.8
Rural areas	17.4	31.9	39.9	52.3
3) By education of wives				
Less than 10 years	14.2%	28.2%	35.0%	46.9%
10–12 years	25.4	46.1	51.6	58.1
13 years and over	37.3	47.8	51.9	65.2
4) By occupation of husbands				
Agriculture & forestry	} 11.3%	25.4%	34.9%	47.0%
Physical labour		35.8	40.7	50.4
Non-agricultural self employment	} 25.9	37.4	40.1	51.0
Non-physical labour		39.8	53.4	56.8

Source: Hisao Aoki, reference material in note 23), p. 76.
Note: The survey covers 3,000 to 6,000 married couples samples whose age of the wife is under 50 years. 2) to 4) show the current practice ratios. Large cities in 2) are those with population over 100,000 excluding 6 metropolitan cities. Non-physical labour in 4) includes waged workers and those in liberal occupations.

induced abortion, however, it requires attention that for the 3-year period of 1962–64, the number of cases of induced abortion shown in Table 18 still amounts to 56 per cent of the number of births shown in Table 2.

Brief comment on the trend of foetal deaths should be made here. Table 21 is based on the vital statistics, and the foetal deaths here mean the stillbirths after 4 months of pregnancy reported in accordance with the provisions of the Eugenic Protection Law and are included in the "artificial foetal death". As it is clear from the table, artificial foetal deaths show apparent declining trend after the peak in 1951. There are two cases of the decrease in artificial foetal deaths, i.e., one is the case where those of after 4 months of pregnancy decrease in spite of the increase in induced abortions, and the other is the case of decrease of induced abortions themselves including the ones of after 4 months of pregnancy. It can be assumed that during 1951–55, former situation was

Table 21. SPONTANEOUS AND ARTIFICIAL FOETAL DEATHS AND DEATH RATES

(number of foetal deaths is in 1,000 and the rate is per 1,000 births)

Year	Total		Spontaneous		Artificial	
	Number	Rate	Number	Rate	Number	Rate
1935	116	50.1	..	..	..	..
1950	217	84.9	107	41.7	110	43.2
1951	217	92.2	101	43.0	116	49.3
1952	204	92.3	95	42.8	109	49.5
1953	193	93.8	90	43.5	104	50.2
1954	187	95.6	87	44.6	100	51.1
1955	183	95.8	85	44.5	98	51.3
1956	179	97.1	87	46.9	92	50.1
1957	176	101.2	87	49.9	89	51.3
1958	185	100.7	92	50.2	93	50.5
1959	182	100.6	93	51.3	89	49.3
1960	179	100.4	93	52.3	86	48.1
1961	180	101.7	96	54.3	84	47.4
1962	177	98.8	97	54.2	80	44.6
1963	175	95.6	98	53.3	78	42.4
1964	168	89.2	97	51.7	71	37.5
1965	162	81.4	94	47.6	67	33.8
1966	148	98.2	83	55.2	64	43.1
1967	149	71.6	91	43.6	58	28.0
1968	143	71.1	87	43.4	56	27.7
1969	139	68.6	86	42.3	53	26.3
1970	135	65.3	84	40.6	51	24.7
*1971	131	61.4	84	39.3	47	22.1

Source: *Vital Statistics Reports.*
*Provisional.
Original footnote: Totals are not in all cases the sum of natural foetal deaths and arti-
ficial deaths because of unknown cases.

the stronger factor whereas the latter worked stronger since 1956. During the period of 1950–58, artificial foetal deaths were greater in figures than spontaneous foetal deaths both in real numbers and in foetal death ratios, which is, number of foetal deaths / (live births+stillbirths)×1,000. Since 1959, however, while the artificial foetal deaths are showing clear declining trend both absolutely and relatively, spontaneous foetal deaths are somewhat in gradual increasing trend. Due to this fact, as the years approach to the present one, the difference between spontaneous and artificial foetal deaths has been on continuous expansion both absolutely and relatively. Under any circumstances, it is a significant problem for maternal and child health that the number of spontaneous foetal deaths has been absolutely stagnant or in gradual increase since 1959.

(D) 1966 was the year of *"hinoeuma* (fire-horse)". Following the slight upward

tendency both in the number and the rate of birth since 1963, in 1965 preceding the year of *hinoeuma*, both birth numbers and the rate jumped up, falling aside from the tendency, which probably may indicate the moderation of birth control in the year preceding that of *hinoeuma*. In the year 1966 of *hinoeuma*, notable decrease resulted both in the number of births and the birth rate and in the following year of 1967, apparent increase in both was recorded which seemed to compensate the withholding in the previous year (See Table 2). The fact that such vivid change could actually occur in the number of birth and the birth rate indicates, among other things, that the artificial control of births is widely disseminated among people.

The figures relative to fertility in the years of 1965, 1966 and 1967 are these under abnormal conditions and require caution in handling them if the normal fertility trend is to be sought. Throughout the following comments, it is intended that the fertility figures for these three years will not be treated as normal data. It can not be denied that the effect of *hinoeuma* may still remain up to 1968 to some extent, or that the number or the rate of birth in 1964 is also already affected by the preconsideration of *hinoeuma*. The trial calculation of 3-year average crude birth rate for the years from 1965 to 1967 gives 17.20 per thousand, being somewhat lower than 1964 (See Table 2). Its standardized birth rate is 14.32 per thousand and lower than 1964 which is 14.80 per thousand.

In summary, although *hinoeuma* had substantial effect on fertility in 1965–67, it was a temporary confusion factor and as far as the normal trend is concerned at least at present, it did not change the trend of birth rate or fertility to a noticeable degree.

(E) From 1968 onward, girls who were born during the immediate postwar baby boom have been reaching the marriageable age. This has led to an increase in both number of births and crude birth rate to 2 million and 19.2 per 1,000 population, respectively, in 1971 (Table 2). These levels are somewhat higher than those experienced in the 1960's.

2. Demographic implications of recent fertility

According to Table 22, crude birth rate of recent Japan stands slightly lower than the medium of the rates of developed countries. However, as the ratio of reproductive-age female population is larger in Japan than that of other developed countries, after standardizing the birth rate in the difference in the age distribution, Japan's standardized birth rate is the same as that of Romania or is the lowest except Hungary in the world [25] For France which is known

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25) Kiichi Yamaguchi, "The population reproductivity of Japan in comparison with other countries", *The Journal of Population Problems*, No. 104, October 1967, pp. 15–38, (English summary).

Table 22. CRUDE AND STANDARDIZED BIRTH RATES IN DIFFERENT COUNTRIES

Crude birth rate* (⁰/₀₀)			Standardized birth rate** (⁰/₀₀)			
Order	Country	Birth rate	Order	Country	Year	Birth rate
1	New Zealand	22.8	1	New Zealand	1965	26.5
2	Canada	21.4	2	Canada	1965	23.8
3	Netherlands	19.9	3	United States	1965	22.4
4	Australia	19.6	4	Australia	1965	22.1
5	United States	19.4	5	Norway	1964	21.8
6	Italy	19.2	6	England & Wales	1964	21.7
7	Switzerland	18.8	7	Netherlands	1965	21.5
8	England & Wales	18.4	8	France	1965	20.8
9	Denmark	18.0	9	Austria	1965	20.1
10	Fed. Rep. of Germany	17.9	10	Belgium	1964	19.8
11	Austria	17.9	11	Denmark	1964	19.7
12	France	17.7	12	Czechoslovakia	1964	19.4
13	**Japan**	17.7	13	Switzerland	1964	19.2
14	Norway	17.5	14	Fed. Rep. of Germany	1964	18.8
15	Finland	16.9	15	Italy	1964	18.1
16	Belgium	16.4	15	Sweden	1965	18.1
16	Czechoslovakia	16.4	17	Finland	1965	17.5
18	Sweden	15.9	18	**Japan**	**1964**	14.8
19	Romania	14.6	18	Romania	1965	14.8
20	Hungary	13.1	20	Hungary	1965	14.1

Source : Reference material in note 25).
* All rates are for 1965 except Japan whose rate is for 1964.
** Standard population is the total population of Japan in 1930.

for the low fertility continued for a long time, her standardized birth rate is 8th highest among 20 developed countries. Also, birth rates of north European countries which are representative of continuous low level are definitely higher than that of Japan after standardization.

If the assumption is made that a married couple or a potential mother continues the present birth probability by age of females, the average number of births in both sexes during her life time can indicate a fertility measure from the viewpoint of population reproduction. This index is called "total fertility" which is listed for Japan in column (1) of Table 24.[26]

In measuring fertility from the standpoint of population reproduction, the measurement may be made for female births only instead of total births.

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26) If male and female birth probability by age of female population is $\phi(x)$, total fertility rate r_t is :

$$r_t = \int_0^\omega \phi(x)dx.$$

Minoru Tachi, *Techniques of Population Analysis, op. cit.*, p. 235.

Namely, the measurement of the average number of female births by a woman during her lifetime to replace her in the following generation may be made under the assumption of constant female birth probability by age at present. This is called "gross reproduction rate",[27] and is shown in the column (1) of Table 23 and the column (2) of Table 24.

Ttble 23. REPRODUCTION RATES OF FEMALES
IN DIFFERENT COUNTRIES

Country	Year	Gross reproduction rate	Net reproduction rate
New Zealand	1964	1.75	1.70
Canada	1965	1.55	1.51
Netherlands	1964	1.55	1.50
Australia	1964	1.53	1.47
United States (White)	1964	1.50	1.45
Norway	1964	1.42	1.38
England & Wales	1964	1.41	1.36
France	1965	1.38	1.34
U.S.S.R.	1960–61	1.37	...
Belgium	1964	1.32	1.27
Switzerland	1963	1.31	1.27
Denmark	1964	1.26	1.23
Finland	1964	1.24	1.20
Fed. Rep. of Germany	1964	1.24	1.19
Italy	1963	1.23	1.14
Czechoslovakia	1963	1.22	1.18
Sweden	1964	1.21	1.18
Japan	**1964**	**0.99**	**0.95**
Romania	1964	0.94	0.88
Hungary	1965	0.88	0.83

Source: Reference material in note 25).

Further, measurement of reproductive capacity of population in the light of the balance between births and deaths, or with additional consideration of the probability of death or of survival to the gross reproduction rate during the period that a born female replaces the mother, is the "net reproduction rate".[28]

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27) If female birth probability by age of female population is $\phi_{fF}(x)$, gross reproduction rate r_g is:

$$r_g = \int_0^\infty \phi_{fF}(x)dx.$$

Minoru Tachi, *ibid.*, p. 235.

28) If female birth probability by age of female population is $\phi_{fF}(x)$, and survival probability in x years after birth of the born females is $l_F(x)$, net reproduction rate r_n is:

$$r_n = \int_0^\infty \phi_{fF}(x) l_F(x)dx.$$

Minoru Tachi, *ibid.*, pp. 235–236.

Therefore, the value of the net reproduction rate at 1 denotes "simple reproduction" and represent the reproduction of the population without any increase or decrease in the following generation, or the potential of "stationary population". When the net reproduction rate exceeds 1, the population is the one of "increasing reproduction", showing the increasing potential. If it is smaller than 1, it is the "decreasing reproduction", showing the potential of decreasing population. These figures are shown in the column (2) of Table 23 and the column (3) of Table 24.

Table 24. REPRODUCTION RATES OF JAPANESE FEMALES

Year	Total fertility rate	Gross reproduction rate	Net reproduction rate
1925	5.11	2.51	1.56
1930	4.71	2.30	1.52
1937	4.36	2.13	1.49
1940	4.11	2.01	1.44
1947	4.52	2.20	1.67
1950	3.63	1.76	1.53
1955	2.36	1.15	1.05
1956	2.21	1.07	0.99
1957	2.03	0.99	0.91
1958	2.10	1.02	0.96
1959	2.03	0.99	0.92
1960	1.99	0.97	0.92
1961	1.95	0.95	0.90
1962	1.97	0.95	0.91
1963	1.99	0.97	0.93
1964	2.04	0.99	0.95
1965	2.13	1.04	1.00
1966	1.60	0.77	0.74
1967	2.22	1.08	1.05
1968	2.12	1.02	1.00
1969	2.12	1.02	1.00
*1970	2.14	1.03	1.01

Source: Kiichi Yamaguchi, "Population reproduction rates for all Japan: 1969", *The Journal of Population Problems*, No. 119, July 1971, p. 58.
* Provisional.

According to the data given in Table 23, fertility of Japan as seen in the gross reproduction rate belongs to the lowest group in the world with Romania and Hungary. Gross reproduction rates of Japan, Romania and Hungary are all below unity and indicate the potential of decreasing population even only from the standpoint of fertility.

(B) Net reproduction rates of Japan, Czechoslovakia, Romania and Hungary as shown in Table 23 are also below unity, showing the potential of decreasing

populations. These show potentials only and the net reproduction rate coming to be under 1 does not immediately connect itself with the start of decrease in the population. Theoretically, if the present birth and death probabilities by age of females are assumed to remain constant, the population starts to decline after one average life interval,[29] or after 30 years counting from the average age of birth of females, but actually, because of the extention in the expectation of life, the starting of decrease is usually postponed to a later time.

