English Pamphlet Series No. 63
Institute of Population Problems
October 1, 1966

PAPERS PRESENTED BY THE STAFF MEMBERS OF THE INSTITUTE OF POPULATION PROBLEMS TO THE CONGRESS SYMPOSIUM NO. 1, THE ELEVENTH PACIFIC SCIENCE CONGRESS

Institute of Population Problems
Ministry of Health and Welfare
Tokyo, Japan

CONTENTS

PREFACE

This is a collection of papers presented by the staff members of the Institute of Population Problems to the Congress Symposium No. 1, "Population Problems in the Pacific" at the Eleventh Pacific Science Congress which was held from 23rd to 26th August of 1966 in Tokyo.

This might be a useful collection for the study in population of Japan, because each paper summarizes up the various aspects of the demographic development in Japan. As these papers were worked out by the staff members of this Institute in their capacity of an expert in population fields, the views expressed by the authors are not necessarily those of this Institute.

In order to show the organization of the Symposium, Convener's Opening Address is added in front of the papers. In view of their importance, Resolutions in the field of population of the Congress are attached as an appendix. These Resolutions were presented by the Congress Symposium No. 1 to the Standing Committee on Anthropology and the Social Sciences, reported to the Council of the Pacific Science Association with the approval of the Committee, and finally agreed unanimously at the General Meeting of the

Congress on September 3rd, 1966.

September 20th, 1966

Minoru TACHI, Director
Institute of Population Problems
Ministry of Health and Welfare
Japan

The Eleventh Pacific Science Congress
The Congress Symposium No. 1
Population Problems in the Pacific
August 23, 1966, Tokyo.

CONVENER'S OPENING ADDRESS

Minoru TACHI, Convener

His Imperial Highness, the Crown Prince, their Excellencies, ladies and gentlemen:

I take it as my greatest honour and pleasure to have been given this opportunity, before the Crown Prince, to make an opening address on behalf of the conveners of the Congress Symposium No. 1.

I may say that the latter part of the 20th Century is "the Age of Population Problems" in the world history, because in any period before this age, population problems have never received graviest concern all over the world. Since World War II, all international organizations including the United Nations and its Specialized Agencies and many countries have been making all efforts to solve population prombems which are so closely interrelated with the basis of enhancement in the welfare of the human race, and with the basis of maintenance of peace and security of the world. Under the present circumstances, such efforts must be continued increasingly on, at least, by the end of this century.

The Pacific Region presents most fascinating laboratories of demography. Nearly a half of the world population, around 1 billion and a half people in different ethnic groups are living under different natural, economic, social, cultural and political conditions. And in many countries of the Pacific, these conditions are changing rapidly, and the population changes are enormous. It is basically important that experts in various fields of sciences of various countries meet together and draw the demographic picture of the Pacific Region as a whole.

Generally speeking, population problems have multifarious dimensions. Therefore, demography must be one of the typical multidimensional sciences, including almost all natural and social sciences, for instance, biology, medical science, public health, economics, sociology, anthropology and so on. Accordingly, when the Eleventh Pacific Science Congress is held, and experts in the fields of all sciences from various countries in the Pacific Region meet together, it is of great significance to have a forum to exchange opinions and experiences. We are expecting that this Symposium will turn out to be successful by provoking scientific interests among the experts in various fields on demography, by deepening genuine professionalization of each science, thus facilitating

inter-disciplinary cooperation among the related social and natural sciences centering around the study of population.

Now, in the opening of the Congress Symposium on Population Problems in the Pacific, we have requested Dr. Irene B. Taeuber to serve as the chairman of this Symposium. Dr. Taeuber is one of the most prominent demographers in the world, and I am sure that I do not actually need to introduce her to you. If I briefly introduce her, however, she is a senior research demographer at the Office of Population Research of Princeton University in the United States. She served as consultant in demography to the United Nations, the World Health Organization, the Pacific Science Board of the National Research Council and other important national and international organizations. She is a former President of the Population Association of America and a frequent contributor to the periodicals on demography. Her works are widely known as to be creative and stimulating in nature. Although her scope in demography is very broad, she has shown particular interest in population problems in Asian countries. Her laborious book titled, "The Population of Japan" published in 1958 is one of the greatest contributions not only to demography in Japan, but also to demography in Asia and the world.

Secondly, we would like to request the following experts

to serve as rapporteur for each six sections.

Dr. Shigemi Kono, a staff member of the Institute of Population Problems of Japan, for the first section of this Symposium on "Population Growth", to be taken place this afternoon.

Dr. Mercedes B. Concepción, acting director of the Population Institute of the University of the Philippines, and Dr. Minoru Muramatsu, Section Chief of the Public Health Demography at the Institute of Public Health of Japan will serve for the second section on "Fertility and Family Planning" to be taken place tomorrow afternoon.

Mr. Basillio Aromin, Demographer in the Division of Social Affairs of ECAFE, for the third section on "Food Potential and Nutrition", to be taken place the third day of the Symposium, 25th of August.

Dr. Yoshiko Kasahara, Senior Demographer of the Dominion Bureau of Statistics of Canada, for the fourth section on "Mortality", to be taken place also in the afternoon of 25th August.

Prof. You Poh Seng, Director, Economic Research Center, University of Singapore, for the fifth section on "Migration, Urbanization and Economic Development" which is scheduled to take place on the last day of the Symposium, 26th August.

Mr. S. Selvaratnam, Senior Research Officer in the

Department of National Planning of the Government of Ceylon, for the sixth section on "Development Programs", which is taken place also in the afternoon of 26th August.

Third, I should like to introduce to you the other officers of this Symposium.

Mr. Toshio Kuroda, a Section Chief of the Institute of Population Problems of Japan serves as Executive Secretary for the Symposium, who plays a part of coordinating procedural matters and of circulating necessary information on the arrangements of the Symposium.

Mr. Yoichi Okazaki, a staff member of the same Institute, Miss Teiko Hasekura, a staff member of the Western Pacific Regional Office of the International Planned Parenthood Federation and Miss Keiko Yoshida, a staff member of the Family Planning Federation of Japan, serve respectively as the Secretaries of the Symposium who handle procedural matters.

The conveners would like, in this connection, to express our sincere gratitude given to us by many organizations and individuals for the cooperation in the process of organizing this Symposium.

Our heartfelt appreciation is extended to the United Nations Organizations and other international agencies which have sent their representatives in person and background papers

to this Symposium, and at the same time to the cooperation of the United States.

Lastly, we should like to emphasize again, we do hope that this Symposium will turn into success by the cooperation of all participants, and will become a corner stone for opening up the new dimensions of Pacific Demography, no matter how it is defined.

In closing, I repeat again that we are deeply honoured by the presence of the Crown Prince and many distinguished guests in this Symposium, and I am thankful for your kind cooperation.

Thank you, indeed.

POPULATION GROWTH IN JAPAN

Masao UEDA

1. Introduction

1.1 The total population of Japan is 98.3 million as of 1 October 1965 by the latest census, comprising three percent of the world's population, and is about as large as the recent population of Indonesia or Pakistan. Her present population thus numbers about three times as large as in 1868 (The Meiji Restoration) when Japan initiated steps of economic and social modernization.

1.2 Japan's present territory, which consists of the islands of Honshu, Hokkaido, Kyushu, and Shikoku, covers 370,000 square kilometers or 0.3 percent of the world's total land area. Her population density is 266 persons per square kilometer in 1965, which ranks among the highest following Netherlands, Belgium and Taiwan. Of the total territory, however, 55 percent is mountainous and only 14 percent remains cultivated; if the density is calculated on the basis of cultivated lands, it is estimated at 1,622 persons per square kilometer, making it the highest density in the world.

1.3 Much of her industrialization was seen about the turn of the twentieth century, and her population increased rapidly along with the growth of her capitalistic economy since then.

In the latter half of 1920's, Japan's population showed a high rate of increase of about 1.5 percent per annum. In the 1930's and early 1940's just before the start of World War II, however, the rate of population growth gradually decreased. Once again, following the end of the war, the growth rate suddenly rose to the unprecedented level of 3 percent per annum in 1945 - 50 due to baby boom, repatriation and demobilization. However, the sharp decrease in fertility since 1950 induced the lowering of the rate of population increase and the rate is observed today to be about one percent per annum. This rapid shift of vital trends brought about a drastic change in the age structure of the population. Moreover along with the economic reconstruction and subsequent development, population tended to concentrate into metropolitan districts, especially as the pace of economic growth quickended. These drastic post-war changes of population trends have affected and are expected to continuously influence over Japan's prospective economic and social development.

2. Population Growth before World War I

2.1. For about two decades following the Meiji Restoration, i.e., up until the first half of 1880's, the rate of population increase averaged 0.5 - 0.6 percent per annum.

However, in the latter half of the 1880's, the rate gradually began to rise. In the 1900's, it reached an annual rate of 1 percent, and a trend is seen to have risen continuously until the end of the Meiji period (1912) (Table 1).

2.2. The population of Japan, surveyed as of January 29, 1872 (lunar calender) for the establishment of a modern civil registration system, was estimated at 34.8 million after necessary adjustments were made. The modern system of vital registration was also established in 1872. Officially published birth and death rates, which therefore defined, the rate of natural increase, were remarkably low, and remained at about the same level until the end of the nineteenth century. After the beginning of the twentieth century, the birth rate showed a drastic increase whereas the death rate did not indicate any rapidly decreasing trend. According to the study by Dr. Yuzo Morita 1/, Mr. Yoichi Okazaki 2/, and Masaaki Yasukawa 3/, the vital trends of the period concerned are deceptive, largely due to incompleteness and inaccuracy of vital statistics which are derived from the civil registration. Among other reasons, a decrease in omission of birth or death from being registered is probably one of the most important factors which had affected the vital trends and contributed deceptively to the constantly rising vital trends from the

beginning of the Meiji Era.

2.3. According to Mr. Y. Okazaki who estimated vital rates of the Meiji Era, birth rates were generally high, the rate being 33 - 37 per thousand population and showed some increase in the latter half of the period, while death rates indicated a falling trend since the beginning of the period, and declined from 31 per thousand in 1870 - 75 to 27 in 1895 - 1900. It is most probable that this rising trend in fertility was attributable to a decrease in miscarriages both by natural and artificial causes, but especially by the latter for which there exists some evidence of practice since the time of the feudal age. As a consequence, rate of Japan's population growth gradually began to rise since the end of nineteenth century (Table 2).

2.4. Noted as before, the industrialization processes were initiated in the 1890's and were advanced much about the turn of the present century. Up to the beginning of the industrial evolution, the annual rate of population increase had been maintained as low as anywhere between 0.5 to 0.7 percent, and the annual rate of increase in real national income was around 5 percent.

Along with the progress of the industrial evolution, the size of manpower in primary industries naturally decreased

while the increase was noticed among those who were employed in secondary and tertiary industries. The proportion of workers in the primary industries to the total working population was 81 percent in 1875 - 77, which decreased to 70 percent in 1893 - 97 and further to 56 percent in 1913 - 17. The annual average rate of population increase was 1.2 percent and that of the standard of living was 2.9 percent in 1875 - 97, but the former rose to 1.3 percent while the latter dropped to 1.5 percent in 1898 - 1918. Nevertheless, during this period, the growth of population was one of the most forceful factors for the development of the Japanese national economy 4/.

3. Population Growth after World War I

3.1. The industrial evolution proceeded rapidly and further accelerated, its pace during World War I, reaching its peak about 1920. The first population census took place in 1920, establishing the quinquennial system of census enumeration. According to the result of the census, the population of Japan was over 55 million and showed 1.6 times increase in 48 years as compared with the population of 1872.

3.2. The trends of fertility and mortality began to show characteristics as have been experienced by western countries since 1920. The birth rate of 37 per thousand population

estimated for 1905 - 10, clearly established a decreasing trend after 1920, and fell by 15 percent by 1937, the rate then being 31 per thousand. The magnitude and rapidity of decrease were somewhat similar to the experience of England and Wales which recorded a decline in crude birth rate from 36 in 1876 to 31 in 1893, although the decrease in Japan started half a century later because of the delay of her industrial institution. It is noted generally that two factors with equivalent force had affected fertility trends in Japan during this period; the increase in late marriage and the decrease in fertility itself. According to findings of the Fertility Survey, carried out by the Institute of Population Problems in 1940, it may be said that the fertility trend of Japan up to the start of World War II generally exhibited much similarity in its declining pattern to the experience of western countries. In spite of the ardent efforts on the part of some expert-pioneers, however, the modern fertility control measures, then succeeded only among the salaried people in metropolitan districts.

3.3. It is noted that the mortality rate, like the birth rate, started also a declining in years following 1920. It decreased from 25 per thousand in 1920 to 16 in 1940 - 43, which, in turn, means a decrease of mortality by 33 percnet. The death rate for 1920 as well as 1918 was high because of

the world-wide epidemic of influenza immediately following the end of World War I. Even when the influence of the influenza is taken into consideration and adjusted, the death rate would still be no lower than 22 or 23 per thousand per annum. The infant mortality rate, which was noticeably high in 1920, continued to decrease since then and dropped by one-third by the end of the period concerned (Table 2).

3.4. Consequent to the vital trends so far observed the magnitude of natural increase of population was generally in the order of 0.8 - 0.9 million, reaching 1 million in some years. The rate of natural increase was high, ranging from 1.3 to 1.5 percent in annual average.

During the period concerned, the growth of population of Japan was determined on the basis of natural increase only, since the flow of international migration was negligible.

3.5. The steady industrial evolution came to a "plateau" around 1920, to be followed by an internal economic crisis and further, by the now famous world-wide depression in the early 1930's. Consequently, the economic growth of Japan was greatly slowed down, if not completely halted. Although the real national income increased by 10 times and also per capita national income rose during the period from 1880 to 1935, the foreign investment was extremely limited during the same perioa.

As a result, a high saving rate (15 - 20 percent of average income) was necessary and in fact, was maintained for the purpose of capital formation, and the "austerity life" continued.

Owing to the world economic crisis in the 1930's, the number of the unemployed and also the never-employed increased, especially in areas of large-scale modern industries. However, the majority of those who had been affected were absorbed in agricultural households or small-scale industries in the form of "under-employment" or "disguised unemployment", and the cases of complete unemployment were not as numerous as had been observed among highly developed countries.

4. Rapid Development of Demographic Evolution after World War II

4.1. As a result of the defeat in World War II, Japan lost 46 percent of her area and her economy was near complete destruction. Immediately following the end of the war, the production index in mining and manufacturing industries suddenly fell to one-third of the pre-war level, which was not regained until 1951. Ther real national income per capita dropped to one half of the pre-war level. It regained the pre-war level in 1955 and, in recent years, surpassed the

population index.