What is to be considered in this connection is what level of gross reproduction or total fertility rate is necessary in order to maintain the unity in the net reproduction rate, or to become the stationary population. The ratio obtained by dividing the net reproduction rate by the gross reproduction rate is called the "reproduction survival rate", which represents the degree of loss in births by deaths during the process of reproduction under the prevailing death probabilities. Recent reproduction survival rate of Japan is extremely stable in the very high level of 96 per cent, as the result of substantial improvement in death probabilities during the reproductive period. Accordingly, in order to have the unity in the net reproduction rate, it requires the gross reproduction rate over 1.04. It has already been mentioned that the recent gross reproduction rate of Japan is below unity. Sex ratio at birth, or the ratio of male births to female births is very constant at 105 males per 100 females. Accordingly, if the gross reproduction rate over 1.04 is required to maintain unity in the net reproduction rate, over 2.13 in the total fertility rate is required. The value dividing the total fertility rate by the net reproduction rate may be named as "stationary total fertility rate", and it represents the total fertility rate required to maintain unity in the net reproduction rate, under the assumption of constant death probabilities.[30] The stationary total fertility rate for recent years are around 2.13–2.15, and excluding the year 1965 of *hinoeuma* effect, the total fertility rate in Japan is between 1.95 and 2.04, indicating the total fertility rate, or more generally, fertility of Japan is below the stationary limit.

(C) As shown in Table 24, the net reproduction rate of Japan became below unity at 0.99 in 1956 and that level continued as long as for 9 years until 1964.

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29) For the female population, if x is age, $B(x)$ is the number of birth by females at age x, and average life interval is β,

$$\beta = \frac{\displaystyle\int_0^\infty xB(x)dx}{\displaystyle\int_0^\infty B(x)dx}$$

This is the weighted average of the age with the weight of $B(x)$.
Minoru Tachi, *ibid.*, p. 215.

30) Minoru Tachi, *ibid.*, p. 238.

There were not a few cases among the advanced countries during the period of "world depression" that the net reproduction rate came down less than 1. However, the continuation of the net reproduction rate below unity for 10 years is a rare example.

Summarizing the above statements, the demographic implications of recent fertility in Japan are cognizable in the facts (A) that the fertility belongs to the lowest group in international comparison, (B) that the net reproduction rate is below unity, holding the potential of decreasing reproduction, as well as that the fertility is below the stationary limit both for the gross reproduction rate and the total fertility rate, and (C) that such conditions continued nearly 10 years. It may be said that according to these three kinds of demographic standards, fertility of Japan has become excessively low. Also, it may be said that recent fertility of Japan has some room for recovery. In view of the experiences in developed countries, it may be considered that once the fertility is lowered to this much of extent, it will not be resurged as much as the gross reproduction rate would exceed 2 as it did in pre-war times, although some recovery may be possible.*

3. Some consequences of declining fertility

The sudden fertility decline in post-war Japan has left variety of effects economically and socially, as well as demographically. In this report, it may be appropriate to review some major effects from the standpoint of population problems.

In spite of the tremendous improvement in infant mortality, the sudden decline of fertility has caused the rapid decrease in child population under the age of 15. While the pre-war level of the child population to the total population was 37 per cent, it dropped to 33 per cent in the Census of 1955, and in the 1970 Census, the ratio became 23.9 per cent, being the lowest ever recorded in censuses. The Institute of Population Problems estimates that the number of child population will be around 28 million in 1985. Since the speed of fertility decline was greatly accelerated since 1950, the relative decreasing trend of child population should be observed in the future.

The National Institute of Demographic Studies in France earlier pointed out of "the empirical law for the ageing of population". It states that the demographic factor promoting the relative expansion of the ratio of the aged population in

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* Note of the reviser: The discussion of the above Section 2 on the demographic implications of recent fertility is that of the original author based on the fact until 1966. According to the information for more recent years, the net reproduction rate of Japan has come to maintain the level of unity, as the figures for 1968 to 1970 in Table 24 indicate, being no more below unity.

the total population, or ageing of the population, is not mortality decline nor the combination of mortality decline and fertility decline, but solely the decline in fertility. Tachi verified this with reference to facts in Japan,[31] and there also is a study by Mizushima.[32]

As to be mentioned later again, the household size, i.e., average numbers of household members per household, started to show rapid decreasing trend in 1955. It can easily be assumed that one of the factors for this decrease in the household size was the fertility decline which surpassed the improvement in mortality.

So far are the major demographic effects of the rapid fertility decline, and various economic and social effects may also be pointed out.

In economic aspect, it is needless to say that the absolute and relative decrease of child population due to fertility decline reveals itself in the quantitative and qualitative changes of demand. Domestic demands for necessaries for child population such as toys or rain-coats, rubber boots, etc. for school children inevitably decrease.

Socially, while the labour of house-wives comes to be alleviated as the durable household commodities popularize on one hand, the sudden decrease in the number of children as the result of fertility control presents difficult problems in the adjustment in relation to childbearing. Excessive care of mothers to children is liable, in many cases, to cause various problems in child discipline as well as sound development of the physiques. Also, while there is an opportunity for mass training within a family when there are many children in a family, the limited number of children may be deprived of their possible group training setting in a family. Under such circumstances, it has to be compensated by the society, but at present it is not suffifficiently available. Necessity should be emphasized in the intensification of families for the sound development of children, and one of the most basic problems here may be the adaptation of mothers themselves so that they may be ready to bring up the small number of children as sound social beings.

4. Conditions for recovery of fertility

Mentions have previously been made that the present fertility of Japan may be excessively low judgeing from the facts that it belongs to the lowest group in the world, that it is below the stationary limit and that it has continued in such low level for approximately 10 years. It has also been pointed out that

31) Minoru Tachi, "Structural change of population in Japan—in relation to fertility and mortality change", *Annual Reports of the Institute of Population Problems*, No. 1, 1956, pp. 4-5, (English summary).

32) Haruo Mizushima, "Relation between ageing of population and fertility and mortality decline", *Index of Health and Welfare*, Vol. III, No. 7, July 1956, (Japanese).

the fertility of Japan has the room for recovery viewing from the experiences of developed countires. Then, it is now necessary to examine the conditions for fertility recovery. In order to understand the conditions, the causes for the fertility decline should be clarified.

(A) The Institute of Population Problems conducted a sample survey on "Social and Psychological Factors Affecting Fertility in Japan" in 1965.[33] Kono made the multiple correlation analysis to the results of the survey and pointed out that the duration of marriage played a major role in determining fertility.[34]

One of the important factors to determine the duration of marriage is the age of marriage. Average age at first marriage for husband and wife showed an upwarding trend up until 1960 for both and became stagnant since 1960. In 1966, that for husband was 27.3 years and for wife 24.5 years, indicating the type of late marriage in this country. (See Table 25).

Table 25. AVERAGE AGE AT FIRST MARRIAGE

Year	Husband	Wife
	(years)	(years)
1950	25.9	23.0
1955	26.6	23.8
1960	27.2	24.4
1961	27.3	24.5
1962	27.3	24.5
1963	27.3	24.5
1964	27.3	24.4
1965	27.2	24.5
1966	27.3	24.5
1967	27.2	24.5
1968	27.2	24.4
1969	27.1	24.3
1970	26.9	24.2

Source: *Vital Statistics Reports.*

Average ages at first marriage in developed countries are in two extremes. The United States and Canada are typical in early marriages, and particularly in the United States, the average age at first marriage of wife broke the level of 20 years in 1959 to be at 19.9 years and that of husband was 22.5 years. England and Wales and western and northern Europe are typical of late marriages. The average ages at first marriage of husband and wife in England and

33) Shigemi Kono, *Report on the 1965 Survey on the Socio-Psychological Factors Affecting Fertility and Their Future Trends,* Institute of Population Problems Field Research Report, March 1966, (Japanese).

34) Shigemi Kono, "Social and economic factors affecting fertility", *The Journal of Population Problems,* No. 100, *op. cit.,* p. 75.

Wales in 1960 are 25.7 and 23.3 years respectively and those of Japan in recent years even exceed these higher ages of marriages in western Europe. Such prolongation in marriage can be assumed to be acting as an important factor for the fertility decline. One of the reasons of above-mentioned concentration tendency of the age-specific fertility rate of females in the age group of 25–29 seems also to relate to this delay in the average age at first marriage.

(B) As will be elaborated later, pre-war "stem family system" is now undergoing rapid "nuclearization of families". Accordingly it can be assumed that the attitude for births for the purpose of transmission or continuation of a family on the basis of traditional concept of a family has come to be extremely rare in these days. The public opinion surveys by the Population Problems Research Council of the Mainichi Newspapers reveal the rapid decrease of consciousness among parents of "depending on children in the advanced age". Such modernization in consciousness and attitudes as regards the family may also be a reason for the fertility decline.

(C) From the viewpoint of the selective behavior in relation to economic value system, present inclination is more favourable to the selection of durable consumption goods such as refrigerator, electric washing machine, colour TV set, automobile, etc. Similar selection pattern was observed also among developed countries during the period of modernization in mode of living and in elevation of the level of living, but after reaching a certain saturation point, chief interest again turned back to the healthy development of human beings or children. In the case of Japan, the level of living has followed a rapid upward trend since 1955 from the extremely low level in pre-war times, made of living has been modernized, and the stimulative effects upon needs and wants by mass communication have greatly increased, and through these aspects also, the fertility decline may have been promoted.

(D) According to the results of the above-mentioned fertility survey of 1965 by the Institute of Population Problems, "fertility differentials are greatly influenced by the level of education of married couples and the extent of urbanization of the place where married couples reside such as large city, medium-scale city, small city or rural area. Fertility is low in large cities and high in rural areas, and the lower the level of educational attainment, the higher is the fertility."[35] Post-war elevation of educational attainment and particularly conspicuous urban concentration of population also seem to be reasons of the promotion of attitudes and behaviors in favour of fertility control.

(E) As the result of this survey, Kono points out as the following: "Though it

35) Shigemi Kono, *ibid.*, p. 73.

is a classical interpretation that income and fertility are in inverse association, such association can only be observed in rural areas, and overall relation between the two are more or less in U shape or J shape relation, and generally speaking, the higher the income is, the higher the fertility is also."[35] It can be assumed that the recent fertility of Japan is now going through the rapid transitional period from the "classical" association of income and fertility observed previously in developed countries to the recent pattern of developed countries.

Further, "in occupation, differentials are not very remarkable except in the agriculture versus non-agriculture comparison,...........and it seems to be indicated that the motivation for fertility control is the highest among those people who are relatively well educated, engaging in apparently urban type of occupation, but whose income is not large."[35]

(F) According to the public opinion survey of family planning by the population Problems Research Council of the Mainichi Newspapers, as the reason for practising contraception, "adequate child care, particularly higher education to children by limitation of family size" is the most popular answer in recent years. In Japan, where the post-war hike in educational expenses to be born by families has been most rapid, where the families are extremely concerned with the education of children, and where the society places great emphasis on the education background, such attitude in education may also be counted as one of the factors for fertillity decline.

(G) Another reason of fertility decline which can naturally be considered is the conditions of housing and living environment. The above 1965 survey of the Institute of Population Problems reveals that "as the association of average space of living per person and fertility, the number of children is larger when the space of living per head is smaller. Instead of controlling births because of the limitation of living space, the relation is rather inverse where the space is smaller because of the large number of children, and the direct influence of space oppression to fertility is not observed. However, the practice rate of family planning is the highest among the group where one person has one room in average."[35] Presently, housing conditions in Japan are also in transitional period. There have been numerous destruction of houses and evacuation to rural areas during the war, emergent housing measures in post-war period, and the initiation of the full-scale housing policy in recent years, and these processes resulting in the imbalance between the size of households and of houses are clearly reflected in the result of the survey. It should not be overlooked that the living space oppression is reflected in the family planning practice rate. It

can not be denied that the prevailing shortage of houses, unvafourable living environment, difficulties in commuting, etc. are also the promotive factors for the prolongation of marriages as well as fertility decline.

If the present conspicuous fertility decline is being caused by such factors as given above, the uprooting of these causes may immediately connect itself with the conditions for fertility recovery. The conditions for fertility recovery most evidently signify that without disregarding the necessity of economic policies for the further enhancement in the level of living, economic policies alone do not suffice the conditions for fertility recovery. Significant implication is to be noted that the necessity is there for the promotion of "social development" in such aspects as in education, housing, living environment, "family intensification", etc. It is in such cognizance that the need for the social development in balance to the economic development is emphasized as conditions for fertility recovery.

V. Future Population

1. Future population by the Institute of Population Problems, Japan

The Institute of Population Problems has often publicized its future population estimates of this country, the most recent one of which is the estimates as of August 1969. Taking the complete enumerated *de jure* population by sex and age of 1965 census as the base population, this estimate provides the estimated *de jure* population as of October 1 for every year from 1965 to 1985 and for every five years from 1990 to 2025. The estimate after 1990, however, is merely the projection with the assumptions for 1985 as remaining constant. In other words, up to 1985, it presents "population prediction" and since 1990 "population projection".

The methods of the estimates can be summarized as follows. Empirically, the volume of international migration has been extremely small as against the total population, and moreover the in-migration approximately balance with each other. "A closed population", therefore, is assumed, disregarding the international migration, which changes only by births and deaths. For mortality assumptions, by comparing the death probabilities by sex and age, $q(x)$, in the latest life tables of developed countries available at the time of the estimate, the lowest portion was connected to be set as the target $q(x)$s for 1975, which were set constant for the later years. In this schedule, the expectation of life at birth, $\overset{\circ}{e}_0$, for 1975 was 72.5 years for males and 75.8 years for females. For fertility, future trends are assumed in reference to 5-year age-specific fertility

Table 26. VARIOUS FUTURE ESTIMATES OF TOTAL POPULATION

(in 1,000)

Year	Institute of Pop. Problems (1)	United Nations maximum	medium (2)	minimum	Yujiro Hayashi (3)	Yoichi Okazaki (4)	New National Development Plan (5)
1965	98,275*	98,275*	98,275*	98,275*	98,275*	98,275*	98,275*
1975	109,925	109,536	106,174	104,081	112,607**	110,162	108,664**
1985	120,798	122,819	115,169	110,750	129,637	121,937	120,136

Source:
(1) Hidehiko Hama, reference material in note 36).
(2) United Nations, *World Population Prospects as Assessed in 1963*, Population Studies, No. 41, New York, 1966.
(3) Yujiro Hayashi, reference material in note 37).
(4) Yoichi Okazaki, reference material in note 38).
(5) Newspaper release in June-July 1968.
  * Enumerated population as of October 1, 1965.
 ** Interpolation by 1968–85 compound annual average increase rate.

rate of females with the analyses of past trends in each age group, and the assumptions are made for the maximum and the minimum, from which the medium is calculated as means of the two extremes. The total fertility rates in 1985 according to these assumptions are 2.435 in the maximum, 2.027 in the minimum, and 2.231 in the medium.

The total population thus obtained is 109.93 million in 1975 and 120.80 million in 1985, as shown in Table 26. Under the minimum assumption of total fertility, net reproduction rate is expected to be below 1 over the whole period of projection and the population will reach its peak between 2010 and 2015 and the population will change into decline since then, as shown in Table 27.[36]

Table 27. FUTURE POPULATION ESTIMATES BY 3 MAJOR AGE GROUPS PREPARED BY THE INSTITUTE OF POPULATION PROBLEMS, JAPAN

Year	Population (in 1,000)				Ratio (Total population=100.0)			Annual average increase of population of 15–64 years (in 1,000)
	Total	0–14 years	15–64 years	65 and over	0–14 years	15–64 years	65 and over	
1955*	89,276	29,798	54,729	4,747	33.4	61.3	5.3	1,055
1960*	93,419	28,067	60,002	5,350	30.0	64.2	5.7	1,385
1965*	98,275	25,166	66,928	6,181	25.6	68.1	6.3	868
1970*	103,356	24,751	71,270	7,335	23.9	69.0	7.1	719
1975	109,925	26,347	74,863	8,715	24.0	68.1	7.9	583
1980	115,972	27,914	77,780	10,279	24.1	67.1	8.9	660
1985	120,798	28,211	81,085	11,502	23.4	67.1	9.5	612
1990	124,744	27,519	84,145	13,080	22.1	67.5	10.5	373
1995	128,344	26,952	86,012	15,380	21.0	67.0	12.0	119
2000	131,838	27,541	86,605	17,692	20.9	65.7	13.4	52
2005	134,960	28,647	86,865	19,448	21.2	64.4	14.4	−13
2010	137,215	29,346	86,801	21,069	21.4	63.3	15.4	−189
2015	138,614	29,279	85,857	23,477	21.1	61.9	16.9	168
2020	139,605	28,971	86,696	23,938	20.8	62.1	17.1	360
2025	140,619	29,128	88,496	22,994	20.7	62.9	16.4	

* denotes census results and others are all medium estimate taken from August 1969 Estimate by the Institute of Population Problems.

36) Hidehiko Hama, *Future Population Estimates for Japan by Sex and Age for October 1 of Every Year from 1965 to 1985, for October 1 of Every Five Years from 1990 to 2025, Estimated in August 1969*, Institute of Population Problems Research Series No. 192, August 1, 1969.
   Hidehiko Hama, "Future projections of size and sex-age composition of the population", *The Journal of Population Problems*, No. 100, *op. cit.*, pp. 34–39.
   Hidehiko Hama, "Changes in birth rate and death rate and the future population of our country" *Obstetrics and Gynaecology World*, Vol. 20, No. 9, September 1968, pp. 7–12, (Japanese).

2. Other various future population projections

(A) As shown in Table 26, the maximum estimate of the United Nations is similar with the above-presented estimate of the Institute of Population Problems. The United Nations estimate, however, is as of July 1 of each year.

(B) Among these many future estimates, the largest values are given by the estimate of Hayashi. This has resulted from his assumptions which forsee fairly high-level economic growth elevates the level of living, promotes marriages, lowers the average age at first marriage and recovers the fertility level to a considerable degree.[37] Although this type of estimate is valuable as an affluent vision of future Japan, when the annual average compound rate of increase at 1.39% between the 1965 census and 1985, and the present status of demographic changes are considered, this estimate leaves the impression of somewhat over evaluation as far as seen from the standpoint of demographic analysis.

(C) What is attention-worthy from the standpoint of demographic analysis is the one prepared by Okazaki.[38] In this estimate it is assumed that the net reproduction rate will reach unity between 1964 and 1975 and that after 1975 the rate remains constantly at unity. His estimate provides somewhat larger estimated population than that of the Institute. According to his estimate, the population is 110,162 thousand in 1975 and 121, 937 thousand in 1985.

(D) In the New National Development Plan, it assumes the rise in income level, realization of living environment facilities and recovery of fertility and and calculates the population of 108,664 thousand in 1975 and 120,136 thousand in 1985. This result is slightly lower than that of the Institute of Population Problems.

The difference between the estimated values of the Institute of Population Problems and actual values is extremely small for the years when the actual data came to be available. Therefore, the future population of Japan is estimated at around 110 million for 1975 and around 120 million in 1985.

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37) Yujiro Hayashi, *A Vision of Affluent Japan in 20 Years*, October 27, 1965, (Japanese).
38) Yoichi Okazaki, *Long-Term Perspectives of Labour Force*, Japan Institute of Labour, JIL Series No. 40, 1968, (Japanese).

VI. Trends in Changing Age Distribution and Related Problems.

The rapid progress of the demographic revolution since 1950 is introducing very rapid changes in the composition of the Japanese population. Dividing the age distribution into three major portions of (1) child population under 15 years of age, (2) "productive-age population" of 15–64 years, and (3) aged population of 65 years and over, the respective trend and problems will be summarized hereunder.

In discussing the future trends of changes in age distribution of population here, the above-introduced estimate of the Institute of Population Problems is used. Table 27 presents this estimate by 3 age groups as categorized above. For 1955, 60, 65 and 70, however, the census results of respective years are shown.[39]

1. Child population

Since the national census was initiated in 1920, the child population continued increase to reach the peak of 29,798 thousand in 1955 and then turned to the rapid decreasing trend. This is naturally due to the rapid fertility decline since 1950. The child population in 1970 was 24,751 thousand and the decrease in this 15-year period was as big as over 336 thousand on annual average. The child population ratio to the total population, which was 33.4% in 1955, decreased to 23.9% in 1970, the lowest ever recorded in the history of censuses. As shown in Table 27, the future prospect is also for further gradual decline in the ratio, while for slight recovery in the size of child population.

Needless to say, the healthy development of child population on whose shoulders the next generation depends, is important from the viewpoint of promotion of population quality. The healthy development of child population and promotion of population quality are always important population problems and are included in the population policies regardless of time and nations. In future Japan, however, the necessity and importance should particularly be emphasized, because the present status and future prospect of the child population are as such as referred above in spite of the great demand for human ability promotion risen in technological renovation and economic and social development.[40]

39) Masao Ueda, "Changes in population structure", *The Journal of Population Problems*, No. 100, *op. cit.*, pp. 20–26.

Masao Ueda, "Interrelationship between population structure and reproduction", *ibid.*, pp. 27–34.

Hidehiko Hama, "Future projections of size and sex-age composition of the population", *ibid.*, pp. 34–39.

40) Population Problems Inquiry Council, *Resolutions Concerning the Policy for Population Quality Improvement*, July 12, 1962, (Japanese).

2. Productive-age population

According to Table 27, the productive-age population was 54,729 thousand in 1955, 60,002 thousand in 1960, 66,928 thousand in 1965 and 71,270 thousand in 1970 and already in 1960's, the "shortage of labour force" was admitted, but the annual average increase of the productive-age population in 1960-65 was conspicuously expanded compared with that at 1,055 thousand in 1955-60, to reach the largest recorded volume of 1,385 thousand. This was due to the entry of baby boom population of 1947-49 into the productive ages. Reflecting the fertility decline since 1950, however, the annual average increase of productive-age population decreased to 868 thousand in 1965-70, and is estimated to decrease suddenly down to 625 thousand in 1970-75, and 583 thousand in 1975-80. Though slight increase is shown in 1980-85 at 660 thousand, the overall trend is on very rapid decrease since 1965. The ratio of productive-age population to the total population showed marked expansion from 61.3% in 1955 to 69.0 in 1970, but since then it is estimated to slightly decline.

The labour force population can be provided by functioning the labour force participation rates by sex and age to the productive-age population by sex and age. Thus, the increase of the productive-age population is the outer frame of the increase of the labour-force population and the decrease in its annual average increase results in promoting the decline of the annual average increase of the labour-force population.

3. Labour force population

The changes in labour-force population from 1955 to 1965 according to census returns and its future estimate in every five years from 1970 to 1985 prepared by the Institute of Population Problems are presented in Table 28.

Table 28. ESTIMATES OF FUTURE LABOUR FORCE POPULATION PREPARED BY THE INSTITUTE OF POPULATION PROBLEMS, JAPAN

(in 1,000)

Year	A Estimate Total	Male	Female	B Estimate Total	Male	Female	C Estimate Total	Male	Female
1955*	40,027	24,435	15,591	40,027	24,435	15,591	40,027	24,435	15,591
1960*	44,009	26,822	17,187	44,009	26,822	17,187	44,009	26,822	17,187
1965*	48,294	29,519	18,775	48,294	29,519	18,775	48,294	29,519	18,775
1970	54,026	33,186	20,840	53,148	33,057	20,091	52,268	32,932	19,336
1975	56,901	35,415	21,486	54,998	35,130	19,868	53,007	34,843	18,164
1980	59,284	37,168	22,116	56,116	36,702	19,414	52,937	36,234	16,703
1985	61,598	38,705	22,893	57,081	38,027	19,054	52,559	37,346	15,213

Source: Reference material in note 41).
* Census results.

The most recent future estimate of labour force by the Institute of Population Problems is that as of December 1, 1966.[41] There are various conditions for labour-force estimate and corresponding to each, different methods can be designed. What are to be pointed out here are two different kinds of most basic methods of labour-force estimate by sex and age: (a) One is the method to apply labour-force participation rates by sex and age assumed in certain ways to the population by sex and age, and by summing the results to obtain the total labour-force population. (b) The other method is firstly to estimate the employed population by sex and age in each industrial sector in reference to the demand prospect of the labour force, and proceed to estimate the labour force population by sex and age in consideration with the unemployed population by sex and age, and obtain the total labour-force population as their sums. In this case, it is usually practised to estimate the labour-force participation rates by sex and age by using the estimated results of the labour-force population and the estimated total population and the reasonability is checked by comparing with the change trends and past experiences. At the Institute of Population Problems, since the estimate of future population by sex and age is already available as mentioned above, method (a) is practised on the basis of this estimate. As the initial step of the estimation, the labour-force population by sex and age has been estimated on the asssumption that the labour-force participation rate by sex and age according to 1965 census would remain constant through the future. The results are shown as A estimate in Table 28. As the industrial structure advances, the labour force participation rate can be considered to decrease.[42] "As a method to assume the degree and the timing of such decline, the relationship between the ratio of the population employed in non-primary sectors of industry and the labour-force participation rate by 5-year age groups is identified from the prefectural data of 1960 and applies regression curves to the correlation graphs. As the individual assumptions, the ratios of the primary industry population (25.5% for the total country) in 1965 for each age groups are predetermined to decrease 50% in 20 years by 1985, and decides the labour-force participation rates corresponding to non-primary sectors ratio on the regression straight line. For the age group of 15–19, however, the estimate is made on

41) Hidehiko Hama, *Estimates of Future Labor Force Population in Japan for October 1 from 1965 to 1985, Estimated in December 1966,* Institute of Population Problems Research Series No. 174, January 26, 1967, (Japanese).
   Hidehiko Hama, "Future projections of size and sex-age composition of the population", *op. cit.,* pp. 40-41.
42) Yoichi Okazaki, *Labour Force Problems in Japan, op. cit.,* pp. 59 fg.
   Yoichi Okazaki, *Long-Term Perspective of Labour Force, op. cit.,* pp. 40 fg.

the assumption of employment and school attendance rates."[43] C estimate in
Table 28 shows the results. In this connection, the number and the ratio of
workers by three major industrial sectors are shown in Table 29. If the indus-
trial structure further advances accompanying decline in labour-force participa-
tion rate in the future, A estimate in fact is the maximum estimate, and C
estimate which assumes considerable advancement in industrial structure is the
minimum one. B estimate in Table 28 is the arithmetic mean of A and C
estimates.