4.2. After the termination of the war, the population of Japan saw an abrupt increase. The population which numbered 72.2 million in 1945, grew by 11 million in five years and reached 83.2 million in 1950. The annual average rate of population increase, which was 1.5 percent at the highest in pre-war years, was exceedingly high at 2.9 percent in 1945 - 1950.

4.3. This extraordinary increase was due to three reasons; repatriation of overseas Japanese, decrease in mortality rate and the "baby boom" of 1947 - 1949.

The repatriants from overseas were as many as 6.3 million while the foreign repartriants from Japan did not exceed 1.2 million. In this regard along, Japan gained the population of 5 million in 5 years. In spite of the marked drop of the level of living, the crude death rate has shown a rapid decline since 1947 and is now about one half of the pre-war level. The recent crude death rate of Japan is one of the lowest among the highly developed countries of the world. However, it must be noted that the number of younger people is comparatively much larger in Japan than other highly developed countries, thus indicating the influence of the age structure on crude vital rates.

4.4. The improvement in the mortality rate after the end

of the war was due notably to the decrease in the infant mortality and tuberculosis mortality among adolescence. Owing to these improvements, the expectation of life at birth exhibited a rapid rise even within a short time.

4.5. The fast fertility decline noted since 1950 in Japan has no historical precedence among any other developed and developing countries of the world. According to various surveys, this decline has been due to the fact that many married couples started to feel the economic pressure against the sudden lowering of standard of living and subsequently became strongly desirous of limiting the family size. However, as mentioned before, the family planning was not fully appreciated in pre-war years and, unfortunately, the number of those who took recourse to the induced abortion since 1950 reflected the same view on family planning. According to a report under the Eugenic Protection Law of 1948, however, the number of cases of induced abortion has been gradually decreasing after reaching the peak in 1955.

4.6. During the "baby boom" period, the rate of natural increase was noticeably high due to the increase in fertility and decrease in mortality. Since then, the mortality maintained the slowly declining trend along with the rapidly declining fertility trend, and the rate of natural increase was rapidly

falling with the annual rate of below 1 percent in recent years.

4.7. The (female) gross reproduction rate fell to 0.96 in 1963 which was 2.30 in 1930. The net reproduction rate 1.50 in 1930, came down to 0.92 in 1963. If the present vital trends continue, it is envisaged that the population of Japan still increasing may change into being a decreasing one within a generation's time.

5. Changes of Demographic Characteristics of Population

5.1. The progress of rapid demographic evolution in the post-war period has brought about equally as noticeable changes in the age structure of population. During the period from the Meiji Restoration to the beginning of World War II, the percentage of population aged under 15 years was highly stabilized picture, at about 36 - 37 percent. However, after the end of World War II, but especially in years following 1950, the proportion of population under 15 years of age was reduced, in spite of the betterment in infant and child mortality, but because of the decrease in births. The percentage of the population under 15 years of age was 35.4 percent in 1950. In 1955, after a drastic decline in

fertility for a few years, the percentage declined to 33.4, and further to 30 in 1960, which set the smallest figure ever recorded in Japan (Table 3).

5.2. On the other hand, the proportion of the population in productive ages, 15 - 64 years, expanded noticeably and the proportion of the population of 65 years and over rose also at a fast rate. The percentage of population in productive ages increased to 61 percent in 1955, owing to the reduction of the younger population, and further to 64 percent in 1960, the largest ever recoreded in the Japanese censuses. The percentage of the aged population of 65 years and over has steadily increased to reach the figure of 5.8 percent in 1960.

5.3. Within a decade between 1950 and 1960, the population in productive ages 15 to 64 increased by 10 millions and the population in old ages 65 and over increased by 1.3 million while the young population aged under 15 decreased by 1.5 million. The increase of the productive age population amounted to a million per year, which is twice as much as its increase in pre-war years. High past fertility and declining post-war mortality trends were responsible for such a drastic increase in the population of productive ages.

5.4. According to the life table for 1935 - 36, 79 males and 80 females could survive up to age 15 out of 100

newly born babies of each sex. The number of survivors increased to 96 males and 97 females in 1964 - 1965. In contrast to only 46 males and 54 females could survive up to ages 65 out of 100 survivors at age 15 of each sex in pre-war years, 71 males and 82 females can reach the age of 65 recently. This means that the population in the productive ages would be greater because of the improvement in mortality in postwar years alone even if the number of new participants were the same as pre-war years.

5.5. In pre-war times, 100 persons of productive-age supported 63 children, but in 1960 the corresponding ratio was down to 47 children. On the other hand, the pre-war figures of 8 aged-dependants to 100 productive-age population increased to 9 in 1960. It may thus be seen that the ratio of total number of dependants to 100 productive-age population decreased from 71 of pre-war times to 56 in 1960.

6. Trends of Future Population

6.1. The latest projections of Japanese population were undertaken by the Institute of Population Problems, Ministry of Health and Welfare, in 1964. The projections were prepared by "component" method, with the use of estimated future age-specific survival rates and fertility rates. The estimates

after 1980 was extrapolated simply on the hypothesis that age-specific fertility rates and sex-age-specific survival rates assumed for 1975 would be constant thereafter. Therefore the estimates up to 1975 can be regarded most plausible since present vital trends and their probable future trends are amply considered. The far-off future estimates after 1980, however, represents a projection which was obtained by a simple extrapolation of probable trends up to 1975 with some pre-conditions, and thus should be regarded as an expression of potentials involved in population trends of the present.5/

6.2. The estimates indicate that the total population will exceed 100 millions in about the decade through 1965 - 1975, with the annual average of population increase of 1.0 percent (Table 4).

6.3. It is generally noted that social and economic implications of population trends are permeated mainly through the dynamics of the age structure of population. Thus, changes so far observed and still anticipated in the age structure of Japanese population indicate certain social and economic consequences. Owing to a rapidly declining fertility trends through years following 1950, the population under the age of 15 years is anticipated to decline in its relative size through 1965 - 1975. On the average, the population in productive ages

increased by 1.2 million during the period of 1955 - 1960. It is expected that the peak of its absolute increase estimated at 1.4 million per annum will be attained in 1960 - 1965. However, the declining fertility trend in years following 1950 is expected to exert its influence on the size of cohorts reaching the productive age span, reducing on the average the increase in the size of the population of productive ages to 0.9 million per annum by 1965 - 1970 and further to 0.6 million by 1970 - 1975. The reduction in the annual increase will largely be attributed to the increasingly smaller cohorts which will survive to the productive ages through years up to 1975.

6.4. The increase in the aged population of 65 years and over will be accelerated in absolute and relative size. While the proportion of the child population under 15 years is projected to fall from 30 to 23 percent between 1960 and 1975, the corresponding proportion of those of 65 years and over is expected to rise from 6 to 8 percent during the same period.

6.5. If age-specific fertility and mortality schedules are assumed constant after 1975, the age structure with a large proportion of the aged then anticipated will affect the natural increase in such a way to make it negative by

2005 when the projected population of 121.7 million will in fact begin to decline in aggregate size.

7. Regional Characteristics of Population Growth

7.1. The result of 1965 census revealed that depopulation had taken place in the last five years in the 25 prefectures out of the total of 46 prefectures. During the same period, depopulation had also occurred in 2,575 of the total of 3,376 minor administrative divisions (cities, towns and villages). The same population census also indicated that the 58 percent of the population lived in cities with the population of 50,000 or more, incontrast to the corresponding figure of 52 percent noted in 1960. In 1960, the notion of "densely inhabited districts" was introduced within the census program. Between 1960 and 1965, the proportion of the population residing in such districts rose from 44 to 48 percent.

7.2. Among 21 prefectures in which population increase occurred during 1960 - 1965, the rate of population increase for metropolitan and adjacent prefectures were higher than the national average. The rate for 7 cities with the population of one million or more decreased from 17 percent in 1955 - 1960 to 9 percent in 1960 - 1965. Among others, 5 cities with the population of 0.5 - 1.0 million showed the highest rate of

increase during the same period, for which the average figure of 26 percent was estimated. In contrast, the loss of population was seen in towns and villages with the population of less than 30,000.

7.3. During the same period, in-migrants to the 6 metropolitan prefectures, enumerated on the basis of the Resident Registration system numbered about the half of the number of inter-prefectural migrants of, 3.6 million, while the number of out-migrants from these prefectures was 39 percent of those migrants, in 1964. In the 6 metropolitan prefectures including the three major industrial areas, the constant excess of inflow over outflow of migrants has been registered except immediately after the end of World War II. In almost all of the other prefectures, the excess outflow observed. Particularly noticeable was the loss of population of the 26 prefectures in 1955 - 1960 and 25 prefectures in 1960 - 1965, as a result of the large net migration loss which exceeded the natural increase of the prefectures concerned.

7.4. According to the 1960 census results, the population aged 1 year or more who resided in other prefectures one year prior to the date of the census comprised two-thirds of those aged 15 to 29 years. In the 6 metropolitan prefectures, the in-migrants aged 15 to 29 years in 1960

constituted 71 percent of the total in-migrants to all prefectures. It may readily be appreciated that because of such internal migration patterns much changes have taken place with respect to the age composition and vital trends of urban and rural population. Thus, the crude birth rate in the metropolitan prefectures has recently shown an upward trend because of the voluminous inflow of young population of reproductive ages while registering lower in some rural areas than in the metropolitan areas.

7.5. The recent rural-urban migration trend in Japan does not have its parallel to any of her previous experience, either in terms of its magnitude or short period of its occurrence. Such a rapid urban concentration of population inevitably creats a number of unprecedented economic and social problems in urban as well as rural communities.6/

8. Some Implication of Recent Trend of Population

8.1 During the period of 1945 - 1950, the real gross national product (at average price level in 1934 - 1936) dropped to 60 - 70 percent of the pre-war level and the real national income per capita dropped to half of the pre-war level. Since 1950, however, the rate of population growth

has increasingly become reduced, and the rate of economic growth has risen at the same time. By 1955, the real national income per capita was restored to the pre-war level.

8.2. From about 1955 on, Japan's economy progressed steadily, especially under the Government's National Income Doubling Plan. This high economic growth has brought about the improvement of the standard of national living as well as the enrichment of social overhead capital. However, rapid economic growth has also brought about the regional disparities in social development, which has been manifest in the distorted industrial structures resulting from the backward status of small and medium scale enterprises and of agricultural industries, and insufficient public facilities such as transportation, communication, and health and welfare services.

8.3. In spite of the rapid economic development, the proportion of the population engaged in the primary sector of industry was as high as 44 percent of the total employed population in pre-war times. The number of workers employed in the primary industry comprised of 41 percent of the labor force in 1955 which fell to 33 percent in 1960 and further to 27 percent in 1964. On the other hand, the economically active population in the secondary industry rose to 31 percent in 1964, the highest percentage ever registered, and those in

tertiary industry also increased to 42 percent in the same year. With the high economic growth, the rapid process of modernization has thus affected the industrial structure in recent years.

8.4. One of the prominent characteristics of the Japanese industrial structure is the dualism of highly modernized large-scale enterprises and pre-modern small-scale family-unit enterprises both of which has existed side by side. However, the proportion of workers employed in small establishments has declined recently and instead those working in larger establishments have taken a larger place in manpower market. It may readily be seen that the proportion of the "modern" employees has been on the way up in contrast to the proportion of the unpaid family workers which has been on the way down. It is evident in such an observation that the modernization of employment relations has definitely been under its way.

8.5. As has been indicated previously, the population of productive ages has exhibited a rapidly increasing trend both in aggregate as well as relative size; however, the "shortage of labor" is currently being felt in certain sectors of industry. One of the various reasons is unmistakably that those who have completed the compulsory education have increasingly chosen to further their education rather to seek employment although medium- and small-scale industries have traditionally drawn and

still draw their manpower supply from those who have just completed the compulsory education, and are still untrained but willing to accept lower wages. The manpower shortage has also been felt in modern large-scale industries. However, this has generally been the result of qualitative rather than quantitative unbalance between demand and supply of labor force with pertinent skills which have been necessitated by the "technical innovation"7/.

8.6. With the present transitional state of economic structure and social institution, the rapid change in the age distribution of population anticipated in the near future should much influence the supply of manpower and no doubt exert a tremendous effect on the future economic and social development of Japan. The promotion of the economic development of Japan in future years will require all examinations of possible avenues to take advantage of a decline in the excessive supply of manpower but at the same time to manpower cultivation to meet the challenge of technical innovations.7/

8.7. The rapid post-war demographic transition represents the ability of the Japanese population to adapt themselves through great social and economic changes. It is of great importance that the population be well-adjusted for future economic and social changes through improvement of its quality.

Japan has succeeded with respect to the quantitative adjustment of her population by means of effective family planning. However, the problem of improving the quality of the population, characteristic of one of socio-demographic questions that confront economically advanced countries, is very much present in today's Japan which has demographically and economically undergone much changes. It must be said in this connection that the ultimate object of the improvement in the quality of population be the elevation of the general welfare of the people.8/

Notes:

1/ Morita, Yuzo: "An Estimation on the Actual Birth- and Death-Rates in the Early Meiji Period of Japan, Population Studies, Vol. XVII, No. 1, July 1963.

2/ Yasukawa, Masaaki: "Estimates of Annual Births and of General Fertility Rates in Japan, 1890 - 1920 -- Derived by Projecting the Census Population of 1920 Backwards --", Keio Economic Studies, Vol. 1, 1963.

3/ Institute of Population Problems (Y. Okazaki): Population Estimates by Sex and Age from 1870's to 1920, Institute of Population Problems Research Series, No.145, 1962.

4/ Tachi, Minoru and Okazaki, Yoichi: "Economic Development and Population Growth", The Developing Economics, Vol.111, No. 4, Dec. 1965.

5/ Institute of Population Problems, Future Population Estimates for Japan by Sex and Age, Research Series No. 159, 1964.

6/ Ueda, Masao: "A Study on Internal Migration and Age Structure of Migrants", Archives of the Population Association of Japan, No. 4, pp. 105 - 129, 1962.

7/ Tachi, Minoru: Forecasting Manpower Resources; Population and Labor Force-- Some experiences in Japan, Institute of Population Problems, Japan, English Series No. 55, 1962.

8/ Tachi, Minoru: Implication of Population Trends for Planning Social Welfare Services, Institute of Population Problems, English Pamphlet Series No. 58, 1964.