The trends of labour-force increase examined by B estimate may be described
as the following. Since the available census figures and the future estimate of
labour force population by the Institute of Population Problems are both for
every five years, the increase of every 5 years and the annual average increase
obtained from it are shown in Table 30. According to the Table, the annual
average increase of the total labour-force population is 796 thousand in 1955-60
and becomes 857 thousand in 1960-65 and 971 thousand in 1965-70. With the
peak in 1965-70, however, it turns to rapid declining trend to reach 370 thousand
in 1970-75, 224 thousand in 1975-80 and 193 thousand in 1980-85. It should be

Table 29. NUMBERS OF WORKERS BY 3 MAJOR GROUPS OF INDUSTRY

| Year | Numbers of workers (in 1,000) | | | | | Ratio (total=100.0) | | | |
	Total	Primary	Secondary	Tertiary	Others	Primary	Secondary	Tertiary	Others
1920[1]	26,966	14,442	5,576	6,424	524	53.6	20.7	23.8	1.9
1930[1]	29,341	14,490	5,993	8,788	71	49.4	20.4	30.0	0.2
1940[1][2]	33,839	14,739	8,869	10,005	226	43.6	26.2	29.6	0.7
1947[3]	33,329	17,812	7,427	7,646	444	53.4	22.3	22.9	1.3
1950[4]	35,626	17,208	7,812	10,568	37	48.3	21.9	29.7	0.1
1955[5]	39,261	16,111	9,220	13,928	2	41.0	23.5	35.5	0.0
1960[5]	43,691	14,237	12,764	16,682	8	32.6	29.2	38.2	0.0
1965[5]	47,610	11,731	15,395	20,465	19	24.6	32.3	43.0	0.0
1970[5][6]	52,042	10,066	17,651	24,309	16	19.3	33.9	46.7	0.0

Source : Results of each year's census. (pre-war data include Okinawa).
        Primary industry include agriculture (including husbandary), forestry, hunting,
        fisheries and aquiculture.
        Secondary industry includes mining, construction and manufacturing.
        Tertiary industry includes other industries.
Note 1) Employed persons of all ages.
     2) Excludes foreigners except the ones in former outer territories of Japan.
     3) In and after tenth year counting from the beginning of the year of birth.
     4) 14 years and over.
     5) 15 years and over.
     6) 1% sample tabulation.

43) Hidehiko Hama, "Future projections of size and sex-age composition of the population",
    op. cit., p. 40.

Table 30. ESTIMATED LABOUR FORCE INCREASE BY THE INSTITUTE OF POPULATION PROBLEMS, B. ESTIMATE

(in 1,000)

Period	Five-year increase			Annual average increase		
	Total	Male	Female	Total	Male	Female
1955–60	3,982	2,387	1,596	796	477	319
1960–65	4,285	2,697	1,588	857	539	318
1965–70	4,854	3,538	1,316	971	708	263
1970–75	1,850	2,073	−223	370	415	−45
1975–80	1,118	1,572	−454	224	314	−91
1980–85	965	1,325	−360	193	265	−72

Source: Reference material in note 41).

noted that the enormous decrease in the annual average increase of the total labour-force population since 1970 is not in small extent due to the shift to the absolute decrease of female labour force. Further, as the major portion of the changes of labour force volume is in young labour force, the decline of labour-force increase depends in particular on the decrease of young labour force. Thus, "labour force shortage" will become rapidly intense from 1965–70 on.

Japanese economy is continuing its high-level growth where the demand for the labour force population particularly for young labour force is significantly large. On the other hand, the trend of productive-age population or of labour-force population being as such as mentioned above, "labour-force shortage" will become serious and increasingly important problems.

In referring to the experiences in West Germany where the start of decline in population increase rate and increase rate of labour force population approximately with the decline of economic growth rate, some people fear that the rapid decline in labour-force increase rate in future Japan might cause the decline in economic growth rate. However, there are major differences between West Germany and Japan in the industrial structure on which the increase rate of labour force and economic growth rate affect, and in the distribution of presently available labour force, or accordingly in labour productivity. In West Germany, the labour market had already been efficiently established before the population increase rate and labour-force increase rate started to decline, the distribution of labour force was extremely reasonably arranged, and labour productivity was substantially high. In Japan, however, the country has for many years been accustomed to abundant labour-force supply, labour market contains much room for improvement, and many unreasonable aspects are left in labour-force distribution. Accordingly, the labour productivity is lower than that of West Germany. Under such circumstances, if Japan's industry realized the reasonable set-up of

its labour market and corrects the unfavourable points of labour-force distribution, it is not possible that the experiences in West Germany will immediately apply in Japan.

As it is clear that the total volume of annual increase of productive-age population is to decrease and also the annual increase of labour force is to decline rapidly in the future, the most fundamental policy to cope with such situation is to elevate labour force mobility. There may be various kinds of measures for the promotion of labour-force mobility such as vocational training, retraining, child allowance system, etc., and also further modernization in such aspects as in the permanent-employment system in large enterprises created during the course of modern economic system connected with that, etc. Constitutional improvement in labour-economical nature is urgently needed for small and medium scale enterprises which have been operating on the basis of abundant young labour force supply.

As the declining trend of the annual increase of labour force population is for the most part due to the lower age-group labour, it should be noted that the middle and advanced age labour force increases both absolutely and relatively as shown in Tables 31 and 32. In order to cope with "labour-force shortage", proper utilization of middle and advanced age labour force is important. There are various measures for this purpose which can be divided into those which try to find appropriate occupations to fit such workers and those which try to re-arrange the occupational systems in working places in such manner to be able

Table 31. LABOUR FORCE INDEX BY SEX AND AGE

(total of male and female in each age group in 1965=100.0)

Age groups	Total	1975 Male	Female	Total	1985 Male	Female
15–19	78.6	78.3	78.8	78.9	78.7	79.1
20–24	99.7	101.7	97.3	83.8	86.7	80.3
25–29	128.5	132.0	121.1	89.9	93.7	82.0
30–34	109.8	112.7	103.8	103.2	109.2	90.8
35–39	108.5	112.4	101.9	134.7	145.8	115.8
40–44	134.0	148.8	104.6	146.5	170.5	115.0
45–49	143.0	158.8	122.5	155.4	181.3	121.7
50–54	111.9	118.1	110.2	153.5	175.0	122.1
55–59	105.0	103.3	108.0	151.5	165.2	127.4
60–64	115.9	117.1	113.4	132.4	138.9	119.6
65–69	121.2	124.8	113.0	126.8	132.3	114.1
70–74	131.4	136.2	118.5	149.7	158.9	124.8
75–79	138.3	148.7	109.3	168.0	187.5	113.0
80+	144.6	156.3	111.8	212.3	239.6	135.3

Source: Same as Table 30, B Estimate.

to utilize these workers. Although the importance is admitted to find appropriate jobs to them, it is more important to re-arrange the working system itself so that these workers in large volumes can be utilized. In western European countries where the ageing of population and labour force proceeds, the emphasis is increasingly placed on this direction. It is by no means easy to re-arrange working systems in the way to be adjustable for the use of such workers, but accumulation of such trifle and small efforts as to brighten the lighting or to enlarge the measurement scale reader, for example, are worthy of starting.

Table 32. LABOUR FORCE POPULATION RATIOS BY SEX AND AGE

Age groups	1965 Total	1965 Male	1965 Female	1975 Total	1975 Male	1975 Female	1985 Total	1985 Male	1985 Female
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
15–19	8.6	7.2	10.7	5.9	4.7	8.0	5.7	4.4	8.4
20–24	14.7	13.3	17.0	12.9	11.4	15.6	10.4	9.0	13.4
25–29	12.5	13.8	10.4	14.1	15.4	11.9	9.5	10.0	8.4
30–34	12.5	13.8	10.5	12.1	13.1	10.3	10.9	11.7	9.4
35–39	12.1	12.4	11.6	11.5	11.7	11.1	13.7	14.0	13.2
40–44	9.6	9.0	10.7	11.3	11.2	11.6	12.0	11.8	12.1
45–49	8.0	7.4	9.0	10.1	9.9	10.4	10.6	10.5	10.8
50–54	7.4	7.2	7.7	7.4	7.1	8.0	9.6	9.7	9.3
55–59	6.0	6.2	5.6	5.5	5.4	5.7	7.7	8.0	7.0
60–64	4.2	4.6	3.6	4.3	4.6	3.9	4.8	5.0	4.3
65–69	2.6	3.0	2.0	2.8	3.1	2.2	2.8	3.1	2.3
70–74	1.2	1.4	0.8	1.4	1.6	0.9	1.5	1.5	1.0
75–79	0.4	0.5	0.3	0.5	0.6	0.3	0.6	0.7	0.3
80+	0.1	0.2	0.1	0.2	0.2	0.1	0.2	0.3	0.1

Source: Same as Table 30, B Estimate.

The problem of utilization of middle and advanced age labour force is interrelated with the problem of retirement. It is a fact that the retirement age is on prolongation these days, but in large enterprises, the retirement age at 55 is still widely being applied. From the standpoint of demography, what is to be considered here is the actual rise in probability of survival of those in ages 15–55 or to 65 who enter and remain in labour market, or survival ratio at the productive age. As shown in Table 33, according to the 6th Complete Life Table which was constructed on the basis of facts of 1935–36—this may roughly represent the pre-war level—the probability of survival during the period after a male reaches the age 15 to the retirement age of 55 was 65.3%. Survival probability up to age 60 was 56.5% and that up to 65 was only 45.8%. The 8th Complete Table of 1947, soon after the war, shows slight improvement as 67.2% for 15–55 years, 59.0% for 15–60 years and 48.1% for 15–65 years, all for males.

Table 33. SURVIVAL RATES OF REPRODUCTIVE PERIOD

Period	Life tables	l_{55}/l_{15} Male	Female	l_{60}/l_{15} Male	Female	l_{65}/l_{15} Male	Female
1935–1936	6th Complete Life Table	65.3%	68.2%	56.5%	62.2%	45.8%	54.4%
1947	8th Complete Life Table	67.2	72.9	59.0	66.9	48.1	58.5
1971	Abridged life table of Ministry of Health & Welf.	88.9	93.5	83.6	90.3	75.4	85.3

In the most recent life table of 1971, however, probability of survival of males attained remarkable rise as 88.9% for 15–55 years, 83.6% for 15–60 years and 75.4% for 15–65 years. These facts seem to indicate that the "durable years"—though the term is not necessarily appropriate—of the labour-force population has been greatly extended as the result of remarkable improvement in mortality in post-war years.

As the start of the payment of old-age benefit of Welfare Pension Insurance is 60 years of age and that of the National Pension is 65, the social security, particularly the old-age security does not directly connect itself with the retirement age, taking aside the low level of benefit for the moment. For this reason, Tachi once metaphorically said that the social security system of Japan is the system in "connection on foot". Problems are either to lower the age to start receiving the old-age benefit under social security systems or to postpone the retirement age so that the two would be directly connected. Since the expansion of labour-force population will be withheld, the middle and advanced age population will conspicuously increase both absolutely and relatively, and "durable years" of labour force are being prolonged greatly, it is possible that the retirement age would be postponed, or it should be postponed. In the examples of advanced countries, the retirement age and the start of social security are linked at the age of 65 in many instances, and in Sweden, the connection is made at the age of 67 even. The social security in Japan, or the old-age security in particular, is only recently initiated and the benefit level is still low and contains imbalanced aspects in relation to other various kinds of social security systems. In view of the expected rapid transition into the aged community in the future, the appropriate re-arrangement of the system must be recognized as urgent tasks of the society.

4. Aged population

As shown in Table 27, the population of 65 years and over was 7,335 thousand and 7.1% of the total population in 1970 census. In advanced countries in general, the percentage of the population of 65 years and over to the total population is 10–15%, and Japan's figure is young compared with them. However, the future population estimate of the Institute of Population Problems shows their

numbers becoming 8,715 thousand for 1975 and 11,502 thousand for 1985. The increase in annual average for the period of 1965–85 is 253 thousand and that for 1975–85 is 279 thousand. The percentage of the population of 65 years and over to the total population is 8.9% in 1975 and 9.5% in 1985. From these figures it is clear that, though the present population of Japan is relatively young among developed countries, the rapid progress of demographic revolution in post-war years will accelerate the increase of old-age population of 65 years and over, and suddenly raise their percentage to the total population, and thus that the rapid ageing of population will proceed in future Japan.

Since the Meiji Restoration up to the break of the War, in spite of the increase in the old-age population, the enormous increase in child and productive-age population caused the "rejuvenation" of population. Accordingly, the population ageing is a totally new experience in post-war years for the Japanese community. Further, the traditional stem family system of Japan took appropriate care of living for the aged, their jobs, nursing in time of sickness and alleviation of loneliness in the pre-war times generally. The community was responsible for only those portions of the aged who unfortunately were outside of such stem family system.

Recently, however, the container—though the term is not appropriate—for the old-age population which used to be provided by the stem family system has very rapidly been destroyed due to neclear fisshions of families, as to be referred later. Thus, the care for the aged has become social responsibility and the enhancement of the welfare of the aged has become a stringent role of the society. "The Law for the Welfare of the Aged" was promulgated and executed in 1963 and numerous voluntary groups started active programs in this field.

VII. Trends in Changing Households

1. Reduced household size

Since 1960, the average household size of Japan obtained in census returns, or average number of persons per household, started for the first time some speedy decline (see Table 34).

In pre-war years, the average household size was around 5 persons and in slight upward trend. This can be assumed to be due to that the nuclear fissions of stem families were almost negligible and also that the mortality deline, in spite of fertility decline, promoted the expansion of the average house-hold size. The post-war changes in the average household size examined in ordinary households which constitute the major portion of households show the decrease from 4.97 persons in post-war housing-shortage period of both 1950 and 1955, to 4.54 persons in 1960, 4.05 persons in 1965 and 3.69 persons in 1970. During the five years from 1955 to 1960, ordinary households increased 13.2%, or nearly 3 times increase compared with the population increase which was 4.6% in the same period. During the next two 5-year periods from 1960 to 1965 and from 1965 to 1970, the increase of ordinary households was 17.5% and 15.9%, respectively, while that of the population was 5.2% and 5.6%.[44]

Corresponding to each declining trend of average household size, substantial changes can be noticed in the family composition of households as well as their

Table 34. AVERAGE HOUSEHOLD SIZE

Year	All household	Oridinary households
	(persons)	(persons)
1920	4.99	4.89
1925	4.98	4.88
1930	5.08	4.98
1935	5.13	5.03
1940	5.10	5.00
1950	5.02	4.97
1955	4.97	4.97
1960	4.52	4.54
1965	4.08	4.05
1970	3.72	3.69

Source: *Population Census Reports.*

44) Akiko lto, "Changes in household structure in recent Japan", *Ochanomizu University Studies in Arts and Culture*, Vol. 21, No. 1, March 1968, pp. 15–20, (Japanese).

economic structure.[45] Such changes are widely studied in various aspects of social sciences,[46] and also are very important aspect of study from the standpoint of population studies.[47] It can be said from the viewpoint of population studies that the average size of ordinary households is the most intensive indicator of the familial and economic structure of households. The analysis of these changes in time series is also important and particularly in Japan through the process of "demographic transition" or "demographic revolution", the peculiar fact can be noted that between the starting time of fertility decline and that of household size decline, there is a time gap of about half a century.[48]

2. Some determinant factors of household size

Together with the importance of the analysis of changes in time series of the average household size, its regional patterns are also attention-worthy,[49] and the correlations with some demographic factors which seem to bear interrelation are tried here.[50]

As the factors relating to the regional patterns of the average household size, multiple correlational analyses are made with A) fertility, B) population migration, C) industrial structure, D) degree of urbanization and E) degree of nuclear fissions of families, for 3 years of 1955, 1960 and 1965, taking prefectures as calculation units.

As indicators of the degree of nuclear fissions of families here, a) household composed of married couple and clildren, b) father-child household, c) mother-child household, d) household of married couple only, according to the census returns were taken and respective percentages to the total ordinary households were used.

The multiple correlation coefficients between the average household size

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45) Bureau of Statistics, Office of the Prime Minister, *The Population of Japan—Its Regional Distribution and Structure*, 1965 Population Census of Japan Abridged Report Series, 1967, pp. 86-91, (Japanese).

   Masao Ueda and Shigemi Kono, "Changes and future projections of the households", *The Joural of Population Problems*, No. 100, *op. cit.*, pp. 42-45.
46) For example see: Kiyomi Morioka, "Family pattern", Kaoru Ohashi and Kokichi Masuda, *Family Sociology*, Third edition, 1967, particularly pp. 1-15, (Japanese).

   Tsutomu Himeoka, "Family structure", Kiyomi Morioka ed., *Family Sociology*, Yuhi-kaku Shobo, 1967, pp. 26-37, (Japanese).
47) Yuichi Minakawa, "Modernization of family and population problems", *Annual Reports of the Institute of Population Problems*, No. 12, 1967, pp. 1-4, (English summary).
48) Minoru Tachi, "Japan's modernization in demographic transition process", *op. cit.*, pp. 78-81.
49) Akiko Ito, *op. cit.*, pp. 33-38.
50) Minoru Tachi, Kiichi Yamaguchi and Takeharu Kaneko, "Regional correlation between household size and some demographic factors", *Annual Reports of the Institute of Population Problems*, No. 13, 1968, pp. 5-10, (English summary).

and other 5 factors cited above are 0.7–0.8, and in partial correlation coefficient, the factor in highest correlation with the average size of household is the degree of nuclearization, followed by the level of fertility.[50]

3. Disintegration of the stem family and its determinant factors

Among the factors in correlative relation with the degree of household nuclearization of A) internal migration of population, B) industrial structure, and C) degree of urbanization, the multiple correlation coefficient of 0.7 was obtaind, and partial correlation coefficients show the degree of urbanization to be in highest correlation with the degree of household nuclearization.[50]

From the above results, it can be verified as appropriate the Future Household Estimates for Japan of the Institute of Population Problems established the assumption that the progress of urbanization would raise the degree of nuclearization of families.[51]

The trend of nuclear family households is as shown in Table 35, and according to the study by Toda on the basis of the results of 1st population census in 1920, nuclear family households were 6,005 thousand and occupied 54.0% of the total ordinary households, which counted 11,119 thousand. The special computation by the Bureau of Statistics of the Office of the Prime Minister

Table 35. TRENDS OF NUCLEAR FAMILY HOUSEHOLDS

(number in 1,000)

Household structure	1955 a) Number	Ratio	1960 b) Number	Ratio	1965 c) Number	Ratio	1970 c,d) Number	Ratio	1920 e) Number	Ratio
Total ordinary households	17,398	100.0	19,678	100.0	23,092	100.0	26,747	100.0	11,119	100.0
Total nuclear family households	10,366	59.6	11,788	60.3	14,464	62.6	16,952	63.4	6,005	54.0
Married couple-child	7,499	43.1	8,489	43.4	10,490	45.4	12,310	46.0	4,259	38.3
Father-child	275	1.6	245	1.3	231	1.0	254	0.9 }	601	5.4
Mother-child	1,408	8.1	1,424	7.3	1,463	6.3	1,479	5.5 }		
Married couple only	1,184	6.8	1,630	8.3	2,280	9.9	2,909	10.9	1,145	10.3

Source : a) Bureau of Statistics, Office of the Prime Minister, "Special household tabulation of population census", (unpublished), Table 2.

b) Bureau of Statistics, Office of the Prime Minister, 1% tabulation results of *Population of Japan*, in note 45).

c) Bureau of Statistics, Office of the Prime Minister, *1970 population census of Japan, prompt report of the basic findings*, 1971, p. 482.

d) 1% sample tabulation.

e) Teizo Toda, *Kazoku Kosei* (household structure), 1937, p. 481.

51) Hidehiko Hama, *Future Household Estimates for Japan, for October 1 of Every Year, 1970–1985, Estimated in October 1971*, Institute of Population Problems Research Series, No. 197, 1971. (Japanese).

on the basis of 1955 census reveals 10,366 [thousand of nuclear] households which occupy 59.6% of the ordinary households which number 17,398 thousand. The percentage was somewhat raised to occupy 60.3% by 1960, and in 1965, nuclear households were 14,444 thousand in number and 62.5% of the total ordinary households which were 23,117 thousand. In 1970, nuclear households were 16.9 thousand in number and 63.4% of the total ordinary households which were 26.7 thousand. Thus, the increasing trend of nuclear households is obvious from the data provided above.

4. Future projection of households

As mentioned above, the Institute of Population Problems conducted the future projection of households by number of household members, by sex and five-year age groups of household heads and by prefectures.

The methods adopted here include three kinds of future assumptions. They are: (a) the increase of number of households by number of household members will be much larger in small size families having one, two and three persons than in large size ones having more than four persons, (b) household headship rates will increase very rapidly in unmarried young people corresponding to the spread of apartment dwelling, (c) average household size by prefectures will decrease toward the low level which the metropolitan areas such as Tokyo and Osaka show at present.

Table 36. FUTURE ESTIMATE OF THE NUMBER OF HOUSHOLDS

(household number in 1,000)

Year	Ordinary households			Quasi-households	Average household members (med.) b)
	Max.	Med.	Min.		
1965 a)	..	23,085	..	996	4.08 (persons)
1970 a)	..	26,747	..	1,010	3.72
1971	27,751	27,547	27,343	968	3.68
1972	28,802	28,479	28,156	926	3.61
1973	29,852	29,406	28,959	884	3.54
1974	30,903	30,354	29,804	842	3.48
1975	31,954	31,226	30,498	800	3.43
1976	32,822	32,018	31,214	760	3.39
1977	33,690	32,838	31,986	720	3.35
1978	34,557	33,653	32,748	680	3.31
1979	35,425	34,403	33,381	640	3.28
1980	36,293	35,230	34,169	600	3.24
1985	39,398	38,391	37,384	500	3.11

Source: Reference material in note 51).
    a) Population Census results.
    b) Medium estimate of average household members against total households.

Table 36 presents the estimate results in summary where three kinds of estimates—maximum, medium and minimum—are given.

In either of the assumptions, as the future increase of the number of house-households is going to be substantial, exceeding the speed of population increase, the average household size will be greatly minimized. The calculations show the decline in the numbers as 4.08 persons for 1965, 3.72 in 1970, 3.43 in 1975, 3.21 in 1980 and 3.11 in 1985 (on medium estimates). Present average household size in western European countries and United States is around 3.0 persons, and Japan will rapidly approach this level of household size in the future.

VIII. Trends of Internal Migration of Population and Related Problems.

1. Magnitude of population migration in recent times[54]

During the five years from 1960 to 1965, population of Japan increased about 4,856 thousand according to the censuses, the volume being equivalent to the total population of Aichi Prefecture.   Prefecturally, 21 prefectures had population increase and in as many as 25 prefectures population decreased during the same period.

In counting each ward of Tokyo and other 6 large cities as respectively one city, there were 645 cities at the time of 1965 census and among them, 265 cities or 41% of the total experienced population decrease.   At the same time, there were 2,815 towns and villages in Japan and in 83% of them, or in 2,338 towns and villages in number, population decreased (see Table 37).

Table 37. NUMBER OF CITIES, TOWNS AND VILLAGES BY POPULATION INCREASE-DECREASE

(as of October 1, 1965)

Kind	No. of cities, wards, towns and villages	Percentage distribution
No. of cities & city wards	645	100.0
Population increased	380	58.9
Population decreased	265	41.1
No. of towns & villages	2,815	100.0
Population increased	477	16.9
Population decreased	2,338	83.1

Source : *1965 Population Census Report.*
Note :   Each city-ward in 7 large cities including Tokyo is counted as one city.

In four islands of Japan, those where population increased during the period from 1960 to 1965 were the main island and Hokkaido and population decreased both in Kyushu and Shikoku.   The population increase in main island was 5,404 thousand, being much larger than the increase of the total country which was 4,856 thousand.   The increase in Hokkaido was only 133 thousand.   Since there were approximately 60 thousand natural increase annually in Hokkaido, only the

54) Minoru Tachi, "Trends of changes in regional distribution of Japanese population—analysis of prompt reports of 1965 population census—", Japan Center for Area Development Research, *Area Development*, No. 16, January 1966, (Japanese).

Minoru Tachi, "The inter-regional movement of population as revealed by the 1970 census", Japan Center for Area Development Research, *Area Development in Japan*, No. 4-1971.

two-year share of the natural increase could be maintained during the five year period. Further, both in population increase rates and in population ratios, it is certainly obvious that the population of Japan is in substantial volume being agglomerated in the main island. (Table 38).

The main island of Japan can be divided to Japan-Sea side and the Pacific side by mountain ranges which run westward in the middle of the island. The exact division should be made at least by cities, towns and villages as unit areas, but a very rough division is used here taking prefectures as unit areas. In considering the pattern of population distribution within each unit area, prefectural populations were divided half and half to the Pacific and the Japan-Sea sides respectively for these Prefectures of Aomori, Nagano, Gifu, Shiga and Yamaguchi, and for Kyoto and Hyogo Prefectures, 2/3 of the population was assumed to belong to the Pacific side and remaining 1/3 of the Japan-Sea side respectively.[55]

Table 38. POPULATION INCREASE IN JAPAN (FOUR ISLANDS)

Island	Poulation (1,000)				Increase (1,000)			Increase rate (%)			Population ratio			
	1955	1960	1965	1970	1955 -60	1960 -65	1965 -70	1955 -60	1960 -65	1965 -70	1955	1960	1965	1970
Total	89,276	93,419	98,275	103,720	4,143	4,856	5,445	4.6	5.2	5.5	100.0	100.0	100.0	100.0
Hokkaido	4,773	5,039	5,172	5,184	266	133	12	5.6	2.6	0.2	5.3	5.4	5.3	5.0
Main Island	67,320	71,354	76,758	82,560	4,035	5,404	5,802	6.0	7.0	7.6	75.4	76.4	78.1	79.6
Shikoku	4,245	4,121	3,975	3,904	−124	−146	−71	−2.9	−3.7	−1.8	4.8	4.4	4.0	3.8
Kyushu	12,937	12,904	12,370	12,072	−34	−533	−298	−0.3	−4.3	−2.4	14.5	13.8	12.6	11.6

Source: *Population Census Reports*.

The Pacific side population according to the above division was 61,790 thousand in 1965, occupying 80.5% of the total poulation of the main island. On the other hand, the population in the Japan-Sea side was 14,970 thousand, or not more than 19.5% of the total. In 1960, the former was 56,300 thousand and 78.6% of the total island, and the latter had 15,060 thousand and 21.1%.

Thus, during the five-year period of 1960-65, the Japan-Sea side showed over 80 thousand of population decrease, while the Pacific side gained 5,490 thousand, exceeding the population increase of the main island in total which was, as cited above, 5,404 thousand. The agglomeration of population in the main island is more precisely the agglomeration in the Pacific side.

A brief mention is appropriate here on the "Tokaido megalopolis" which is said to be "a revolutionary development of large metropolitan areas as the peak

55) Minoru Tachi, "Trends of changes in regional distribution of Japanese population", *ibid.*, pp. 7-8.

of urbanization symptoms".[56] It is not an easy task to decide how to delineate the Tokaido Megalopolis, and we are still in the process of compiling efforts in such endeavor.[57] For the present purpose, the megalopolis can be roughly delineated by connecting such prefectures where population is increasing along the Pacific coast from Saitama and Chiba Prefectures to Hyogo Prefecture, making prefectures as unit areas in due reference to other studies on the delineation. Similarly with the case of dividing populations in prefectures in obtaining the population of the Pacific side, however, it is assumed that the megalopolis would include 1/2 each of the populations of Gifu and Shiga Prefectures and 2/3 each of population of Kyoto and Hyogo Prefectures respectively.[58] The population of the Takaido Megalopolis thus obtained was 38,770 thousand in 1960 and 44,310 thousand in 1965. Their percentages in the total population of the Pacific side were 68.9% in 1960 and 71.7% in 1965.