Annex Table 1. Population Growth

Year	Population ('000)	Annual average rate of increase (%)	Population density (per km^2)
1880	38,166		101
1890	40,353	0.6	106
1900	43,785	0.8	115
1910	49,066	1.1	129
1920	55,391	1.2	146
1925	59,179	1.3	156
1930	63,872	1.5	168
1935	68,662	1.4	181
1940	72,400	1.1	191
1945	72,200	-0.1	196
1950	83,200	2.9	226
1955	89,276	1.4	242
1960	93,419	0.9	253
1965	98,275	1.0	266

1880 - 1910, estimated by Mr. Y. Okazaki 3/.
1920 - 1965, census population.

Annex Table 2. Vital Rates

Year	Number ('000)			Rate (per 1000)		
	Birth	Death	Natural increase	Birth	Death	Natural increase
1870- 75 1)	1,335	1,153	182	36.3	31.3	5.0
1875- 80	1,372	1,179	193	36.4	31.3	5.1
1880- 85	1,311	1,095	216	33.9	28.3	5.6
1885- 90	1,341	1,120	221	33.7	28.1	5.6
1890- 95	1,410	1,123	287	34.3	27.3	7.0
1895-1900	1,553	1,154	399	36.3	27.0	9.3
1900- 05	1,585	1,091	494	35.2	24.2	11.0
1905- 10	1,765	1,203	562	37.0	25.3	11.8
1910- 15	1,810	1,123	687	35.6	22.1	13.5
1915- 20	1,793	1,203	590	33.2	22.3	10.9
1920- 25	1,991	1,307	684	35.0	23.0	12.0
1925- 30	2,078	1,207	871	34.0	19.8	14.3
1930- 35	2,092	1,194	899	31.8	18.1	13.6
1935- 40	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 2)	1,717	673	1,044	17.7	6.9	10.7
1965 2)	1,822	700	1,122	18.5	7.1	11.4

1) 1870 - 1943, annual average.

2) Preliminary.
1870 - 1920, estimated by Y. Okazaki 3/.
1920 - 1965, Vital statistics

Annex Table 3. Percentage of Population by Age

Year	Percentage by age			Ratio of dependent population		
	0 - 14	15 - 64	65+	Total	0 - 14	65+
1920	36.5	58.2	5.3	71.6	62.6	9.0
1930	36.6	58.7	4.7	70.4	62.3	8.1
1940	36.0	59.2	4.7	68.8	60.8	7.9
1947	35.3	59.9	4.8	67.1	59.1	8.0
1950	35.4	59.7	4.9	67.5	59.3	8.3
1955	33.4	61.3	5.3	62.7	54.1	8.6
1960	30.0	64.2	5.7	55.7	46.7	9.0

Population census reports.

Annex Table 4. Future Population Growth

Year	Total population ('000)	Percentage by age			Vital rates 1)	
		0 - 14	15 - 64	65+	Birth	Death
1965	98.403	25.2	68.6	6.3	16.6	6.9
1970	103,327	23.2	69.8	7.1	16.6	6.6
1975	108,635	22.7	69.3	8.1	15.4	7.0
1980	113,265	22.2	68.8	9.1	13.4	7.8
1985	116,458	20.9	69.2	9.9	12.2	8.5
1990	118,619	19.2	69.8	11.0	12.1	9.4
1995	120.225	17.9	69.3	12.9	12.2	10.4
2000	121,353	17.6	67.9	14.5	12.0	11.5
2005	121,698	17.7	66.3	16.0	11.4	12.9
2010	120,817	17.5	64.8	17.7	10.8	13.8
2015	119,015	17.0	63.0	20.0		

1) Per thousand, annual average in each period.
Estimated by the Institute of Population Problems 5/.

HISTORICAL CHANGE IN MORTALITY IN JAPAN

Sadamu WATANABE

I. Introduction

Study of mortality constitutes an essential part of the science of population, and longevity.

The crude death rate has been long employed as a convenient index to long term trends of mortality, but this sometimes give a distorted picture, since it does not take into account the factors of age composition. However, the use of a standardized rate of age and life expectancy overcomes this limitation.

A correct approach to the study of mortality requires specific facts based on ages, sex, and cause.

Statistics are respectively different in accuracy and coverage, depending upon time and region.

Chart I., demonstrates historical trends in expectation of life at birth in selected countries. Figures on the expectation of life at birth before 1920 in Japan were not based on data of a national census, but registration data. Corrected figures by Dr. H. Mizushima are shown on dotted lines. From this Chart, it is evident that while life expectancy in various countries substantially rose, in Japan until 1945, it seems to have been retarded. From 1948 a rapid decrease of mortality brought the Japanese life expectancy to the level of European countries.

Chart II., illustrates comparison of age - specific death rates of selected countries by applying index figures, taking Japan as the basis. From this Chart, it is clear that except for age groups for 40 to 65 the death rates of selected countries are lower than in Japan, especially for females. In age groups 40 up to 65, in United States, Great Britain and France, the death rates are totally or partially higher than in Japan. This is a noticeable fact.

In this paper, an attempt is made to present the changes in mortality according to the following chronological periods, based on social conditions.

A) Public Health Service: Prior to the Meiji Restoration, 1868

B) The Introduction of Modern Medicine, 1868 - 1900

C) The Struggle for Public Health Service, Phase I, 1900 - 1920

D) The Struggle for Public Health Service, Phase II, 1920 - 1943

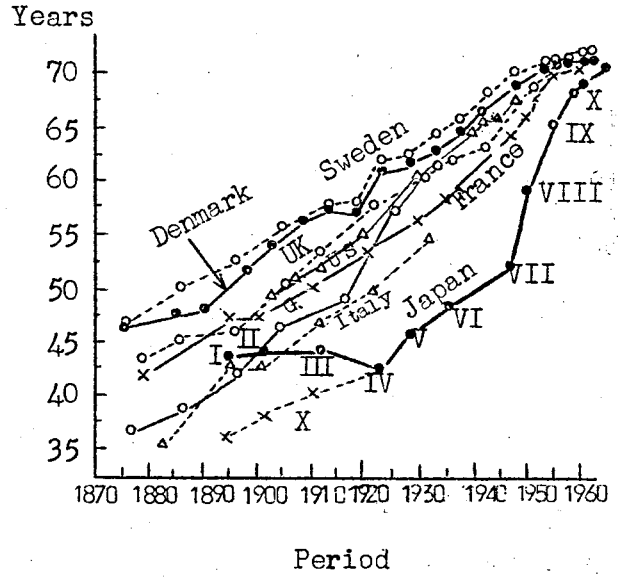
E) Present Condition, 1948 - 1964

Forward Movement for Public Health Service.

In conclusion mention will be made of some peculiarities and related problems in connection with causes of death in Japan.

CHART I

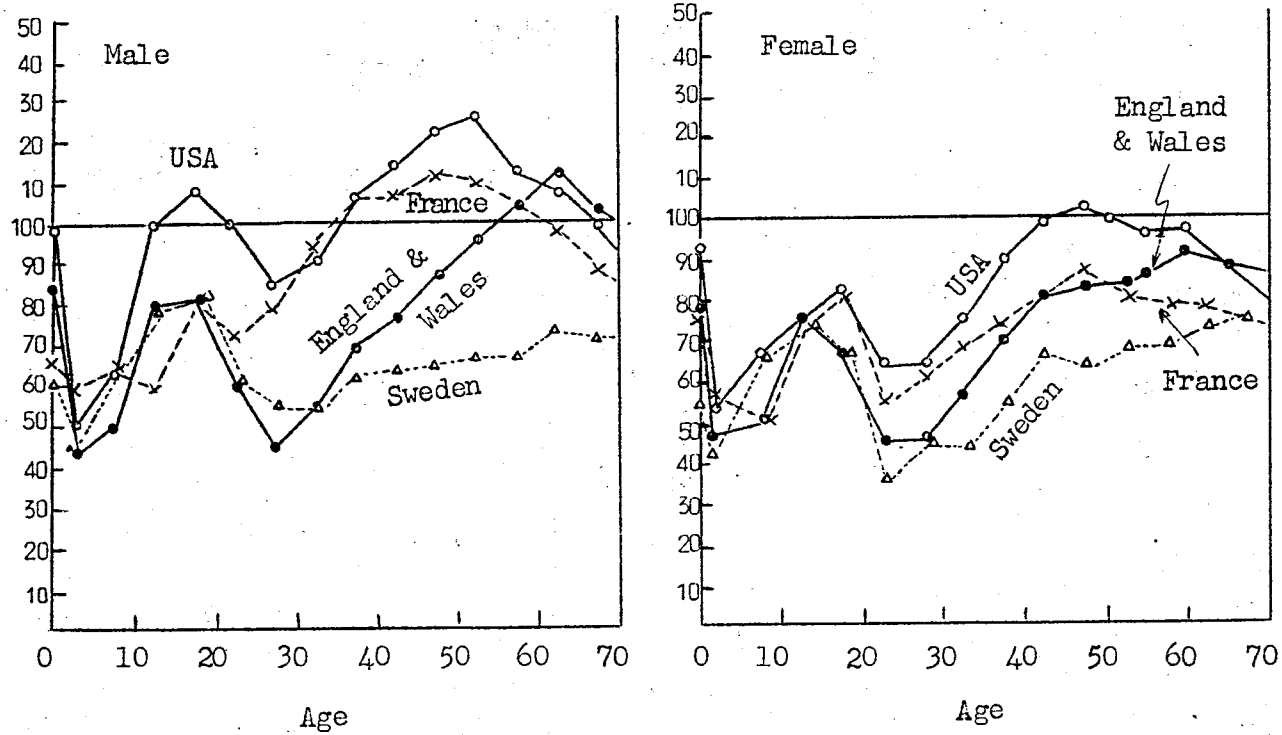
Trends in Expectation of Life
at Birth in Selected Countries
(Average value of male and female)



Note: X Corrected estimated expectation of life at birth.
Calculated by H. Mizushima

CHART II

Ratio of Death Rates in Selected Countries to Those in Japan by Age Groups



II. Public Health Prior to the Meiji Restoration, 1868

Under the Tokugawa Shogunates, measures concerning the health of the people may be regarded as having been non-existant- the value placed upon the lives of the people was perhaps less than that of a work horse, because the prolific peasants could be depended upon to supply of continuous replacements of cheap manpower. Chinese Medicine and Herbs were available but charms and exorcism were employed by the majority of the people to alleviate their ailments and to assuage their miseries.

Although the Dutch introduced Western Medicine to Japan, through the confined passage of Nagasaki, with the special permission of Tokugawa government, the applications for the people were limited to the privileged few. General knowledge of medical and sanitary measures before Meiji era was exceedingly low, and the undernourished overworked peasants were natural targets for epidemics and famine.

Tuberculosis was particularly prevalent; contageous diseases and infant mortality were extremely high. Even cholera took its toll. The length of life of the people was certainly a sensitive index to their various levels of living.

III. The Introduction of Modern Medicine, 1868 - 1900

With the fall of the Tokugawa feudal government, an overall revolutionary change occurred in Japanese social conditions.

Sweeping reforms were instituted by the Emperor Meiji; equal legal status was granted to all men and women, progressive industrial techniques were adopted and educational institutions were founded to satisfy the overwhelming thirst for western scientific knowledge. Perhaps one of the most significant achievement of the very humane Meiji was the formulation of the Medical Act in 1870. Comprising 75 articles, the new act stipulated the introduction and application of modern Western medical science; creation of a relevant medicare system for the people; the elevation of medical education; the acceleration of public health activities.

As a result, 4 medical colleges were established. Up to 1920, a total of 19 were created. Administration of Public Health Services were conducted by local offices. However, they were under the jurisdiction and supervision of the Bureau of Sanitation of the Ministry of Home Affairs. In practice, the services were hampered by insufficient facilities and personnel. Their main activities were concentrated on vaccinations and isolation of patients afflicted with contageous diseases. Official statistics on mortality rates fluctuated

due to occasional epidemic. In addition, we have good reasons to assume the death rates around 20 per thousand in that era to be higher, because of underregistration.

The numerous factories which had been hurriedly built to accomodate Japan's ever-increasing industrial potential were hotbeds of infection.

Sanitary facilities and medical care were conspicuous by their absence. Urgent and drastic measures were essential to remedy the unwholesome working conditions in the factories. In 1891, a bill to this effect was presented to the Diet. However, all efforts failed to get the bill passed. Light industries, in particular, textiles flourished after the Sino Japanese war 1895 - 1896. It may be said that tuberculosis also flourished at this time. Workers from agricultural areas contracted the disease in the extremely crowded and unsanitary factories, and in returning to their villages, carried the sickness home with them. The plight of the factory hand was indeed an unhappy one, and the struggle for public health care under unsatisfactory arrangements continued. Infant death also were very high.

IV. The Struggle for Public Health Service Phase I, 1900 - 1920

After the subsequent events of 1891 - 1905, military and

economic leaders developed ambitious tendencies for expansion of territories and industry, aiming at a strong and rich nation. However, people in urban areas still struggled to eke out an existence on sub-minimum incomes. In rural area, half of their crops were handed over as tithes to the land owners. Mortality rates remained high, an estimated 20 - 22 per thousand, up to the influenza epidemic in 1918 - 1919, with as high as 27.3 in its peak. Between 1910 - 1914, the total death rates was in average 20.7 per thousand, and that of infants 156.7. Death from preventable diseases including gastroenteritis, pneumonia and meningitis constituted over 45% of the total death, and showed almost no decline.

Campaigns were organized by the Government for the prevention and eradication of these diseases. Proposals and results of medical surveys were repeatedly presented to the government. Finally Factory Law in 1911 and Tuberculosis Prevention Law in 1919 were approved by the Diet.

At this point of Japan's medical history, medical science was considered to be on an equal level with other advanced nations. During 1914 - 18 Japan attained a phenomenal economic prosperity. Despite this, Japan had no social insurance; the budget for public health activities was extremely small; the low level of living of the people remained unchanged; and the

high mortality rates in rural areas continued. The prevailing militaristic regime was most detrimental for the advancement of social welfare.

V. The Struggle for Public Health Service, Phase II, 1920 - 1945

With the completion of the Japanese Industrial Revolution in 1920 the necessity for physically healthy manpower was recognized. This in effect, gave impetus to the creation of improved working and living conditions for the people, together with an increase in medical and public health activities. After containment of the influenza epidemic in 1921, Japan experienced for the first time, a continuous decrease in mortality rates, although to a light degree. This reduction may have been partly due to the fact that tubercular and other weak persons were carried off by the epidemic. However, increased national wealth and its resultant advantages, advanced medical knowledge, combined with the accelerated efforts of public health officers and the increased dietary intake of the people were largely responsible for the decrease in mortality rates. However, interesting enough to observe is the mortality trend from 1930 to 1943. After experiencing substantial decrease in mortality up to around 1930, the

decreasing tendency stopped and approximately the same mortality level was retained for five years. Then, in 1935, mortality rose slightly and this tendency continued up to 1940.

This almost stagnant level of mortality during 1930 to 1935 may be explained by the increase in mortality from tuberculosis for both sexes in young adult ages, particularly for males 20 - 34. And the gradual increase after 1935 is attributable to overwork in the prewar period 1935 to 1940. A slight increase were evident in all age brackets in deaths from pneumonia, dysentery and apoplexy. Under such circumstances, the Ministry of Health and Welfare was established.

In 1940 Japan instituted the rationing of rice and other staples. The effects of the rationing were surveyed by the National Institute of Public Health. Statistics show that body weight of the average adult dropped by 1 - 3 kg. and the growth of school children was considerably retarded. However, contrary to general expectations, a noticeable phenomenon was the decline of mortality in the period 1940 - 1943, namely, 16.5 in 1940, 16.0 in 1941, 16.1 in 1942, and 16.7 in 1943. For comparison, the five-year average death rate for 1935 - 1939 was 17.3. According to Table 1, death from C.V.A.(apoplexy), beri-beri, dysentery, nephritis and gastroenteritis decreased, although death from T B increased

Table 1. Trends in Death Rates for All ages from Selected Causes: 1935 - 1943

(per 100,000)

Selected causes of deaths	1935	1939	1940	1941	1942	1943	1947
Tuberculosis (B1, 2)	190.8	216.3	212.9	215.3	223.1	235.3	187.2
Typhoid fever (040) Paratyphoid fever (041)	10.8	10.2	10.3	10.1	9.3	12.9	3.8
Dysentery (B6)	23.0	34.9	30.6	22.8	19.7	17.3	12.3
Diphtheria (B8)	6.4	7.4	6.6	7.0	7.1	9.8	4.3
Malignant neoplasm (B18)	72.3	72.9	72.1	73.9	74.5	73.5	69.0
C.V.A. (B22)	160.4	183.3	177.7	174.6	173.2	166.0	129.4
Heart diseases (B25 - 27)	57.6	66.5	63.3	59.2	60.1	62.3	62.2
Pneumonia & Bronchitis (B31 - 32 B43a)	186.7	219.5	185.8	176.0	177.5	200.2	174.8
Gastroenteritis (B36, B43b)	173.2	167.9	159.2	142.8	142.0	153.2	136.8
Nephritis (B38)	80.9	82.4	76.0	69.6	70.6	68.2	57.6
Beri-beri (280)	14.5	13.4	10.0	9.3	9.2	8.1	

Cf. C.V.A. is an abbreviation of "Vascular lesion of central nervous system"

Source: Cabinet Bureau of Statistics, Statistics on Causes of Deaths of Imperial Japan.

Table 2. Trends in Age-Specific Death Rates from Tuberculosis for Females under 45

(per 100,000)

Age group	1935	1939	1940	1941	1942	1943	1947
0 -- 4	53.4	63.2	51.5	55.1	53.1	64.7	63.1
5 -- 9	49.4	50.6	45.5	41.5	38.8	39.7	42.6
10 -- 14	138.3	143.3	127.8	118.6	109.2	96.8	52.8
15 -- 19	434.7	495.7	475.8	441.0	425.4	423.8	226.8
20 -- 24	459.9	504.2	472.3	471.4	479.5	485.0	386.1
25 -- 29	344.9	304.3	376.3	368.8	381.1	397.3	342.6
30 -- 34	237.1	258.9	254.0	258.0	267.1	285.5	272.0
35 -- 39	174.7	186.4	178.4	184.2	199.0	209.8	197.3
40 -- 44	140.7	148.8	141.5	148.9	159.2	168.0	144.4

Source: See the footnote of Table 1.

Note: Death rates for female was adopted because of the less distorted population due to war.

for all ages. An age - specific analysis revealed an interesting phenomenon as Table 2 presented.

This table shows mortality caused by T B in age groups 5 - 19, where initial infections were prevalent, decreased consecutively in 1940, 1941, 1942, and 1943, while in older age groups where recrudescenses were prevalent, mortalities from T B by malnutrition increased. According to some authors, the decrease among ages 5 - 19 is explained as having been the natural result of the increased knowledge of medicine, application of preventive measures for the control of tuberculosis infection including tuberculin tests and other measures. Although it is difficult to present a concrete proof, I consider the strengthening of physical resistance against tuberculosis played a very vital role in stamping out this dread disease.

VI. Present Condition 1947 - 1964: Forward Movement in Public Health Service.

In 1947 Japan was able to reduce the high death rates to 14.6 per thousand. This figure was lower than that of 1935 when mortality marked the lowest of prewar time. This could not have been achieved in the midst of adverse living conditions, without the support and guidance of GHQ. The government struggled to reconstruct the destroyed public health systems and

facilities encouraged by the strong sense of self-preservation of the people. Mass Media of Communication contributed much.

The first step taken by the government was a nationwide survey of health conditions and efforts were made to prevent an outbreak of epidemics. DDT and other media for eradicating insects and rodents prevented typhus and cholera epidemics.

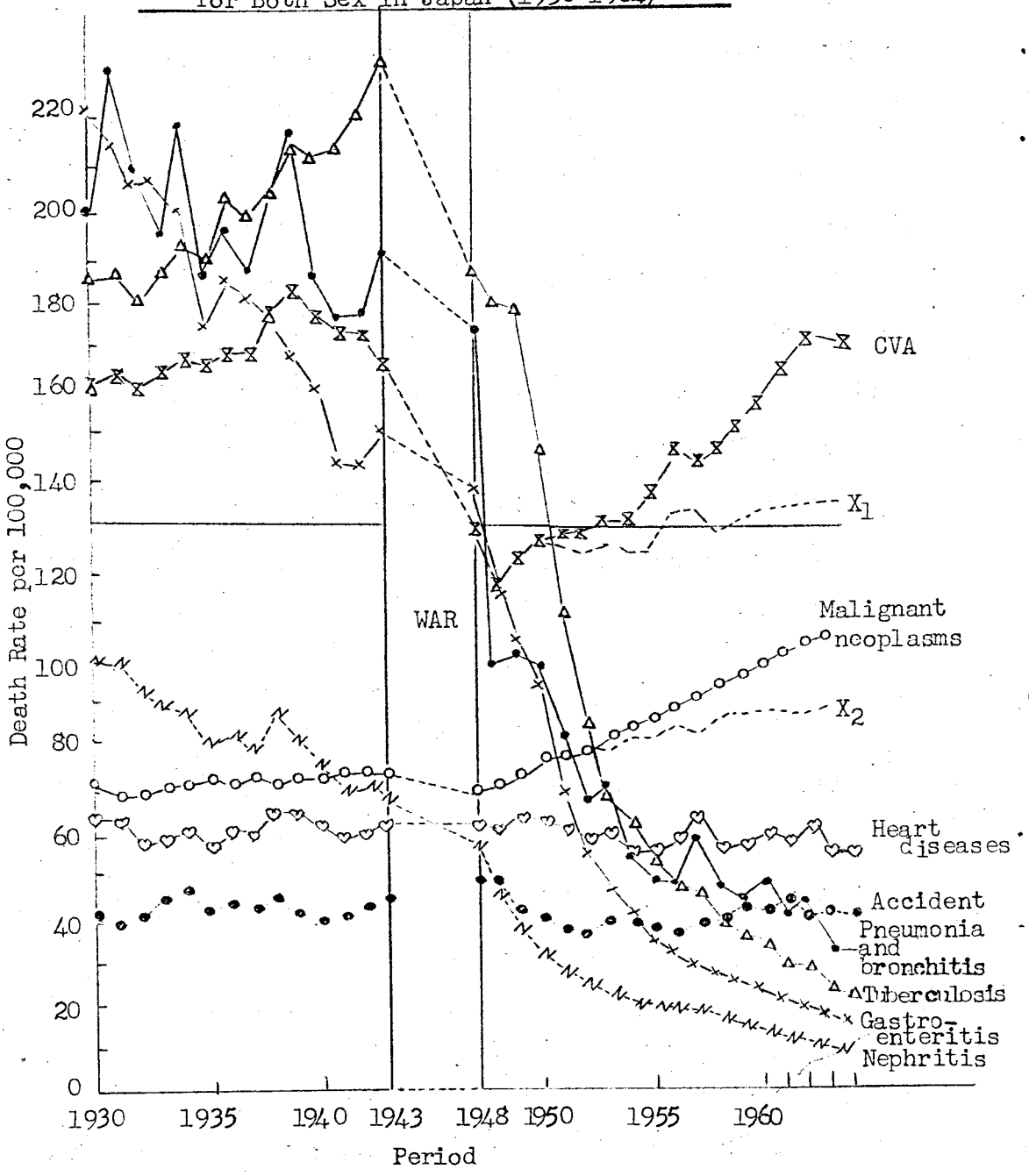
An analysis of causes of death at this time revealed that the lowered death rates from CVA, gastro-enteritis, nephritis, beri-beri, tuberculosis among youths, typhoid fever, dysentery were responsible for the over all lower rate, although deaths from tuberculosis for ages 30 and over and ulcer of the stomach for all ages increased. It is very interesting to note that this pattern is almost parallel to those in 1940, 1941, 1942, and 1943.

In 1947, many laws for public health were revised, medicare facilities and equipments were reorganized and improved, public health programs were reorganized and Health Center Laws were completely revised. Health Centers had more responsibility with authority for local programs.

It was fortunate that we were able at this critical time to have the opportunity of applying the cream of the results of revolutionary medical developments in Western countries to the whole nation through the reorganized national health insurance system and private medical practitioners.

CHART III

Trends in Death Rates from Selected Causes for Both Sex in Japan (1930-1964)



Note: X_1 and X_2 show standardrized death rates from CVA and malignant neoplasms roapectively.

With the use of penicilin the drastic drop in mortality from pneumonia, from 1947 to 1948, and with the use of streptomysin a rapid reduction from tuberculosis occured, as Chart III shows. A decrease in gastroenteritis followed.

These three diseases constituted the main causes of death in 1935, presenting 32.8 per cent of the total deaths, now only 10.0 per cent. The chart also shows three old-age diseases, CVA (apoplexy), malignant neoplasm, and heart disease are responsible for dampening the declining trend of total mortality accounting for 24.8, 15.5 and 10.0 per cent of all deaths respectively in 1964. Accidental deaths which show almost a stationary trend, also constitute 6.0 per cent.

In 1964, these four causes of death constituted 56.3 per cent of all deaths, therefore exerting great influences upon the future course of total mortality. Thus, an attempt will be made to present a brief explanation for the nature and future trend of mortality due to important causes of death.

VII. Some Remarks on Important Causes of Death

1. Vascular lesions affecting central nervous system (CVA) (apoplexy)

While heart diseases are the leading cause of death in Western countries, CVA deaths are the leading cause of death

in Japan, with the rate showing remarkably higher than that of Western countries.

This fact was rather doubted by WHO and some countries suggesting that it may be due to erroneous diagnosis on the part of physicians in Japan.

To this question, many answers have been made from Japanese doctors but so far there have been no evident proofs to negate the WHO or other suspicions. A study recently conducted by 18 universities led by Dr. S. Okinaka which summed up the three year follow-up study under a research grant of the Ministry of Education, investigating 20621 cases at 18 districts has done much to clarify this. This study pointed out that CVA death constitutes 35.8 per cent of total deaths for persons aged 40 and over. As for the question as to why CVA disease is prevalent among Japanese, Dr. H. Takahashi suggested that over-intake of rice and salt and insufficiency of calcium will explain the primary high frequency of occurence. The particular high occurence in Tohoku region in northeast of Tokyo may be in addition attributable to the existing insuitable housing of the cold climate of that region. After 1935, mortality from CVA rose a little. Followed by a apparently lowered level after the initiation of food rationing in 1940, a further decline was observed immediately after the termination of World War II,

but rose again after a few years with the improvement in national nutritional conditions. This is for all-age group combined. However, if an age-wise analysis is made, mortality for 70 years and over in the case of men and for 75 years and over in the case of women indicates a tendency of increase. Mortality for remaining younger age groups reached the highest point in 1955-60, but afterwards showing signs of gradually descending with the tendency that, the younger the age, the more the decline.

Females show a more pronounced trend of decline than males. The decline of mortality due to CVA is likely attributable to carebral haemorrhage. On the contrary, mortality owing to softing of brain may increase. According to the official death statistics, the present ratio of death due to haemorrhage to softing of brain is 3.6 : 1. We are anticipating improvements in the general health of the people and further decreases in mortality from apoplexy influenced by the developing tendencies for periodical health examinations including blood pressure tests.

2. Malignant neoplasm

Among some 30 countries where reasonable statistics are available, Japan ranks 20th for male and 26th for female, as far as mortality due to malignant neoplasms is concerned (according to Dr. M. Segi). But the mortality rate of stomach cancer shows the highest mark in the world which is only shared

by Chile. Up to 1960, the standardized death rate of stomach cancer rose somewhat but later became stationary. However, since 1960 it shows rather declining tendency which suggests a further decline in the future. Age-wise analysis shows a decrease in middle ages, but increase in old ages, the reason for which has not yet been thoroughly explained.

It is considered that mortality due to stomach cancer in Japan will further decrease along with the rationalization with respect to eating habits and with the general rise in the level of living among the Japanese people.

3. Heart disease

Heart disease as a broad group of cause of death shows a stationary trend in recent years in terms of standardized rate. In age-wide analysis, it has decreased in the age group below 60 years and it has increased more with the increase in age. Judging from some clinical studies, increased mortality due to arterisclerotic heart diseases may be responsible for this.

4. Other causes of deaths

Mortality due to ulcer of the stomach increased during World War II and immediately after it, but soon decreased with improved national nutritional conditions. Even so, the current level is substantially higher than other countries. Mortality

due to cirrhosis of the liver shows a gradual increase. Regarding suicides, the peak of the curve in the younger groups indicates uniquely high mortality. For the age groups 70 and over, Japan ranks the highest in the world.

In the past economic depression, mortality rose up to about 65 per cent, but recently it has returned to prewar level. The reason why suicide rate among youth is so high in Japan is explained partly by quick-tempered character of the people, by religious background and by the unique traditional way of life, the origin of which was traced back to the Tokugawa period. Some scholars maintained that some suicides are actually due to psychosis.

VIII. Gerontological Perspective

The challenge confronting Japanese Gerontologists is to prevent typically Japanese causes and promote a further decline in mortality from the medical and social standpoint.