The population increase in the Tokaido Megalopolis during the 5-year period of 1960–65 was 5,630 thousand as compared with 5,490 thousand in the Pacific side in total. In summary, it is observed that the population of Japan is increasingly concentrated in the main island, particularly in the Pacific side, or further in the Tokaido Megalopolis in particular with the agglomeration of over 5,600 thousand in five years.[59]

2. Motives, functions and results of internal migration

Various motivational factors for population migration have so far been discussed and examined. For example, population migrates from such areas where the level of living is relatively low to such areas where it is relatively high; toward areas with relatively better employment opportunities; toward cities where enterprises concentrate from the rule of benefit of concentration of enterprises;

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56) Toshio Kuroda, *op. cit.*, p. 113.

57) See paper by Minoru Tachi, Hidehiko Hama and Masao Ueda in *The Journal of Population Problems*, No. 94, April 1965, and papers by Toshio Kuroda and Shigemi Kono, and by Yuichi Minakawa and Seiko Takahashi in *The Journal of Population Problems*, No. 95, July 1965, (English summaries).

   Masao Ueda, "Agglomeration of urban population and formation of megalopolis", Structure and Dynamics of the Population of Japan—Part Two, Special Issue in Commemoration of the 100th number of the Journal of Population Problems, *The Journal of Population Problems*, No. 101, February 1967, pp. 48-60, (English summary).

58) Minoru Tachi, "Trends of changes in regional distribution of Japanese population", *op. cit.*, pp. 8-10.

59) See the detailed analysis concerning the size, regional pattern, characteristics, etc. of population migration in the following:

   Toshio Kuroda, "Trend and characteristics of migration", *The Journal of Population Problems*, No. 101, *op. cit.*, pp. 1-6.

   Toshio Kuroda, *op. cit.*, pp. 39-65.

toward cities where the opportunities of finding marriage partners more easily from the rule of benefit of contact in cities; toward cities being attracted by active urban atmosphere without much well-founded reasons, etc.[60]

The assumption was previously presented that the most important motivational factors among these is the motivation to migrate from the area where the level or conditions of living is low to these areas where it is relatively high, and that the migration is primarily motivated by the contradiction between regional structure of the level or conditions of living and the regional structure of the reproductive capacity of the population, which can be explained in the fact that in those areas where the level or conditions of living is relatively low, the reproductive capacity of the population is relatively high at least up to present, whereas in those areas where the level or conditions of living is relatively high, the reproductive capacity is relatively low.

Accordingly, the function of the migration of population is the balancing movement on the part of the population of the regional disparities of the level of living or living conditions, and thus it is an indispensable function as long as the contradiction exists between the regional structure of the level or conditions of living and that of the population reproductivity.

In order to prove this assumption, prefectural distribution income was firstly taken up as the most conclusive index of the level or conditions of living, making prefectures as unit area. Then, it was calculated how much of population each prefecture could support with the national average per caput distribution income in each given year, and by dividing the prefectural distribution income of each prefecture by this national average per caput distribution income, the outcome was established as the theoretical population or hypothetical population which could support the economy of each prefecture under the national average level or conditions of living. Further, the difference between the theoretical population and the actual population in each prefecture was set as the absolute economic potential of the population migration and the ratio of the absolute potential to the actual population was set as the relative economic potential.

The given assumption has been proved by means of regional correlational analysis between this economic potential and the migration of the actual population, particularly between the relative economic potential and the net migration (=out-migration minus in-migration) rate, in various specific years.[61] Similar

60) Toshio Kuroda, "Trend and characteristics of migration", *op. cit.*, pp. 5–6.
   Toshio Kuroda, "Factors of migration and prospect of migration", *The Journal of Population Problems*, No. 101, *op. cit.*, pp. 27–29.
61) Minoru Tachi and Misako Oyama, "Potential of internal migration in Japan—from the viewpoint of the interrelationship between regional distribution of income and that of

study is being continued presently in incorporating new data, and a few of such results are shown as follows:

1950−54   r=+0.863
1955−59   r=+0.931
1960−64   r=+0.755

For every interval, there can be seen high correlation between the relative economic potential of population migration and the net migration rate of the actual population. What is interesting here is the point that in 1960-64, the correlation coefficient dropped suddenly. This is due, as to be mentioned later, to the suburbanization of large metropolis, particularly to the fact that in Tokyo Perfecture the net migration rate of the actual population is low in spite of its high economic potential, whereas the net migration rates of the surrounding prefectures of Chiba, Saitama and Kanagawa are conspicuously high in relation to their economic potential. If, therefore, the correlation coefficient is calculated in trial, excluding four prefectures of Tokyo, Kanagawa, Chiba and Saitama, the coefficient results in +0.918.

The function of the population migration is an important movement from the standpoint of population, to balance the regional disparities in the level and conditions of living, but on the other hand, "over-concentration" in large metropolitan areas and "over-depopulation" in agricultural and forestry areas are

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61) population", *Annual Reports of the Institute of Population Problems*, 1960, Special Number in Commemoration of the 20th Anniversary of the Establishment of the Institute, No. 5, 1961, pp. 38-42, (English summary).

Minoru Tachi and Misako Oyama, "Migration potential and actual migration of population in Japan", *Annual Reports of the Institute of Population Problems*, No. 6, 1961, pp. 14-18, (English summary).

Minoru Tachi and Misako Oyama, "Economic potential of internal migration of population and its determinant", *Annual Reports of the Institute of Population Problems*, No. 7, 1962, pp. 31-35, (English summary).

Minoru Tachi, "Function of internal migration of population", Minoru Tachi(ed.), *Internal Migration of Population in Japan*, Keisei Sensho, 4th enlarged edition, 1967, pp. 146-177 and 231, (Japanese).

Minoru Tachi, "Function of internal migration of population and large cities", Minoru Tachi(ed.), *Problems of Metropolitan Populations—Population Migration in Japan (2)*, Keisei Sensho, 1st edition, 1962, pp. 211-239, (Japanese).

Minoru Tachi, "Regional distribution of income and internal population migration, in commemoration of 300 years of the publication of the first edition of Graunt", Hitotsubashi University Press ed., *Studies in Economics*, No. 7, 1963, pp. 179-246 (Japanese).

Minoru Tachi, "Regional income disparity and internal migration of population in Japan", The University of Chicago, *Economic Development and Cultural Change*, Vol. XII, No. 2, Jan. 1964, pp. 186-204.

Minoru Tachi and Hisako Misawa, "Economic potentiality of the internal migration of population in Japan", *The Journal of Population Problems*, No. 109, January 1969, pp. 1-19. (English summary).

becoming problems. "Over-concentration" and "over-depopulation" are the results of migration and are not favourable from any standpoint. This is not caused by the function of the migration but by the fact that the deeply-rooted regional disparities of the level and conditions of living are persistently great.

3. Impacts of regional development

When the "regional development" is effectively and appropriately proceeded and the regional disparities in the level or conditions of living are alleviated, such unfavourable results of the population migration will be minimized. It is for this reason that the regional development is extremely significant from the viewpoint of population migration.

Viewing from a wider standpoint, Japan's population is enormously sized and the country is only 370 thousand km² in which mountains continue one after another. Since Japan is highly densely populated community, every 1 m² of the land must be made of utmost use. Even from this reason only, the regional development in Japan should necessarily be totally different in its meaning as well as the procedure from that in such countries as the United States where the population density is 21 persons per square kilometer or Canada and Australia where only two persons live per 1 km².

In countries where the population is sparsely inhabited, the population can be left to take its own course in deserting the land where the profitability is low and gathering in the land where it is high, and the concentric investment can be made to the gathering areas, or in other words, laissez-faire population concentration plus concentric investment practice can be applied. In countries where the population density is high, however, such pattern of regional development comes to bear great significance as to make preliminary investment in purposely designed nuclear cities in different localities and to induce that the "chain reaction" of development in such nuclear cities to permeate into the surrounding peripheries.

What is further to be commented in relation to regional development is on the report on *Opinions on "points for special consideration in regional development from the standpoint of population problems"*, which was submitted by the Population Problems Inquiry Council in replying to the enquiry made by the Minister of Health and Welfare on August 17, 1963. It was in these days when the prevailing regional development was predominantly economic-oriented making emphasis on factory invitation when the report was submitted and thus this report attracted much attention. This report comments on almost all the important items, and a few main points will be noted here.

The report has its stand on the "welfare state" principle as the fundamental

nature, emphasizes the subjectivity of human beings where the development of region or development of economy should primarily be for the people of the region or be basically for human beings, and strongly points out that the balance between economic development and social development—"this means the development in social aspects of cities, rural area, housing, transportation, health, medical services, public health, environmental sanitation, social welfare, education, etc."—is a most urgent requisite.

The report also points out that the modernistic consciousness or interest of each individual in community which is his primary living spheres is extremely scanty in spite of the rapid increase in one's interest and wish for better personal life, and emphasizes the necessity to stimulate voluntary consciousness of the inhabitants themselves to be able to make appropriate judgement in finding and solving the problems of their community and to participate in the efforts for the improvement. In view of the fact that the traditional community has in fact been destroyed at present, it is certainly a basic and indispensable factor to bring up new community consciousness.

4. Some characteristics of recent trends in internal migration

Kuroda points out in describing the trend of internal population migration in post-war Japan that "post-war 20 years can be divided into two periods demographically; first decade being characterized as the period of finalization of vital statistics revolution, and the second decade being the period of rearrangement revolution of regional distribution of population."[62]

Along with the high-level economic development, Japan's internal migration has become rapidly accelerated as can be described as "rearrangement revolution of regional distribution of population". In such trends and characteristics of rapid population migration, various interesting changes have come to be noticed in recent years. Comparing the periods of 1955-60 and 1960-65, somewhat more vivid changes can be observed in the latter period. More specifically, it seems that the increased visuability of characteristics of internal migration started in the year of 1964 onwards. These changes in characteristics of recent internal migration can be observed in various aspects of population, but here 3 points of A) ceiling trend of migration rate, B) transition into excessive outflow in large metropolitan areas, and C) upward trend of population increase rate in cities with the population of 100-300 thousand, are selected and major points are

62) Toshio Kuroda, "Trend and characteristics of migration", *op. cit.*, p. 1.

discussed in relation to the above regional development.[63]

(A) Ceiling trend of migration rate—According to the *Population Migration Statistics of Resident Registration* of the Bureau of Statistics of the Office of the Prime Minister,[64] intra-prefectural migration volume was 2,914 thousand and inter-prefectural migration was 2,227 thousand, making the total migration volume of 5,141 thousand in 1955 as shown in Table 39. In 1960, the volume

Table 39. INTRA-PREFECTURAL AND INTER-PREFECTURAL
POPULATION MIGRATION

Year	No. of migrants (1,000)			Migration rate (‰)			Ratio (%)	
	Total	Intra-prefectural	Inter-prefectural	Total	Intra-prefectural	Inter-prefectural	Intra-prefectural	Inter-prefectural
1954	5,498	3,146	2,353	62.7	35.9	26.8	57.2	42.8
1955	5,141	2,914	2,227	58.0	32.9	25.1	56.7	43.3
1956	4,860	2,738	2,122	54.3	30.6	23.7	56.3	43.7
1957	5,268	2,888	2,380	58.3	32.0	26.4	54.8	45.2
1958	5,294	2,914	2,381	58.1	32.0	26.1	55.0	45.0
1959	5,358	2,915	2,443	58.2	31.7	26.5	54.4	45.6
1960	5,653	2,973	2,680	60.9	32.0	28.9	52.6	47.4
1961	6,012	3,060	2,952	64.2	32.7	31.5	50.9	49.1
1962	6,580	3,277	3,303	69.6	34.6	34.9	49.8	50.2
1963	6,937	3,464	3,473	72.6	36.2	36.3	49.9	50.1
1964	7,257	3,622	3,634	75.1	37.5	37.6	49.9	50.1
1965	7,381	3,688	3,692	75.6	37.8	37.8	50.0	50.0
1966	7,432	3,748	3,684	75.5	38.1	37.4	50.4	49.6
1967	7,479	3,718	3,761	75.1	37.3	37.7	49.7	50.3
1968	7,775	3,838	3,937	77.1	38.1	39.1	49.4	50.6
1969	8,126	4,010	4,116	79.6	39.3	40.3	49 4	50.6
1970	8,273	4,038	4,235	80.1	39.1	41.0	48.8	51.2
1971	8,365	4,105	4,260	80.2	39.3	40.8	49.1	50.9

Source: Arranged by the Institute of Population Problems from Bureau of Statistics of the Office of the Prime Minister, *Annual Migration Report of the Resident Registration,* each year.

Note: Migration rates are annual rates per 1,000 population of total Japan. The ratios are the percentage in the total number of migration.

63) Minoru Tachi, "Population trends", Japan Center for Area Development Research, *Area Development,* No. 48, September 1968, pp. 9–11, (Japanese).

   Minoru Tachi, "Changing pattern of population migration", *Nihon Keizai Shimbun* (Newspaper), 27 September 1968, (Japanese).