This will decide the future trends in mortality of the Japanese.

Table 3 demonstrates the annual decline of mortality in geometric average percentage according to age and sex from 1950 to 1955 and from 1958 to 1963.

Column A shows the required annual average decline of

mortality expressed by geometric average percentage which would enable Japan to reach the minimum recorded world death rates of 1960, after ten years from 1963, i.e., in 1973, although they were approximately estimated.

Table 3 reveals that the decline of mortality is less in 1958 - 1963, than it was in 1950 - 1955. And the younger age, and that for female showed more pronounced decline. From the figures, we can perceive that in younger age groups, under age of 19, there may not be so much difficulty in attaining the level of the world minimum recorded death rate of 1960. However for age groups 40 and over, it may be impossible under the present conditions. Observed for all age, female shows favorable trends.

Table 4 was initially prepared to ascertain the difference between the death rates of the Japanese and the minimum recorded rates of 1960 according to age group and sex. An analysis of the ratios of several causes of death which constitute the difference of the above mentioned mortality has been made.

Preventable causes constitute over 60 per cent in age of 0 year. From this facts, further decrease of death rates can be expected.

In age 1 - 4, it will be not difficult to lower the death rates from accident of this age group to the level of Sweden,

by proper care of mothers. But in younger ages, around 20, it may be difficult but not impossible to lower the mortality due to suicide.

In adult age groups up to old age, CVA are playing a vital role, consisting of Ca. 30 - 70 and 24 - 75 per cent of the difference between those two death rates for total mortality.

It must be taken to note that T B has still an influence on reduction of mortality, while death from heart diseases has a reverse action as its rate is far lower in Japan than those of Western countries.

Therefore, if the death rates from CVA and T B are reduced and rise of mortality from heart diseases is prevented, it will be not impossible to approach to the low level maintained by Scandinavian countries in the foreseeable future.

The scientific suggestion that the heavy animal fat diet habits of European countries tends to increase the mortality from arteriosclelotic heart diseases, is rationally to be taken into due consideration in Westernizing Japan for further study of Gerontology in Japan.

Table 3. Recent Decline Rates of Mortality and Required Average Annual Decline Rates of the Japanese for the World Minimum Recorded Rates

Age	Male			Female		
	Average declining rate 1950-1955	Annual decline rate 1958-1963	A	Average declining rate 1950-1955	Annual decline rate 1958-1963	A
	%	%	%	%	%	%
Total	6.5	3.0	3.3	7.3	3.5	2.9
0	7.4	7.3	3.1	12.3	8.0	3.7
1-- 4	14.6	10.3	6.6	16.2	12.7	7.8
5-- 9	7.4	6.3	4.1	11.3	10.7	5.1
10--14	6.1	6.1	5.0	13.1	9.1	4.2
15--19	4.4	4.1	3.2	15.1	10.6	5.4
20--24	11.2	6.7	4.7	15.5	9.8	10.8
25--29	12.1	4.6	6.1	12.6	7.8	8.2
30--34	11.4	3.8	6.5	12.6	6.9	6.7
35--39	9.8	2.7	5.8	10.6	5.3	6.0
40--44	7.9	2.4	4.5	8.8	4.1	5.8
45--49	5.6	2.5	4.0	6.4	3.6	4.7
50--54	4.4	2.6	3.9	5.5	3.9	5.2
55--59	4.1	1.8	3.3	4.9	3.1	3.0
60--64	3.9	1.3	2.7	4.8	2.8	3.0
65--69	3.4	1.3	3.2	4.2	2.2	2.4
70--74	2.2	0.9	3.5	2.5	2.5	2.3

A Required annual average decline rate of mortality in 10 years, from 1963 to 1973.

Table 4. Components of Cause-of-Death Difference and that Minimum-Recorded (Per cent of

(1)	(2)	(3)	(4)	(5)	(6)
Age	Sex	Japanese death rates	Name of countries recording minimum death rates	Death rates in column (4)	Difference between columns(3) and(5)
0	M	33.6	Netherlands	18.5	15.1
	F	27.6	Sweden	14.2	13.4
1-- 4	M	2.7	Sweden	0.9	1.8
	F	2.2	Denmark	0.7	1.5
15--19	M	1.3	Netherlands	0.7	0.6
	F	0.8	Netherlands	0.3	0.5
25--29	M	2.3	Netherlands	1.0	1.3
	F	1.5	Norway	0.5	1.0
35--39	M	3.0	Netherlands	1.5	1.5
	F	2.3	Netherlands	1.0	1.3
45--49	M	6.3	Sweden	3.9	2.4
	F	4.5	Norway	2.4	2.1
55--59	M	16.8	Norway	10.9	5.9
	F	9.9	Norway	6.6	3.3
65--69	M	42.8	Norway	28.6	14.2
	F	26.7	Netherlands	18.9	7.8

Note: B 1,2 Tuberculosis
B 3-17 Other infectious diseases
B 18 Malignant neoplasm
B 22 Vascular lesions affecting central nervous system
B 25-27 Heart diseases
B 31,32 Pneumonia and bronchitis

* Insert for males and females respectively: Con- Infections of the new born -17, -20 Peculiar

between Age-Specific Death Rate in Japan
in the World, as of 1960.
Difference)

1960

(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
B 1,2	B 3-17	B 18	B 22	B 25-27	B 31, 32	B 33-37	B 38	B 45	B 46	B 47, 48	B 49
±	- 5		±	- 1	-38	-16	±	- 2	- 5	- 3	---
±	- 5		±	- 1	-37	-14	±	- 6	- 4	- 4	
- 3	-19	±	±	- 1	-17	-16	- 3	- 6	- 7	-28	---
- 4	-23	+5	±	- 2	-22	-19	- 2	- 4	- 6	-21	
- 7	- 4	+7	0	- 9	- 4	- 5	- 6	+ 1	- 8	-23	-41
- 9	- 3	- 2	- 1	-16	- 6	- 4	- 5	- 2	- 9	- 2	-42
-23	- 2	+9	- 2	- 6	- 2	- 5	- 3	- 2	- 7	-31	-36
-25	- 2	+ 1	0	- 9	- 4	- 5	- 2	+ 1	-10	- 2	-23
-35	- 2	+2	- 9	- 1	- 4	- 8	- 1	- 1	- 6	-23	- 8
-34	- 2	- 5	- 8	-14	- 5	- 6	- 5	- 3	- 6	- 4	- 7
-28	- 4	-16	-36	+13	- 3	-12	- 3	- 8	- 5	- 7	+14
-16	- 1	-15	-27	- 8	- 1	- 8	- 4	- 1	- 8	- 3	- 4
-17	±	-23	-69	+42	- 3	-14	- 3	-11	- 7	- 2	- 3
-12	- 2	+4	-55	+ 4	- 4	-10	- 3	- 1	- 6	- 4	- 4
-15	- 1	-13	-94	+73	- 9	-19	- 5	+ 5	-12	- 2	- 3
- 9	- 1	- 1	-73	+34	- 2	-13	- 6	- 5	- 9	- 1	- 5

B 33-37 Digestive diseases
B 38 Nephritis and nephrosis
B 45 Senility without mention of psychosis, ill-defined and unknown causes
B46 All other diseases
B47,48 Accidents
B 49 Suicide

genital malformation +16, +10, Injury at birth +24, +26 to infancy -50, -41.

Concluding Remarks

As pointed out previously, mortality of the Japanese has been very substantially decreased. However, there remains some unfavorable conditions for public health such as inadequate development in sewage system, overcrowdedness in housing, air pollution and public nuisances. Further, per capita income which is perhaps the most succinct summarizing index of the level of living ranks rather still low in the world.

Under such economic circumstances, nutritional intake among the Japanese people has been improved much, but is still insufficient. As far as the social security system is concerned, the national health insurance now covered the whole nation since 1963, but the pension system and other social security measures are in the initial stages.

As Dr. Irene B. Taeuber stated in The Population of Japan that, "Japan gave the first major demonstration that a reduced and even low mortality could be achieved in somewhat unfavorable environmental conditions." Certainly as stated, the mortality in Japan has reached almost the same level as in Western countries and is still continuing to decrease. Moreover those of the age groups between 40 - 65 for male, totally or partially are lower than the United States, Great Britain, and France. This fact may be worthwhile studying further.

Generally speaking, the present length of life of the Japanese may be attributable to the high level of education, traditional habits in maintaining their meticulous cleanliness in living, and wide spread of mass media of communication etc. However we are not certain that the decreasing trends in mortality of the Japanese will last long under present condition.

The betterments of public health and further developments in social security are urgently needed for the welfare and health of the people in Japan.

INTERNAL MIGRATION IN RELATION TO ECONOMIC AND SOCIAL DEVELOPMENT WITH SPECIAL REFERENCE TO JAPAN'S EXPERIENCE

Toshio KURODA

1. Introduction

This paper is intended first to review the trend and characteristics of internal migration in Japan since the end of the World War II, to generally indicate the necessity of distinguishing economic and social consequences from economic and social functions of the population transfer (when migration is to be viewed in its inter-relationships with the economic and social factors), and subsequently, to show the importance of internal migration as a factor affecting the economic and social development of the country. In the most part, economic and social implications of the population transfer indicated in this paper are drawn from the analysis of demographic as well as socio-economic trends of Japan since the end of the World War II.

2. Trend and Characteristics of Internal Migration

The post-war trend of internal migration has exhibited, albeit minor deviations, a distinctive pattern which may readily be dichotomized into the trend of the first decennial period and of the second decade when the stages of the post-war economic recovery can likewise be differentiated. In economist's dictum,

the earlier period of 1945 - 1955 may be described as the time of "economic reconstruction". The decade saw a sudden rise in the size of rural population, especially at the onset of the period, as a result of repatriation and demobilization of personnel originally drawn from the rural regions. However, the heavy concentration of population in rural areas was somewhat transient as it soon began to disperse and at the same time the process of economic reconstruction and subsequent urbanization gradually progressed.

In 1947 - 1955, the rate of population growth was relatively stagnant at 14.3 per cent for the entire country. On the other hand, the corresponding rate for the six major cities was as high as 53.7 per cent. From the view point of the population size of these cities, however, the rapid increase of population thus observed was just enough to restore the population size of these cities to its pre-war magnitude.

The economically active population in the primary industries continued to increase immediately after the end of the war and stood approximately at 18 million in 1947, which, however, fell to about 16 million in 1955. Thus, the majority of the balance of 2 million once engaged in the primay industries and resided in rural areas had migrated

out to other industries in urban areas.

The second decade of 1955 - 1965 was the time of rapid economic expansion when, among other things, the exodus of agricultural population out to urban non-agricultural regions was noticeable. The economically active population of 16 million estimated for the primary industries in 1955 decreased to 14 million by 1960 (according to the result of the census enumerations in 1960) which further declined to 11 million by 1965 (according to the result of the labor force survey). To reflect the effect of large population movements, the urban population rose considerably and amounted to as much as 68.1 per cent of the population of the entire country in 1965. As per cent of the total population of the country, the population of the six metropolitan areas increased from 15.9 per cent in 1955 to 18.0 in 1960 and further to 18.6 in 1965.

Some characteristic changes of internal migration began to be noticed in the early 1960's. The most noticeable pertained to the aggregate volume of migratory movements, which was mated at about 5 million per annum on the average in the late 1950's. In 1961, it was approximately 6 million per annum. In 1964, however, it was more than 7 million, according to the report based on the registration system under the "Inhabitant Registration Law." Another change noted was with regard to

areas to which the flow of migratory movements was once directed and which once comprised mainly of so-called "large cities". In recent years, the migratory movements have mainly been directed toward the metropolitan agglomerations. Thus, for example, the net migration has been almost negligible for the Tokyo proper and has been negative for the Osaka proper. The metropolitan agglomerations have taken their prominence, however. Thus, for example, the Tokyo Metropolitan Area, which includes areas peripheral to the Tokyo proper but administratively belonging to the three adjacent prefectures, has been absorbing, on the average, approximately 400,000 migrants every year.

Owing to the voluminous population transfer mentioned above, the areas of Japan have become considerably polarized into areas of either increasing or decreasing population. The areas of decreasing population have largely been the administrative units of "towns" and "villages", which are more abundant in rural agricultural areas. Comparison of the results of the 1965 population census with those of 1960 indicates that as much as 83 per cent of "towns" and "villages" had then become a part of the areas of decreasing population. In the absence of drastically heterogeneous other demographic trends among different regions, the unprecedented pattern of population

distribution recently observed has obviously been the result of active migration.

If the phenomenon of migration has certain economic and so social incentives on the part of migrants, for which the evidence has amply been indicated in a number of pertinent studies, the migratory movements undoubtedly are closely correlated with socio-economic structure and developmental stage in areas of origin and destination, and, consequently, such movements have vital consequences on the growth and changes of economic and social environments. Thus, for example, the common fact that migrants are generally single or migrate individually rather than collectively reflects social institutions, land system and the like in rural area, and employment, wage system and so on in urban area. Simultaneously it has definite economic and social implications for areas of "sending" as well as "receiving" migrants.

3. Functions and Impacts of Internal Migration

It is a matter of general agreement among the students of demography that migration is a necessary element for the population adjustment and equilibrium, which functions as a means to bring about personal as well as socio-economic adaptations in whatever environments may be confronted. Within the context of the Japanese experience so far described, it is also important to note that the dynamic flow of migration has caused multiple

socio-economic difficulties, both in urban and rural regions of the country. The problems that are common to the urban regions are housing shortage, traffic congestions, insufficient public health and welfare facilities, geographic allocation for growing industries, etc. The problems that plague large cities such as Tokyo and Osaka have particularly been of prime magnitude. The socio-economic maladjustments that are not uncommon in the rural regions of the country are various problems that result from the trend of de-population in general but particularly from the shortage of young adults. Because of the shortage and even the lack of human resources, the rural societies have not sufficiently developed the system of community administration along with the rest of the country.

These kinds of social and economic troubles both in urban and rural areas directly caused by rapid migration movements incline people to take some measures to check migration. This mistakes the means for the end. Various problems and troubles which appear due to heavy migration are inescapably transitional one that should be tackled differently.

It is of great importance to note that a new order of society and economy generally emerges through the vigorous population transfer and replacement. In this sense, what is prerequisite to the success of whatever regional development

program is to accurately understand consequences of population trends, of which migration is one of the basic ingredients for economic and social changes. When migration thus accumulates certain momentum, with or without the concurrent force of other demographic variables, it may generate sufficient influences on the economic and social order of any communities. This is what has recently taken place in Japan.