64) For the evaluation of this material, see the following references. Kuroda in his paper summarizes that "though the individual figures are still in lack of accuracy, their magnitude or changes in time series are sufficiently meaningful to observe."

   Hidehiko Hama, "Evaluation of statistics concerning internal migration of population", Minoru Tachi (ed.), *Population Migration in Japan, op. cit.,* pp. 91–121.

   Toshio Kuroda, *op. cit.,* pp. 39–40.

increased to 5,653 thousand in total including 2,973 thousand intra-prefectural and 2,680 thousand inter-prefectural migration. Further in 1965, the total volume jumped up to 7,381 thousand approximately halved in volume in intra- and inter-prefectural migration.

The rate of the total migration to the total population shows marked upward trend from 58.0 per thousand in 1955, to 60.9 per thousand in 1960 and 75.6 per thousand in 1965. The rate, however, becomes stagnant after 1964 and after 1965, slight declining trend can even be noted.

Around 1955, intra-prefectural migration rate was higher than the inter-prefectural migration rate, but the two came to approach with each other gradually and after 1962, the two migration rates are almost identical, and similar ceiling trend of the rate can be observed in either of the two.[65]

What, now, are the reasons behind this ceiling trend of migration rates? As afore-mentioned, it was admitted that the motivational factor of the population migration was the contradiction between the regional structure of the level or conditions of living and the regional structure of reproductive capacity of the population.

Firstly to be examined here is whether or not the regional disparities in the level or conditions of living have recently been on alleviation. If the variation coefficient (=standard deviation / average × 100) is calculated by obtaining the per caput distribution income for each prefecture from *Prefectural Income Statistics Report* of the Institute of Economic Research of the Economic Planning Agency,[66] it gives 24.6% for 1955–59 and 26.7% for 1960–64. So far as checked by variation coefficients, the regional disparities of the level or conditions of living as measured through indices of per caput prefectural distribution income have not necessarily decreased.

The variation coefficient of net reproduction rates by prefectures, on the other hand, was 12.7% in 1955–59 and 7.4% in 1960–64, showing distinct decrease in regional disparities of the reproductive capacity of population. This may be one of the theoretical reasons to cause the migration rate to stay stagnant.

As to natural increase rate by prefectures which indicates the reproductive capacity of the actual population, the variation coefficient show marked expansion from 21.2% in 1955, to 22.9% in 1960 and 31.7% in 1965. Though these variation coefficients only seem to be indicating the expansion of regional disparities

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65) Kiichi Yamaguchi, "Trends of regional migration in Japan", *The Journal of Population Problems*, No. 107, July 1968, p. 59 in particular, (English summary).

66) Economic Research Institute, Economic Planning Agency, Government of Japan, "Special edition, prefectural income statistics", *National Accounts Statistics Quarterly*, No. 17, August 1967, (Japanese).

and thus promotion of migration rather, prefectural distribution of natural increase rate of population is showing unprecedentedly distinct changes in recent years. So far in the past, areas where the natural increase rate was high were north-eastern part of the main island and southern Kyushu where birth rates were high, and areas of low natural increase were represented by large metropolitan areas where fertility was low.[67] In recent years, however, chiefly because of the change in the age composition due to the internal migration,[68] natural increase rate has become higher in Osaka, Kanagawa, Tokyo, Aichi, Saitama, Chiba, Aomori, Shizuoka, Gifu, Hokkaido and Hyogo Prefectures which are predominantly large metropolitan areas and their peripheries, among which only Amori and Hokkaido are exceptionally the areas of high fertility and high increase nature. On the other hand, the natural increase rate has become lower in such prefectures where the population outflow is substantial such as Kochi, Shimane, Tottori, Tokushima, Kagawa, Kagoshima, Okayama, Yamagata, Yamaguchi, Oita, etc. This phenomenon may certainly function in such way to alleviate the internal migration.

According to a survey by Kuroda of the Institute of Population Problems, not a few cities, towns and villages have come to experience the natural increase rate below zero as the result of excessive deaths over births due to voluminous population outflow. "In cities, towns and villages of Hiroshima Prefecture, the first and only case of negative natural increase rate due to the surpassing death rate over birth rate was in Yachiyo Town in 1962, but such cases increased year after year and in 1965, the number greatly increased up to 33 towns and villages."[69]

Kuroda divided all the cities, towns and villages into 4 regions in 1965 in 1) low natural increase region where the natural increase rate is below zero, 2) where the rate is between 0.0 and 5.0 per thousand, 3) medium natural increase region where the rate is 5.0–10.0 per thousand, and 4) the region where

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67) The standard deviation of birth rate distribution by prefectures is always larger than that of death rate distribution, and accordingly, the determinant factor for the natural increase rate is the trend of the birth rate.

68) Masao Ueda, "Demographic influence of migration", *The Journal of Population Problems*, No. 101, *op. cit.*, pp. 17–27.
   Toshio Kuroda, "Patterns of population change in local communities with particular reference to the underdeveloped areas", *The Journal of Population Problems*, No. 103, July 1967, pp. 1–13, (English summary).
   Toshio Kuroda, "Reversal of vital rates and internal migration in Japan", *The Journal of Population Problems*, No. 105, January 1968, pp. 12–13, (English summary).
   Toshio Kuroda, *op. cit*, 219–221.

69) Toshio Kuroda, "Reversal of vital rates and internal migration in Japan", *op. cit.*, p. 14.
   Toshio Kuroda, *op. cit.*, p. 224.

Table 40. THE NUMBER AND THE RATIOS OF CITIES, TOWNS AND
VILLAGES BY 4 CATEGORIES OF THE NATURAL INCREASE
RATE IN 1965

Natural increase rate (‰)	No. of cities, towns and villages	Ratio
Total	3,376	100.0
0>	196	5.8
0.0–5.0	1,020	30.2
5.0–10.0	1,354	40.1
10.0≦	806	23.9

Source : Toshio Kuroda, reference material, "Reversal of vital rates and internal migration in Japan", p. 15 in note 68).

Note : Each ward of Tokyo Prefecture is counted as one city.

the rate is over the national average level of 10.0 per thousand. As shown in Table 40, among the total 3,376 cities, towns and villages, 5.8% or as many as 196 towns and villages show negative natural increase, and in 1,020 cities, towns and villages, or 30.2% of the total, the natural increase rate is less than half of the national average level, though not below zero. By prefectures, "cities, towns and villages where the natural increase rate dropped below zero are predominantly many in Chugoku region prefectures. The number of such cities, towns and villages is the greatest in Hiroshima Prefecture where the ratio exceeds 30%, followed by Shimane at 30%, and Tottori at 20%. Shikoku Island follows Chugoku region, where 15% of cities, towns and villages in Kochi Prefecture and about 10% in Tokushima and Kagawa Prefectures show negative rates. Other prefectures in other regions where over 10% of the prefectural total of cities, towns and villages have negative natural increase rates are Wakayama and Nagano Prefectures. In Tokai and Kinki regions, it can be noted that all prefectures except Osaka are starting to have cities, towns or villages, though not many in number yet, in which the natural increase rate drops below zero.

While a part of prefectures in Kyushu are starting to have some cities, towns and villages of negative natural increase, among the prefectures of Tohoku region, only one village each in Yamagata and Fukushima Prefectures respectively is in negative natural increase and none in any other four prefectures. Approximately similar status is seen in northern-Kanto region. In southern-Kanto region, 5 towns and villages in Chiba Prefecture are noted to have turned into negative natural increase."[70]

70) Toshio Kuroda, reference material, "Reversal of vital rates and internal migration in Japan", *op. cit.*, pp. 14, 16.
    Toshio Kuroda, *op. cit.*, pp. 225–227.

Table 41. POPULATION DISTRIBUTION BY LEVELS OF NATURAL
INCREASE RATE IN AREAS OF JAPAN

(percentage in the total population each area)

Areas	Natural increase rate			
	$0^0/_{00} >$	0.0–5.0	5.0–10.0	10.0 ≦
Total	1.3	11.4	25.4	61.9
Hokkaido	0.1	1.3	31.4	67.2
Tohoku	0.5	15.2	43.2	41.1
Kanto Inland	0.2	17.6	41.4	40.7
Kanto Seaside	0.2	3.3	5.2	91.3
Hokuriku	0.5	16.8	51.3	31.3
Tosan	3.1	20.5	52.0	24.4
Tokai	0.5	5.5	16.3	77.7
Kinki Inland	1.0	11.9	28.9	58.2
Kinki Seaside	0.8	5.7	7.5	85.9
San-in	11.3	33.9	54.1	0.7
Sanyo	7.2	22.1	26.0	44.8
Shikoku	3.8	32.6	37.2	26.4
North Kyushu	1.2	13.7	36.7	48.5
South Kyushu	1.5	22.0	42.9	33.7

Source: Toshio Kuroda, reference material, "Reversal of vital rates and internal migra-
tion in Japan", p. 18 in Note 68).

Kuroda further divided the country into 14 areas and for each area, the
population share according to previously-mentioned four stages of natural
increase against the areal total population was calculated, the result being
shown in Table 41. According to this, in Tohoku and Kanto-Inland more than
80% of their population live in so-to-say "agricultural prototype" area where
the natural increase rate is higher than medium level, and in three large urban
type areas of Kanto-Seaside and Tokai, 80–90% of their population live in the
region of the highest natural increase rate. On the other hand, in San-in and
Shikoku, majority of their population concentrate in the region of the lowest
and medium level natural increase rate, as in San-in, as much as 99% live in
these regions.[71]

Such changes in regional distribution of natural increase rates as the result
of internal population migration imply innumerable important problems both
from demographic and economic as well as social viewpoints. In this report,
however, it cannot be done more than to point out the fact of changes or rever-
sion of the regional structure of the reproductive capacity of actual population,

71) Toshio Kuroda, "Reversal of vital rates and internal migration in Japan", op. cit., pp.
17–20.
Toshio Kuroda, op. cit., pp. 239–240.

Table 42. POPULATION OF 15-29 YEARS OF AGE AND THEIR
INCREASE RATES

(population in 1,000)

Year	Population	Increase rate (%)
1960	25,836	—0.60
1961	25,681	2.59
1962	26,347	2.94
1963	27,122	3.09
1964	27,961	1.16
1965	28,284	1,00
1966	28,567	0.64
1967	28,749	0.49
1968	28,890	0 55
1969	29,048	—0.95
1970	28,772	—1.16
1971	28,438	

Source: For 1960 and 1965, *Population Census Reports*, and for other years by
estimated populations by age of the Bureau of Statistics, Office of the
Prime Minister.

and that this change as the result of violent population migration alleviates the
contradiction between the regional structure of levels or conditions of living and
that of the reproductive capacity of the actual population, participating as a
factor for the stagnation of migration rates.

Over half of the volume of the migrating population is in the age groups
of 15-29. According to the results of 1960 census, for example, 56% of the
migrating population was in the age groups of 15-29.[72]. It may be possible to
understand that the gradual declining trend of the increase rate of the population
aged 15-29 due to the fertility decline since 1950 is also a factor contributing to
the stagnation trend of migration rates (see Table 42.)

Though it is too early to determine the causes of recent ceiling or stagnant
trend of migration rate, if it is assumed that the migration rates will remain
relatively stagnant in the future, it can be one of the stable conditions for the
establishment and execution of regional development programs.*

(B) Transitional trend of excessive outflow in large metropolitan areas—
According to census reports, in large cities with the population of 1 million and

72) Migration statistics by the residence one year ago. Bureau of Statistics, Office of the
the Prime Minister, *Population of Japan, 1960—Summary of the Results of 1960
Population Census of Japan*, 1963, pp. 208-209, (Japanese)
* Note of the reviser: The above statement pointing out a stagnant trend of migration
rate was based on the fact until 1967. Both the volume and rate of migration are,
however, rising again after 1968 as shown in Table 39. This recovery of migration
may be partly attributable to the recovery of the national economy since 1967.

Table 43. POPULATION INCREASE IN CITIES, TOWNS AND VILLAGES BY POPULATION SIZE

Population size	1970		1965	1965–70	1960–65	1955–60
	No. of cities, towns and village	Population (in 1,000)	Population (in 1,000)	Increase (%)	Increase (%)	Increase (%)
Total	3,276	103,720	98,275	5.5	5.2	4.6
1 million & over	8	20,856	20,219	3.2	9.1	17.5
500 thousand–1 million	7	4,562	4,000	14.1	24.6	26.4
300–500 thousand	21	7,890	6,976	13.1	13.9	13.3
200–300 thousand	41	9,802	8,337	17.6	14.8	8.1
100–200 thousand	73	10,416	9,059	15.0	16.9	9.5
50–100 thousand	182	12,364	11,025	12.2	8.4	4.6
30– 50 thousand	255	9,785	9,374	4.4	2.3	1.6
20– 30 thousand	255	6,152	6,095	0.9	−0.8	−1.7
10– 20 thousand	887	12,261	12,607	−2.7	−4.2	−3.1
5– 10 thousand	1,103	8,165	8,885	−8.1	−8.3	−4.7
Under 5 thousand	444	1,465	1,699	−13.8	−13.4	−5.6

Source: *Population Census Reports.*
Note: 1965 population is adjusted for the boundaries of cities, towns and villages in 1970, and 1960 population is adjusted for 1965 boundaries respectively. Each ward of Tokyo Prefecture is counted as one city.

over, the population increase rate suddenly dropped from 17.5% in 1955–60 to 9.1% in 1960–65 and 3.2% in 1965–70 (see Table 43). Migration statistics of the resident registration show that the city of Osaka changed into about 15 thousand excessive out-migration in 1963 and that since then the volume was expanded to 55 thousand in 1966. In the following year of 1964, the ward area of Tokyo changed into excessive outflow and in 1965, Kita-Kyushu city turned into excessive out-migration (see Table 44).