Internal migration is essentially a movement to equalize a regional disparity with respect to the level of living. If indeed this has been and will be the case for Japan and if the growth of economy goes on at the present rate of about more than 10 per cent per annum, it is certainly expected that the migratory flow into the regions of advanced industrialization will continue. However, it is anticipated that some factors may function to deter the future flow of internal migration. For example, a considerable decrease among the mobile population of young ages is expected to take place in near future. According to the latest population projections, it is anticipated that the population aged 15 - 19 years will begin to shrink after reaching its peak in 1965 and that the population aged 20 - 24 years will attain its maximum in 1970 and then progressively decline thereafter. The labor force newly supplied by the entries of those aged 15 - 19 years may also be affected by

yet another factor of the strong tendency for young people to attain higher education and to put off the matter of employment until later. As much as 70 per cent of those aged 15 - 19 years attended schools at the secondary level, in 1965.

A fast decrease of the young population implies that the gross migration rate will be lowered. The high rate of economic growth, which has been in the order of 13 per cent per annum since 1955 and has stimulated the active migratory movements since then, is no longer anticipated to continue into future.

Further analysis may be necessary when the prospects of internal migration are to be considered, for some urban regions of the country may contain adequate qualifications to attract future migration. Large cities with the population of more than 500,000 but located far from the agglomerations of Tokyo, Osaka, and Nagoya have shown considerable development in recent years. Sapporo (in Hokkaido), Sendai (in Tohoku Region), Hiroshima (Chugoku Region), and Fukuoka (in Kyushu) are the cities in this category, all of which had registered a substantial population gain during the latest censal period. The factors underlying this growth are, 1) rapid improvement and expansion of the transportation facilities to utilize more effectively the local manpower, 2) relocation of industrial

plants out from the metropolis of Tokyo or of Osaka to regional cities, and 3) awareness on the part of non-metropolitan population of the ills of the super-cities, all of which have altered, if not definitively, the direction of internal migration.

Nevertheless, it must be admitted that the three major metropolitan areas of Tokyo, Osaka, and Nagoya have the potentials to further attract and absorb migrant manpower from less economically and socially developed rural areas at a nearly constant rate of migration.

4. Internal Migration and Social Development

The 1965 Labor Force Survey disclosed that the economically active population in agriculture and forestry numbered 11.5 million in 1965, which was approximately one-fourth of the aggregate labor force of the country. In comparison with the corresponding proportion in the United States, the United Kingdom, and West Germany, this proportion is still considerably higher. If the productiveity in agriculture continues to rise at what is considered a normal rate and if a large surplus population in agricultural regions can be maintained at the present level, it is expected that the requisite manpower can still be drawn from these regions for the even higher industrial development. This type of manpower recruitment is not necessarily

without difficulty, however. Social institutions such as family succession, psychological attachment to ancestral residence as well as lands, etc., are still dominant among those of middle and older ages in such regions.

The questions concerning the employment systems and wages for workers in industrial, urban regions are still unfavourable for families to migrate.

The present outlook for the manpower supply is the one of limitation, in view of the fact that the de-population trend is anticipated for those of economically productive ages. Thus, the only channel through which the future labor force might be expanded rests in the increase of the rate of economic participation but admittantly the margin of un-used labor is slim at the same time.

If the manpower supply will considerably be limited quantitatively against the continuance of strong manpower demand, the alternatives to compensate the acute shortage be to explore areas of the so-called human development, or, in other words, the quality improvement of population along the line of social development such as higher education, sufficient nutrition, re-training within private enterprises, etc. The social development thus may aid in improving human ability which, in turn, may contribute to the lessening of the deficit

of manpower.

At the same time, measures should be taken to institute and promote policies for a higher mobility of manpower, either as part of the program of social development or independently, which when effectively applied should make the optimum utilization of available manpower a reasonable possibility. Some points to be considered in connection with such policies for the country are, 1) governmental as well as non-governmental measures to promote family migration to make the migratory movements more permanent than seasonal, by providing better opportunities for housing, wages, and employment in general, 2) advancement of certain liquidity policies for the land under cultivation for the purpose of not only promoting out-migration of the agricultural population but also modernizing agriculture in general, and 3) improvement of the existing systems concerning employment, wages, and employment exchange, so as to make possible a maximum utilization of workers with specific qualifications.

5. Internal Migration and Economic Development

The increase of labor force is a basic factor that underlies the expansion of regional activities. When requisite manpower can not be supplied from the regional population alone, it must necessarily be supplemented with the migrant manpower.

So long as various measures mentioned above in connection with the social development program provoke desirable consequences and see effective increase in migratory movements, there should follow a definite relationship between the social and economic development, to which migration will be a contributing factor.

The fact that a certain area suffers the trend of de-population because of heavy out-migration explicitly reflects the existence of mitigating heterogeneous levels of living standard among various regions. However, small communities where the trend of heavy out-migration hinders their administrative as well as other community functions are influenced rather by the so-called "backwash" effects of the processes of economic development that may be taking place in other areas.

During the latest inter-censal perios of 1960 - 1965, the majority of small cities and towns followed the de-population trend. From the point of view of the regional development, it may be necessary to reclassify the administrative boundaries and subsequently integrate such cities and towns into larger metropolitan areas. Furthermore, the program of economic development should fully take account of aspects of the social development of internal migration.

What is most pertinent of internal migration implied in Japan's post-war experience at least pertains to its dual characteristics in that it is basically motivated by economic

and social changes and that it gives rise to the new regime of society and economy.

SUMMARY OF COMMENT ON "THE NATURAL ASSOCIATION OF POPULATION CHANGE IN DEVELOPMENT WITH SPECIAL REFERENCE TO JAPAN"

Minoru TACHI

Dr. Irene B. Taeuber has drawn beautifully the whole picture of this topic in her well-known book, titled "The Population of Japan", and my colleagues presented papers on some facets on this topic at this Symposium.

First, in Japan, the contact with the modern western culture started in the early part of the nineteenth century, but the fundamental policy toward modernization to introduce a western industrial revolution was decided by the Restoration Government which was established in 1868. At that stage of a premodern society, Japan had already a very large and densely inhabited population. Before that time, Japan's population had been stagnant for more than a hundred years, due to the factors of delayed marriage, induced abortion, infanticide, and such disasters as severe famines. This is further explained by the continuation of feudal society for more than three centuries during which Japan's economy and technology were not able to support the population more than the level actually maintained.

At that time, despite the fact that the population was already large and dense, resources were very poor, social organization was traditional, sciences and technology were not developed, capital accumulation was meager. Under these rather unfavorable conditions for economic development, Japan had to make preparation of so called "economic take-off", or more broadly speaking, modernization. Only one favorable condition was a low population increase rate continued from the feudal age. The Restoration Government, on the one hand, made all efforts to import western sciences and technology, and on the other hand, to levy tax, particularly land tax upon the agricultural sector of population as far as it was possible, to establish model government establishments with modern facilities.

The precondition period for the "economic take-off" under the national economic development programs lasted 1872 to the 1890's. Attention should be paid to the fact that during this period, the population increase rate was very low, that is, annual average increase rate was around 0.5%, in relation to the fairly high economic growth rate, at the same time, according to the best estimate, it amounted to around 4% annually. Therefore, economic growth rate was around 7 to 8

times of the population growth rate.

I would like to raise a very simple but important question what is the ratio between economic growth rate and population growth rate which is necessary at minimum to enable preparation for "economic take-off", within tolerable length of time. Main approach to this question is of two types. One type is an empirical or historical method, that is to study the experiences of highly developed countries. The other type of approach is an analytic method by constructing economic model. I am now studing this topic in cooperation with Mr. Yoichi Okazaki who is expected to make a comment later on education programs. Though we have not yet reached a final conclusion, roughly I may say that 4 to 5 as the ratio of economic growth rate to population growth rate is indispensable at minimum in order to complete preparation for "economic take-off" within tolerable length of time.

Japan's economic take-off started out in the 1890's. In this period, mortality rate was slowly declining as Prof. Sadamu Watanabe pointed out at the last session of mortality. Since the level of living went up gradually, and the number of cases of induced abortions decreased, birth rate indicated

a slow upward trend until the sign of demographic transition became evident around 1910. It is, however, estimated that crude birth rate has not exceeded the level of 37 per thousand, and natural increase rate has not been beyond the level of 15 per thousand, mainly due to the slow decline in death rate.

Second, I would like to call your attention to the fact that the sign of demographic transition appeared around 1900. However, before World War II, during a half of a century, demographic transition went on very slowly as Mr. Masao Ueda pointed out in his paper, at the 1st session of this Symposium.

Japan grafted western culture onto the traditional one. Therefore, she has had "dual" economic and social structures. The part of economic sturcture which was grafted has been developed, but traditional part of the structure remained relatively unchanged. I understand that this is one of the most important reasons why the speed of demographic transition in Japan has been slow.

In this connexion, I would like to point out that in the national development programs, first and foremost priority was placed on economic development and the aspect of social

development has been much less emphasized and paid attention which has caused a serious imbalance between two sides of development programming.

Third, after World War II, the rapid population change which has never been experienced in western countries is going on, along with the rapid economic growth and social reformation. This rapid population change accompanies the transformation in family structure from joint to nuclear-oriented type. This point will be further mentioned by Dr. Shigemi Kono, later in this section; a spectacular scale of internal migration taking place in post-war Japan which was mentioned by Mr. Toshio Kuroda at the last section of migration.

The demographic change has caused and will further push the change in age-distribution of population, and this promotes, in turn, modernization of the economic and social structure.

Finally, in view of Japan's experiences, I may say that to keep balance between population growth and economic development is basically important in order to prepare the economic take-off, within tolerable length of time. In this connexion, I may say that positive population policy, if it is necessary,

must be set up hand in hand with the economic and social development programs.

Needless to say that the experiences as such in Japan cannot be transplanted directly on other countries, I am sure, however, that the lessons learned from Japan might be of some use for other countries in the Pacific as Madame Chairman has mentioned in this Symposium and elsewhere.

POPULATION, EDUCATION AND ECONOMIC DEVELOPMENT

Yoichi OKAZAKI

I

Among the factors which promoted the amazingly rapid modernization process of Japan, the importance of an invisible factor, education, has particularly drawn attention recently. Already at the Meiji Restoration in 1868, the starting point of modernization, the level of education in the public was considerably high, because the continuance of peace over two hundred years under the Tokugawa regime contributed to improve the level of culture in general and spread the education on the populace. Moreover the new Meiji government decided to place special emphasis on the education as a part of modernization policies, under impetus from the advanced countries which were adopting social welfare programmes including education. Early in 1872, the fifth year from the Restoration, the government published an official idea on a new education system on which a system of various grades of school should have been developed later.

The development of education proceeded, corresponding to requirements from the economic and social conditions. Three stages are identified in this process. In the first stage, the expansion of primary and higher education were carried out.

As for the primary education, its expansion was required in order to raise the intellectual level of the masses and to form the basic condition in human side for industrialization. In spite of the fact that the school fee even in the primary school was charged until 1900, the percentage of school attendance increased swiftly from 28 per cent in 1873 to over 50 per cent in 1883 and over 80 per cent in 1900. The purpose of the higher education was the training of leaders who worked mainly in the government. An important feature in higher education was that the students were not limited to the special social class but a considerable part of them were from the common people. It was opened to everyone who had an intellectual ability as leaders, without distinction of social classes. The following table is one of evidences.

THE STUDENT DISTRIBUTION BY THEIR SOCIAL CLASSES IN TOKYO UNIVERSITY

Year	Nobility	Ex-military	Commoner	Total
1878	0.6%	73.9%	25.5%	100%
1880	0.9	73.6	25.5	100
1882	0.1	49.1	50.8	100
1884	0.2	50.2	49.6	100

Source: Ministry of Education, The Growth of Japan and Education - Development of Education and Growth of Economy-, 1962, p.35.

The second stage of educational development was the expansion of the secondary education. From about 1895 Japanese economy entered into the new stage of development, so-called the period of industrial revolution. Spinning machinery took the place of handlooms, factory production took the place of handicraft production. Corresponding to this transformation, the tranining system of workers must have shifted from apprentice to technical and business school system. Thus boy's middle schools, girl's middle schools, vocational schools and techinical continuation schools were established in this period. The secondary education spread swiftly thereafter. The percentages of entrance into the secondary school from the primary school increased from 4 per cent in 1895 to 12 per cent in 1910, 16 per cent in 1920, 25 per cent in 1940. After the Second World War, the education system was reformed, then the lower secondary education has been included in the compulsory education. The percentage of entrance into the upper secondary school - the high school in the new education system - was 43 per cent in 1950, 58 per cent in 1960 and 71 per cent ir 1965.

The third stage of educational development was the extension of higher education. The number of students in higher education had not increased for a quarter of century after the Restoration until about 1900, but it began to

increase thereafter. It was a reflection of the expansion of demand for technical experts mainly in manufacturing. Especially after the First World War, a combined effect of the marked development of industrial production which produced the demand for educated technical experts and the improvement of level of living which prepared sufficient economic ground to receive the higher education, brought considerable increase of students in higher education. This tendency continues until now, with the exception that there was some stagnation in the period of 1927 - 35 economic recession.

In short, the education in Japan has been reasonably developed, in accordance with the development of Japanese economy. As the result of it, the quality of productive population in terms of their school career improved as it is shown in the following table.

PROPORTION OF PRODUCTIVE POPULATION BY THEIR SCHOOLCAREER

Year	Not Attendance	Primary School	Secondary School	Higher School	Total
1895	84.1%	15.6%	0.2%	0.1%	100%
1905	57.3	41.6	0.6	0.2	100
1925	20.0	74.3	4.9	0.8	100
1935	7.1	82.1	9.2	1.6	100
1950	2.3	78.5	15.8	3.4	100
1960	0.5	63.9	30.1	5.5	100

Source: Ministry of Education, op. cit., p. 58

II

Annual official expenditure for education calculated in constant price at 1960 was about ten billion yen in 1885. It increased up to twenty-four billion yen in 1900, but it rather decreased during five years from 1900 to 1905 due to the pressure of the war expense expansion. Thereafter it increased sharply again up to forty-five billion yen in 1910. But there was a stagnation during the period of the First World War. From 1920 to 1935, however, it almost tripled from fifty-three billion yen to one hundred sixty-seven billion yen. Although it extremely dropped during the Second World War, it recovered to the pre-war level by 1950 and it has been increasing smoothly thereafter. In short, the official expenditure for education has remarkably enlarged in a long term, although the war expenses sometimes interrupted it.

The relative magnitude of official educational expenses, the proportion of it to the national income has steadily risen from 1.8 per cent in 1885 to 5.2 per cent in 1960, except the war times when it dropped. However the expenditure for education has not so markedly increased recently, relative to high economic growth, so that the proportion of educational expenses to the national income has been stagnant or even declining. The share of the expenses for primary education in the total

educational expenses has declined in the long run from the Meiji era and, on the contrary, the share of that for secondary and higher education has risen. Especially the share of secondary education expenses has markedly risen. It was only 2.8 per cent in 1885 but it increased to 16.5 per cent in 1900 and to 20.1 per cent in 1925. Because the middle school has been included in the compulsory education after World War II, the share increased to 46.2 per cent in 1950 and to 48.1 per cent in 1964. The share of higher education expenses has not so largely increased as that of secondary education expenses. It maintained the level of 10 per cent through the Meiji era until 1920, but it increased to 14.6 per cent in 1925 by the influence of expansion of higher education at the late Taisho era. However, it decreased after the Second World War, because more emphasis was placed in the secondary education rather than in the higher education. The amount of expense per student seems to be a kind of measure of the quality of education. In the primary education, it, in the constant price, doubled during 1890 - 1920, and increased more than four times during 1920 - 1960. In the secondary education, it maintained the almost constant level during the pre-war period, but it increased during the post-war period. For example, it doubled during 1950 - 1960. In the higher education, it increased considerably

in the period of Taisho era, when the higher education was especially expanded, but at present it is definitely below than the pre-war level. One of the reason of it is in the fact that university education has been popularized and the number of university students sharply increased after the war.

III

The fact that the diffusion of education has, in general, a positive economic effect is unquestionable. Also the causal relationship between education and economic development is clear. That is, education has an economic effect upon the technical training of political and economic administrators, also upon the imporovement of quality and ability of the masses to contribute the productive activity as ordinary works. It is difficult, however, to measure quantitatively the effect of education. Several methods have been devised. Dr. T.W. Schultz's method[☆] is one of them and it was utilized in White Paper of Education 1962 by the Ministry of Education. Schultz calculated the contribution of education for the increase of national income during the period from 1929 to 1957 in the United States, as 33% of total national income increase. The author of the above-stated White Paper of Education in Japan applied Schultz's method to the case of

☆T.W. Schultz, Education and Economic Growth - Social Forces Influencing American Education, 1961

Japan in the period from 1930 to 1955, obtained the result of 25 percent. Multiple regression analysis can be applied to measure separately the relative degree of economic effects of productive factors, labor force, material capital stock and educational capital stock. Basic data are presented in the next Table. According to these data, real national income

TIME SERIES OF NATIONAL INCOME, LABOR FORCE, MATERIAL CAPITAL AND EDUCATIONAL CAPITAL

	National Income		Labor Force		Material Capital		Educational Capital	
Year	billion yen	index	million	index	billion yen	index	billion yen	index
1905	1,210	100	25.6	100	5,800	100	310	100
1910	1,559	129	26.2	102	8,000	138	470	152
1913	2,045	169	26.4	103	8,600	148	590	188
1917	2,035	168	26.6	104	8,500	147	730	236
1919	2,761	228	26.6	104	10,100	174	810	260
1924	3,026	250	28.2	110	17,600	304	1,100	367
1930	4,054	335	29.3	115	23,100	398	1,860	600
1935	5,234	433	31.4	123	25,900	447	2,560	831
1955	7,189	594	39.2	153	21,700	374	5,380	1,731
1960	11,822	979	43.7	171	39,800	686	7,110	2,286

Note: Real value at constant price in 1960.

Source: Ministry of Education, The Growth of Japan and Education, 1962, p.11

grew by about ten times, during the period from 1905 to 1960 the volume of labor force increased by one point seven times, material capital stock by about seven times and educational capital stock by about twenty-three times. Educational stock here is the accumulated educational investment embodied in the labor force. The estimation of an equation $Y=A \cdot L^{\alpha} \cdot K^{\beta} \cdot E^{\gamma}$ by least square method is $Y=2.9830 \cdot L^{0.3333} \cdot K^{0.3333} \cdot E^{0.4290}$. Here notation Y means real national income, L, labor force, K, material capital stock and E, educational capital stock. Thus the income elasticities of labor force and material capital are both 0.3333 and that of educational capital is 0.4290. Therefore, it can be said that the ecnomic effect of education was larger than that of other factors.

IV

As the development level and structure of the national economy change, the requirement for the level and quality of education of the labor force naturally changes. As an example of it, the relation between occupation and educational career, and also the rate of growth of employment by occupation are presented in the following table. In this table, a feature of recent economic growth is noticed, that is, the growth of the employment in occupations which require high level of education

is larger than the other kinds of employment. This tendency, in cooperation with the advancement of educational structure of employees in each occupation, brings a result that more educated labor force will be largely demanded in future.

On the other hand, the supply of educated persons increases as the level of living improves. An evidence of it is the fact that the rate of entrance into school of higher grade is rising with economic development. For example, as already indicated, the school enrollment ratio in senior high to the graduates of junior high school has risen from 51.5 percent in 1955, 57.5 percent 1960 and 70.6 percent 1965. Also the enrollment ratio in college has risen 18.4 percent in 1955, 17.2 percent in 1960, and 25.4 percent in 1965. The same relationship between the level of education and the economic level of living can be seen in the regional cross-sectional analysis. For example, the enrollment ratio in senior high school in 1965 is 86.8 percent in Tokyo Prefecture, the most advanced region. In contrast, it is 54.3 percent in Aomori Prefecture, one of the most backward regions. The primary and junior high education is included in the compulsory education under the present system. The enrollment ratio in compulsory schools has already reached 100 percent. Moreover, in the main, the enrollment ratio in schools of higher grade has recently been considerably high

and is increasing rapidly.

In these points, the education of Japan is satisfactory. However, there remain some points which are to be set up as the targets of educational development programmes.

First, although the junior high education is already at a favorable situation in our country, the diffusion and repletion of senior high education is still a problem to solve. According to a series of projections, the number of graduates from junior high school who will not be educated in senior high school is estimated about 250 thousand in 1970. In this connection, the number of students who are educated in senior high school is 1.7 million in 1965 and it will be 1.2 million in 1970 according to the same series of projections. In spite of the increasing trend of enrollment ratio in senior high school going up to 75 percent in 1970, the number of students in it will largely decrease, because the number of births has been reduced sharply since 1950.

Secondly, by the influences of the drastic demographic revolution after the War and the recent decline in labor force participation rate, the volume of labor force, especially young labor force has rapidly been decreasing in recent years and will be so in the near future. Therefore, it is

necessary to raise the labor productivity in order to maintain the high rate of economic growth in future. From this point of view, advisable is the intensification of education which serves to improve the quality of labor force and especially to train technical experts.

Thirdly, the number of students who will be in higher education is projected as to increase suddenly in 1966, then to maintain almost constant level until 1969 and to decrease slowly thereafter. As it was mentioned before, the expense per student in the higher education is already below than the pre-war level. Therefore, it must be the target of program not to reduce the quality of higher education, but rather to raise it in the future, confronting the increasing tendency of the number of students.

PROPORTIONS OF EMPLOYEES BY THEIR SCHOOL CAREER IN 1960

	Total	Primary Education	Secondary Education	Higher Education	Others	Rate of increase 1955-60	Rate of increase 1959-64
	%	%	%	%	%	%	%
Professional and technical workers	100.0	14.1	32.3	52.4	1.3	13.3	8.5
Managers and officials	100.0	33.4	34.8	31.8	-	20.9	37.3
Clerical and related workers	100.0	23.4	58.6	16.8	1.1	41.1	35.0
Sales workers	100.0	60.3	32.5	5.9	1.4	10.3	3.6
Farmers, lumbermen and fishermen	100.0	86.0	10.9	0.5	2.6	-10.2	-17.2
Workers in mining and quarrying occupations	100.0	86.9	10.9	1.3	0.9	5.5	-40.5
Workers in transport and communication ocuupations	100.0	68.1	28.1	2.3	0.4	32.1	73.1
Craftmen, production process workers and labourer	100.0	79.6	17.2	1.8	1.4	32.2	18.2
Service workers	100.0	72.3	24.3	2.5	0.8	18.7	21.0
Unclassified	100.0	59.7	29.8	3.5	7.1	-	-

Source: Bureau of the Census, 1960 Population Census of Japan and Labor Force Servey

POPULATION AND HOUSEHOLD PROJECTIONS FOR THE DEVELOPMENT PROGRAMMING IN JAPAN

Shigemi KONO

1. Introduction

The rapid urbanization and metroplitanization of Japan's population and the social and ecnomic implications of this development have increasingly become the focus of multi-disciplinary research and discussions. In the first half of the 1960's, the urban-ward tide of migration has continued on a spectacular scale. The impact of internal migration and population redistribution on the social and economic spheres of life among the Japanese people is immense and far-reaching. Internal migration certainly plays important functions of equalizing regional disparities in economic opportunities, thus promoting better allocation and use of manpower and human faculties than otherwise and increasing eventually the level of living in both areas of sending and receiving migration. On the other hand, however, the rapid and heavy concentration of the population in narrow territories of metropolitan cities creates many serious problems which we can immediately reckon such as shortage of proper dwelling houses, over-congestion in commuting trains, traffic jams, shortage of good schools, insufficiency of sewage disposal, air pollution, etc., on the

side of urban areas, and depopulation, abandonment of agriculture, abnormal population composition lacking young and middle-aged labor force, the fall of familism, etc., on the side of rural areas.

In view of the current status of accelerated metropolitan-ward migration, the Japanese Government has already undertaken to substantiate programs of building up regional industrial centers and of renewing urban residential areas. The latter programs are based on the government's matter-of-fact approach to the so-called urban "overconcentration" of population in Tokyo and Osaka in relation to their living space and facilities, more or less realistically admitting the continuation of mass in-migration of population to those great cities in the near future. In this regard, the population and household projections are now most badly needed for establishing far-sighted and appropriate policies on population, manpower, and industry redistribution in relation to regional economic development. The population and household projections, if properly made, are to be important tools not only for furnishing the future demographic potentials and direction of future movement but also for contributing to the integration of plans for social and economic development.

In Japan, the Institute of Population Problems, has long

assumed the task of producing population and household projections. Recently four sets of official population projections have been worked out in 1955, 1957, 1960 and 1964 by the conventional component method (cohort survival methods).[1/] Both in 1963 and in 1965, important additions were made to the population projections, showing future population projections by 46 prefectures.[2/] In this series of prefecture-wise projections, the national totals are kept the same as prepared in 1964. At the same time, two different sets of household projections have been calculated so far provisionally by combining future population projections by sex, age and marital status with sex-age and marital-status specific household headship rates.[3/] In July 1966, computations have been completed to indicate future number of households for each of 46 prefectures.

1/ Institute of Population Problems, Ministry of Health and Welfare, Japan, "Future Population Estimates for Japan by Sex and Age", Jinko Mondai Kenkyu, No. 62 (December 1955); Future Population Estimates for Japan, 1955-2015, Institute of Population Problems Series, No. 118 (1957), No. 138 (1960), and No. 159 (1964).

2/ Institute of Population Problems, Ministry of Health and Welfare, Future Population Estimates by Prefectures, Japan for 1965 and 1960, Institute of Population Problems Research Series, No. 154, May 10, 1963; Future Population Estimates by Prefectures, Japan: 1965-1955, Estimated in October, Institute of Population Problems Research Series, No. 164, July 1, 1965.

3/ Shigemi Kono, "Wagakuni Setaisu no Shorai Suikei Ichi-Shisan" ("Household Projections for Japan, 1960 to 1975"), Jinko Mondai Kenkyu, No. 83, pp.1 - 13.

2. Population Projections

Unlike many other countries in the ECAFE region, Japan's detailed and accurate statistics provide great easiness for directly performing population projections, for one need not go into complicated and time-consuming processes of correcting and adjusting basic data of age-wise population, age-specific fertility and mortality rates, which population projections rely upon.

The methodology of the national population projections for Japan is the conventional cohort survival method in combination with future estimates of age-specific fertility and mortality rates as prepared elswhere, except that the future target levels of fertility and mortality are aimed at by blending compositely or taking into consideration of their historical trends of fertility and mortality experienced in the western European countries. In 1965, an attempt was made for the second time to obtain prefecture-wise population projections employing somewhat simple methodology. In this series of projections, several alternative sets of projections were derived from the application of two different sets of methods to each prefecture. Those several alternative values of projection were compared with each other and then the "maximum" and "minimum" values were determined. Averaging the maximum and

minimum projection figures yields the "medium" value of future population for each prefecture.

(1) The first method is of mathematical extrapolation of the aggregate population size of prefecture by employing the concept of population growth cycle which consists of five major stages. Five stages repsectively correspond to the five different types of prefectures concerning their current status of population growth potentials. Type A includes the nuclear prefectures of metropolitan areas characterized by continuous growth but with the gradually diminishing rate of increase in the future. Type B indicates the prefectures currently most rapidly expanding and having a strong likelihood to sustain this rapid increase in the future. Those prefectures generally adjoin a nuclear prefecture within a metropolitan area. Type C is of the prefectures with intermediate character between industrial and agricultural prefectures recently experiencing transition from the status of decelerating population decrease to that of population increase. Type D contains the prefectures showing sustained population decrease. Finally Type E are the prefectures characterized by high birth rate but a small volume of net out-migration w ich may, however, face in the near future population decrease with the likelihood of increasing the magnitude of net out-migration. An assumption is made that those

five different types of current population trends will be followed sequentially along the passage of time, from Types E to D, to C, to B and lastly to A. To fit the growth curve, applications are made of several types of mathematical curves, such as logistic, modified exponential and parabola.

(2) The second method of prefecture-wise projections are made on the basis of the component method, combining future estimates of three demographic components of growth, that is birth, death and migration, in addition to the base population. The component of inter-prefectural migration still remains the major source of uncertainty and very probably makes major contribution to the difference between the projected and actual population growth. Furthermore, inter-prefectural migration is likely to be more important in affecting the rate of growth than fertility and mortality. The second method of computing future numbers of births and deaths for prefecture is to allocate the numbers of births and deaths on the national level by applying the products of prefectural population multiplied by the index numbers of fertility and mortality which are calculated as the ratios of last three year figures of crude birth and death rates calculated as the ratios of last three year figures of crude birth and dealth rates over the corresponding national rates.