In other large cities, the change into excessive outflow has not occurred as yet, but since 1963, the volume of their excessive inflow has come to decrease very sharply. A notable example is seen in Nagoya city where the in-migration excess in 1966 was as less than 400. Such phenomena, particularly because of large volume of out-migration excess in Osaka city and ward area of Tokyo, caused the shift into excessive outflow starting in 1965 for the total of 7 large cities and in 1966 for the total of 6 large cities. It should be noted that in 1967, Tokyo as the prefectural total turned into excessive out-migration.[73]

These facts indicate the progress of increasingly rapid "suburbanization" of the population in large metropolitan area. This trend is not totally irrelevant to the ceiling trend of the national migration rate, but is showing the possibility of independently rapid progress.

73) Kiichi Yamaguchi, "Trends of internal migration in Japan", *op. cit,,* p. 64.

Table 44. IN- AND OUT-MIGRATION IN 7 LARGE CITIES

(in 1,000)

Cities	1959	1960	1961	1962	1963	1964	1965
Tokyo ward area	188.5	174.6	139.6	73.0	28.7	−30.7	−28.8
Yokohama	37.8	43.7	53.8	62.2	60.5	69.3	59.1
Nagoya	32.8	41.0	40.1	29.0	31.7	18.8	5.2
Kyoto	8.1	5.3	6.9	7.4	5.7	5.5	3.0
Osaka	67.9	66.8	54.4	23.6	−14.8	−33.2	−41.9
Kobe	16.3	19.7	18.7	10.1	3.2	1.1	3.6
Kita-Kyushu	..	..	..	..	..	3.0	−2.4
6 large cities	351.4	351.1	313.4	205.3	115.0	30.8	0.2
7 large cities	..	..	..	..	..	33.8	−2.2

Cities	1966	1967	1968	1969	1970	1971
Tokyo ward area	−46.9	−73.1	−95.1	−107.8	−148.8	−139.2
Yokohama	52.2	62.7	73.6	66.4	71.7	73.6
Nagoya	0.4	1.8	−1.7	−2.6	−9.0	−12.7
Kyoto	3.1	0.9	−1.2	−0.0	−5.4	−0.3
Osaka	−54.8	−70.7	−70.1	−76.0	−76.6	−85.2
Kobe	1.2	0.8	−3.0	−0.1	3.7	1.8
Kita-Kushu	−5.0	−6.2	−10.7	−8.4	−11.0	−6.7
6 large cities	−44.8	−77.8	−97.6	−120.2	−164.2	−162.2
7 large cities	−49.8	−84.0	−108.3	−128.6	−175.2	−168.9

Source: Bureau of Statistics, Office of the Prime Minister, *Migration Reports of Resident Registration*.

Note: Figures with (−) denote out-migration excess.

According to the population census results, during the period of 1960–65, among 23 wards of Tokyo City, population decreased in 8 central wards of Chuo, Chiyoda, Taito, Minato, Sumida, Arakawa, Bunkyo and Shinagawa, and in Shinjuku and Shibuya wards, the population was almost at the saturation point. Population also decreased in 13 wards among the total 22 wards of Osaka City, i.e., Higashi, Kita, Minami, Fukushima, Nishi, Higashinari, Naniwa, Oyodo, Tennoji, Abeno, Asahi, Ikuno and Nishinari, and in two central wards of Higashi and Naka among 14 wards of Nagoya City. In Kyoto City, among its 9 wards, central 3 wards of Nakagyo, Shimogyo and Kamigyo had the decrease and in Kobe City, Ikuta ward among its 8 wards showed the population decrease. Situations are somewhat different from other large cities in Kita-Kyushu City, but the population decreased in two wards of Wakamatsu and Tobata among its 5 wards. Even in Yokohama City where the total population increased very rapidly, in one of the 10 wards, Nishi, the population increase rate is approaching nearly the zero level.

In 1955–60, large cities with the population of one million and over absorbed

60% of the total population increase of the period which numbered 4.14 million, but in 1960-65, they absorbed only a little over 33% of the country's population increase of 4.86 million.

The population decrease in the central parts as well as the rapidly proceeding suburbanization occurring in large metropolitan areas urgently demand the planning and realization of urban center renewal and the facilitation of peripheral areas of large cities the latter of which has been even referred as a blind point of city planning.[74]

(C) Upward trend of population increase rate in cities with the population of 100-300 thousand—Similarly with the population increase of large cities of the population of one million and over as explained above, also in 5 large key cities of the population of 500-1,000 thousand of Sapporo, Kawasaki, Amagasaki, Hiroshima and Fukuoka, the population increase rate dropped from 26.4% in 1955-60 to 24.6% in 1960-65 and 14.1% in 1965-70. In the capacity of absorption of the total population increase of the country, however, some change can be seen from 9% in 1955-60 to 14% in 1960-65 and 10% in 1965-70.

In 15 cities of the population of 300-500 thousand such as Sendai, Niigata, Chiba, Shizuoka, Gifu, Kanazawa, etc., extremely small change can be seen in the population increase ratio from 13% in 1955-60 to 14% in 1960-65 and to 13% in 1965-70 and the absorption capacity of the total population increase also expanded from 12% to 14% and 17%, respectively, in each period.

Marked rise in the population increase rate can be seen in the cities of 200-300 thousand population, from 8% in 1955-60 to 15%, in 1960-65 and 18% in 1965-70, and those of 100-200 thousand population, from 10% in 1955-60 to 17% in 1960-65 and 15% in 1965-70. These cities of 100-300 thousand population absorbed 30% in 1955-60, 49% in 1960-65 and and 52% in 1965-70, of the total population increase.

According to 1970 Census, cities of 100-300 thousand population numbered 114 cities, varying in their respective characters and in the implications of the population increase rate. Among these 114 cities, population decreased in 6 cities of Hakodate, Otaru, Ube, Omuta, Yatsushiro, Miyakonojo, but taking these aside for the moment, the cities can roughly be divided into two major patterns. One is for these cities which were involved in the sudden swelling growth of metropolitan peripheries and the other is for these local nuclear cities which continued stable population increase.

In such highly densely inhabited community as Japan, it is necessary to

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74) Comparative reference: Toshio Kuroda, *op. cit.,* Chapters 5 and 6.

proceed the regional development in such a manner as to bring up certain designated nuclear cities in various characteristics and localities making them as strategical points.

Retrogression against the violent current of population migration does not lead to successful regional development. Since the population increase rate is upwarding in the cities of 100–300 thousand population, it is effective to select nuclear cities to function as key points of regional development from among these cities. To serve this purpose, it may be necessary that those cities would be equipped with the following conditions.

Firstly it is to have the location and conditions appropriate for being a key point, secondly to be capacitated to provide favourable location for enterprises dispersed from large cities or newly established, thirdly to possibly extend the favourable chain reaction from the key point to the peripheries, particularly to "over-depopulated" areas, and finally to be able to realize social development programs in balance with economic development programs.

5. Future geographical distribution of population

As mentioned above, it is extremely difficult to estimate future population distribution during this period of vigorous changes in distribution. "In such cases, the possible method of estimation from the part of population itself is the calculation in the form of trend line extention of the changes of demographic

Table 45. FUTURE POPULATION ESTIMATES BY REGIONAL BLOCKS

(in 1,000)

Regional block	1965*	1970*	1975	1980	1985
Total	98,114	103,720	109,925	115,972	120,798
(1) Hokkaido	5,206	5,184	5,261	5,346	5,386
(2) Tohoku	9,150	9,031	9,096	9,089	8,879
(3) Capital Metropolis	26,696	30,258	33,383	36,392	39,070
(4) Hokuriku-Tosan	7,150	7,094	7,235	7,403	7,499
(5) Tokai	10,979	11,778	12,930	14,170	15,283
(6) Kinki	15,653	17,401	18,968	20,517	21,948
(7) Chugoku	6,886	6,997	7,196	7,350	7,363
(8) Shikoku	3,968	3,904	3,873	3,830	3,760
(9) Kyushu	12,427	12,072	11,985	11,875	11,611
(3)+(5)+(6)	53,312	59,437	65,280	71,080	76,300

Source: Hidehiko Hama, "Second Revised Population Estimates by Prefectures, Japan: 1975, 1980 and 1985 (provisional)", The Journal of Population Problems, No. 119, July, 1971, pp. 43–48.

* Population census results.

Note: Estimates are all in medium estimates.

factors from the past up to the present".[75] The estimate made by Hama is available in three alternatives of maximum, minimum and medium projections of *de jure* population by prefectures as of October 1 of each five years from the period from 1965 to 1995, dividing prefectures into 8 groups according to the change trends of demographic factors during 1950–62.[58][75]

The summary results by regional blocks for the years of 1965, 1973 and 1985 are shown in Table 45.

The blocks which show major population increase during this period are three, i.e., capital metropolitan blocks, Tokai block and Kinki block, and all other blocks show either stagnant or declining trend, i.e., the trend is approximately stagnant in Hokkaido, Hokuriku, Tosan and Sanyo blocks and decline in Tohoku, San-in, Shikoku and Kyushu blocks.[76]

It is generally appropriate that Hama comments that the possibility of realization of these estimates stands for the following about 10 years (up to around 1975) "for such reasons that there is some time lag before effects of the regional development plan are reflected and that the projection of regional population change after 1973 will become extremely difficult due to the substantial change in the demand-supply balance of labour force on national basis."[77]

Okazaki has worked out a model on the basis of the following assumptions and estimated the population of the capital metropolitan zone for the years of 1975 and 1985 according to this model. It is herein assumed that the population is proportioned to the employed population. And dividing the employed population in tertiary industry into productive tertiary industry population and consumptive tertiary industry population (according to the estimate by Okazaki by means of the input-output table, the productive tertiary industry population occupies about 62% of the total tertiary industry population in 1965), it is assumed that the productive tertiary industry population is proportioned to the secondary industry population and that the consumptive tertiary industry population is proportioned to the total population. The results for the years of 1975 and 1985 resemble closely with the estimated results by Hama given in Table 45 which was prepared in totally different method and procedures as shown in

75) Hidehiko Hama, "Projection of regional population", *The Journal of Population Problems*, No. 101, *op. cit.*, p. 60.
76) Hidehiko Hama, *ibid.*, pp. 65–66.
77) Hidehiko Hama, *ibid.*, p. 65.

the following.[78]

Estimate	1975	1985
by Okazaki	33,660	37,270
by Hama	33,383	39,070

78) Yoichi Okazaki, "Statistical analysis of population migration", *Bulletin of the Japan Statistical Society*, 1968, pp. 46–48, (Japanese).
   Yoichi Okazaki, "An analysis of tertiary industry workers", *Annual Reports of the Institute of Population Problems*, No. 13, 1968, pp. 20–24, (English summary).

IX. Conclusive Remarks

So far in the paper, the trend of the population of Japan from the past upto the present, particularly in the post-war period has been analysed and about 20 years in the future have been perspected in pointing out in general terms the main points in economic and social problems. Trends of the population of Japan can be conclusively expressed in three terms, i.e., (1) high density society, (2) high age society, and (3) highly urbanized society.

The ideal picture of a society from the standpoint of population problems, on the other hand, should be (1) high land-utilization society, (2) post-industrial society, (3) high human-ability society, and (4) advanced welfare society. In the expected post-industrial society imagined in 20 years future, it is often expected that the per caput national income would reach 2,500 US dollars. The population of Japan at that time is estimated to reach approximately 120 million.

What should not be overlooked here is that this $2,500 should be $2,500 in high welfare society and that the population should be 120 million of welfare beings.

Future population problems in Japan will be substantially different in nature from those up to the present. Firstly, the problem of the quantity of population changes into the problem of the quality of population. Secondly, the population problems as economic problem changes into the population problems as a problem of the balance between economic development and social development.[79]

Finally, a mention should be made as to the population problems of the world, particularly of Asia in which we are located. In many developing countries of Asia, extremely high population increase rate is greatly impeding their economic as well as social development. Such delay in the progress of economic and social development there is at the same time supporting high fertility and high population increase rates. The viscious circle is fundamental in their population problems and this viscious circle must be severed in a way to alleviate population increase rate. It is needless to repeat that the stringent population problems in the world, particularly in developing countries of Asia, are fundamentally important for the enhancement of the welfare of world's mankind as well as for the maintenance of peace and security in the world.

Turning back to Japan's standpoint, it goes without saying that the future progress in Japan's economy is in the long run dependent upon the market in

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79) Shigeru Hayashi, "Prospects and problems of the population reproductivity", *The Journal of Population Problems*, No. 101, *op. cit.*, p. 94.

the world, particularly in Asia. The basis of the development of Asian market lies in the prosperity of these Asian countries. Further, in order that the Asian countries to prosper, they have to solve their basic problems, that is, population problems. Thus, if it is allowed to go too far in saying, the population problems in the world, particularly in developing countries of Asia are at the same time Japan's own population problems. It is, therefore, no exaggeration to say that for Japan who has long and varied experiences in population problems, it is her responsibility to cooperate in the efforts of solving the population problems of the world, particularly of Asia.[80]

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80) Minoru Tachi, "Population situations of the world", *Practice of Gynaecology*, Vol. XVII, No. 7, July 1968, pp. 566–573, (Japanese).
  Toshio Kuroda, *op. cit.*, pp. 243 fg.