Future net in- or out-migration volumes are estimated by linear extrapolation. At the same time, the national total of migration volumes are estimated by fitting both logistic and exponential curves. Because two sets of mathematical extrapolations yield much the same results of approximately 3.6 million as upper asymptote and because this level is nearly attained in 1965 - 1970 by extrapolation, the future migration magnitude is assumed to be constant after 1965. Individual migration volumes of prefectures are adjusted to the national score thus obtained by prorating the difference between the curve-fitted total and the cumulated total of individually projected figures.

The use of the constant assumption of future volume after 1965 has some general demographic reasons. The major portion of inter-prefectural migrants are graduates fresh out of junior and senior high schools and colleges whose ages range from 15 to 25. However, because of the demographic transition from high to low fertility experienced after the beginning of the 1950's, it is foreseeable in the near future after 1970 that the population for the young age population ranging from 15 to 25 will rapidly shrink down to a level on which the number is much smaller than before. Inasmuch as migration is highly selective of age, particularly of ages from 15 to 24 or 25, it is estimated

that the present ever-increasing inter-prefectural migration bolumes will reach a saturation point and after reaching it there are no substantial reasons to conceive of further sustained growth of migration.

Table 1 shows the population projections for Japan by major regions. Table 2 indicates their percentage distribution. Table 3 signifies the changes in age composition of Japan's future population according to the projections.

3. Household Projections

As already mentioned, the household projections have been tentatively made two times in 1961 and 1966. The new projections cover not only the total number of households by ordinary and quasi-households but also their prefecture-wise distribution. The present paper is mainly concerned with the latter ones.

(a) National projections. The methodology of the present household projection is fundamentally the same as the ones performed in 1961. These two series of projections have employed the method of using household "headship rates".4/

4/ Systematic treatment of "headship rate method" is made in Robert Parke, Jr., "The Choice of Assumptions in Household and Family Projections", paper contributed for the United Nations World Population Conference, 1965, (B.5/I/E/300) WPC/WP/300.

Here, headship rate denotes the ratio of household heads to the total number of persons in the class. The 1950, 1955 and 1960 Population Censuses Japan furnish us with the data on the number of household heads classified by sex, age group and marital status. The 1960 Census provides us particularly with 10-year age breakdowns of household heads up to the age of 80. Combining these statistics and the general population classified by the same characteristics, the household headship rates are obtained for 1950, 1955 and 1960. Already the future population projections by sex and age were available up to 2,015 AD, so that the population projections by sex, age and marital status are relatively easily obtained only if assumptions were made with respect to the future marital status structure of each age group. The future household projections are obtained by summing over all classes the product multiplied by the population projected according to sex, age and marital status by household headship rates specific to sex, age and marital status.

Actually, the marital status structure of each age group, namely by single, presently married, widowed and divorced, is assumed to be changed in such a way that the marital status structure for all Japan in the 1960 Census will be linearly transformed to that for the total urban area of Japan until 1975. This transitional process along with the course of

urbanization was determined by performing various regression analyses between the variables of percentage married and the degree of urbanization of the existing 46 prefectures. After 1975, the marital composition of each age group is assumed to be constant.

The main methodological problem remains, however, how to estimate the future course of headship rates. The previous projections conducted in 1961 made an assumption that the headship rates will be constant throughout the projection periods. In the new projections, two series of sequential change in headship rate are assumed. One series of assumption is that the headship rate for all Japan changes linearly to take (1) the average of the 1960 rates for all urban areas and all "densely inhabited districts" (Japanese version of "urbanized area") in 1970, (2) the rate for all "densely inhabited districts" in 1975 and (3) the rate for all "densely inhabited districts" within all urban areas in 1980. After 1980, the schedule of headship rates is held constant. The other series of assumption is that the headship rate for all Japan changes linearly to take (1) the headship rate for all "densely inhabited districts" in 1970, (2) the rate for "all densely inhabited districts" within all urban areas in 1975, (3) thereafter the rates being held constant. In general, headship rates

increase in accordance with the degree of urbanization in sequential order of all Japan, all Urban, all "densely inhabited districts" and all "densely inhabited districts" within all Urban. In order to determine the timing of transformation concerning the schedule of headship rates, various regression analyses were again made between headship rates and degree of urbanization, while controlling population composition.

(b) Prefecture-wise Household Projections. Prefecture-wise household projections were made by multiplying projected prefectural population by projected headship rates. Here only the total population and crude rate of headship are considered. Future headship rates were determined by extrapolating the rates of the 1960 census year by modified exponential curve. The cumulated sum of individually projected numbers of households is adjusted by prorating all figures so as to coincide with the national total obtained by the method described above. Table 4 shows future projections of the number of households for Japan by major regions, 1965 to 1990. Table 5 indicates their percentage distribution.

4. Use of Projections for Development Programming

(a) Use of Population Projections

The use of projections of general population and of

number of household are manifold. Needless to say, population projections are widely used as a basis for the Government's long-term economic and social planning and for manufacturers and merchandisers' estimates of future changes in market for goods and services. Future projections of the volumes of school enrollment and manpower determination of the relative economic burden of public and private programs supporting the dependent aged, etc., all depend on probable future projections regarding the size and composition of pupulation. Furthermore, in recent years a colossal scale of population concentration in metropolitan areas, has now emerged as probably the number one problem in the social and economic spheres of Japan with a concomitant phenomenon of depopulation at rural population, particularly of young population. Each prefectural government has become seriously aware of this landslide movement and some have already initiated effective planning on social and industrial development. In this connection, proper population projections by prefecture and by region always serve to offer important guidelines and tools for regional development programming.

However, as compared to the national projections, the prefecture-wise projections are far more time-consuming, complicated, hazardous and methodologically difficult. Unlike national projections, regional projections inherently involves estimates of inter-regional migration which obviously carries with it the

highest degree of uncertainly for prediction among the components of population change.

Unlike the other demographic events of birth, death, marriage, etc., inter-prefectural migration is far more susceptible first to the economic conditions of both sending and receiving prefectures and secondly to the national and prefectural governments' development plans themselves. Under the present circumstances where it has become both important and "fashionable", so to speak, for the part of a prefectural government to draw its own plans and programs of economic development, population growth and population redistribution within the prefecture, but where it has formulated plans sometimes without much co-ordination with others, demographers who are working on the task of projections sometimes confronts methodological difficulties.

It seems paradoxical that the more local governments become planning-minded and they need probable population projections for the basis of their planning, the more the projections turn out to be difficult for furnishing simplified and satisfactory answers. Thus, as some demographer said, the population projections have become more and more heavily armored with many sets of assumptions, hypotheses, and maximums and minimums.

(b) Use of Household Projections

The use of household projections is no less widespread

than that of the population projections. In Japan, the household projections have recently gained importance as aids to evaluation, planning and operations, whether in the public or the private sector. The government agencies and manufacturers have become increasingly aware of the fact that families and households are units in or related to migration, production, consumption, and economic activity.5/ More specifically this is because the past two censuses have indicated sharp increases in the average size of household which had been for long time stable numbering 5 persons per household. In the 1960 Census, the average household size declined for the first time to the level substantially below 5, that is 4.52. According to the Quick Report of the 1965 Census, it further lowered down to 4.08. According to the present household projections under a moderate assumption, the future household size will be 3.83 in 1970, 3.57 in 1975, 3.36 in 1980, 3.23 in 1985 and 3.13 in 1990.

The sudden decrease in the average size of household found in the census year of 1960 and further continuous drop in 1965 can facilitate us to envisage further declines. Three factors

---

5/ Irene B. Taeuber, "Future Population Trends", Background p paper contributed for the United Nations World Population Conference, 1965, (Background paper A.4/8/E/453), WPC/WP/453, p.29.

are apparently influencing this course of decline. First is the rapid decline in fertility; second, the breakdowns of multi-generational families into nuclear type of families along with the process of secularization and the spread of nuclear-family centered individualism, assisted by the general rise in the level of living to afford family fission; third, a enormous scale of migration of young people into great cities such as Tokyo and Osaka for getting job or for studying, who in a larger number of cases live in boarding house or one-room apartment house, thus constituting singly-living ordinary or quasi-households.

5. Major Gaps in Knowledge and Some Suggestions

In this paper only a limited number of aspects are considered because of the paucity of space.

(1) Among the major gaps in knowledge of the population movement of Japan, the most difficult ones are found in the fields of fertility and internal migration. Methodologies of population projections in Japan have not as yet fully developed to provide theoretically sound and very probable estimates of future course of fertility and inter-regional migration, partly due to the underdevelopment of analytical techniques, partly due to the paucity of substantive knowledge of the mechanism

of the changes in these two factors and partly due to the inadquacy in statistical apparatus and technical facilities. As to fertility, Japan has now been experiencing a new change in the timing of childbearing among low parity women toward having fewer children but having them earlier in the childbearing period. This new trend certainly requires the development of new materials and even techniques for cohort analysis of fertility in Japan. Again, we know little about the extent to which social and economic factors affect fertility.

(2) Gaps in knowledge regarding inter-regional migration directly usable for projection are even more wide-open than that of fertility. Vast field still remains barren of knowledge of factors affecting inter-regional migration which are indispensable for satisfactory projections. Although good studies have been done by a number of demographers and economists in Japan,[6/] we still know little of the extent to which migration occur simply by chance regardless of the cause-effect-ridden principle of economic push-pull theory. Two suggestions are made in this connection. The first one is to work out multiple

6/ See for example, Minoru Tachi, "Kokunai Jinko Ido no Kino" ("Function of Internal Migration") in Minoru Tachi, editor, Nihon no Jinko Ido (Internal Migration in Japan), Kokon Shoin, Tokyo, 1961, chapter 6; Shunsaku Nishikawa, Chiki-kan Rodo Ido to Rodo Shijo (Inter-regional Mobility of Labor Force and Labor Market) Yuhikaku, Tokyo, 1966.

regression analyses of factors affecting inter-regional migration streams with better acquaintance of variables operating and with better frames of reference; the second to try out simulation of migration streams by applying electronic computer model in which individuals rather than classes of persons are subjected to probabilities of migration. Even in performing computations by the conventional age-cohort method, electronic computer will produce fairly easily and with lower cost the population projections by sex and age groupd for geographical subdivisions.

(3) Likewise, in the field of household projection, we do not know much about the probabilities at which young persons fresh out of school migrate into cities and form singly-living households. More research works and field surveys are needed in this line.

(4) More probable projections of number of households can be produced if each region or prefecture is furnished with the statistics of household heads classified by sex, broad age groups and possibly marital status. If this series of data were available, more valid and reliable projections can be made in Tokyo perhaps with the aid of electronic computer.

(5) Finally, a request is made that some one would attempt to prepare a manual of projection techniques

particularly for geographical subdivisions for which the detailed and adequate data are much fewer than the ones on the national scale. Such a manual would be of great help for example for an official at the statistics section of local government who wants to make projections not only for own prefecture but also for subsections of prefecture.

Table 1. FUTURE POPULATION PROJECTIONS

Region	Census		
	1950	1955	1960
All Japan	83,199.6	89,275.5	93,418.5
(1) Hokkaido	4,295.6	4,773.1	5,039.2
(2) Tohoku	9,021.7	9,334.4	9,325.7
(3) Tokyo Metropolitan Area	19,053.6	21,456.4	23,785.1
South Kanto	13,050.9	15,424.3	17,863.9
North Kanto	6,002.7	6,032.1	5,921.2
(4) Hokuriku-Tosan	7,240.3	7,236.2	7,182.1
(5) Tokai	8,867.8	9,488.8	10,086.1
(6) Kinki Metropolitan Area	11,607.0	12,811.8	14,030.6
Kyoto-Osaka-Hyogo	8,999.9	10,174.4	11,404.6
Surrounding Area	2,607.2	2,637.4	2,626.0
(7) Chugoku	6,796.8	6,992.0	6,944.7
Sanyo	5,284.0	5,448.6	5,456.7
Sanin	1,512.8	1,543.4	1,488.0
(8) Shikoku	4,220.3	4,245.2	4,121.4
(9) Kyushu	12,096.9	12,937.5	12,903.5
(10) Tokaido Megalopolis (3)+(5)+(6)	39,528.4	43,757.0	47,901.8

Note: Because of rounding, the cumulated total of individual regional values may not exactly match all Japan value.

FOR JAPAN AND 9 REGIONS: 1965 TO 1990

(In thousand)

Projections (As of 1st October)					
1965	1970	1975	1980	1985	1990
98,114.0	103,038.0	108,346.0	112,976.0	116,169.0	118,330.0
5,206.2	5,318.9	5,404.6	5,437.7	5,406.7	5,331.3
9,149.7	8,985.4	8,836.2	8,643.5	8,332.1	7,957.8
26,696.2	29,475.3	32,413.9	35.075.4	37.197.7	38,860.3
20,745.7	23,486.2	26,302.8	28,840.2	30,883.5	32,491.8
5,950.5	5,989.1	6,111.1	6,235.2	6,314.2	6,368.5
7,149.7	7,190.6	7,284.6	7,355.4	7,353.9	7,309.3
10,978.8	12,014.3	13,165.5	14,246.9	15,133.1	15,867.5
15,652.8	17,243.1	18,831.9	20,241.6	21,355.7	22,272.1
12,948.1	14,385.8	15,743.8	16,889.7	17,742.0	18,399.4
2,704.7	2,857.3	3,088.1	3,351.9	3,613.7	3,872.7
6,885.9	6,906.6	6,929.5	6,934.1	6,858.9	6,736.1
5,461.9	5,513.9	5,577.8	5,629.2	5,618.5	5,570.6
1,424.0	1,392.7	1,351.7	1,304.9	1,240.4	1,165.5
3,968.0	3,827.7	3,712.1	3,600.3	3,488.1	3,378.5
12,426.7	12,075.8	11,767.7	11,441.2	11,042.7	10,617.2
53,311.9	58,732.7	64,411.3	69,563.9	73,686.5	76,999.9

Source: Institute of Population Problems, Ministry of Health and Welfare, Future Population Estimates by Prefecture, Japan: 1965 - 1995, Estimated in October 1964, Institute of Population Problems Research Series, No. 164, July 1, 1965, Tables 12 and 20, p.29 and p.34, respectively.

Table 2. PERCENTAGE DISTRIBUTION OF THE FUTURE POPULATION OF JAPAN BY 9 REGIONS: 1965 TO 1990

	Census Population			Projections (As of 1st October)					
	1950	1955	1960	1965	1970	1975	1980	1985	1990
All Japan	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
(1) Hokkaido	5.16	5.35	5.39	5.31	5.16	4.99	4.81	4.65	4.51
(2) Tohoku	10.84	10.46	9.98	9.33	8.72	8.16	7.65	7.17	6.73
(3) Tokyo									
Metropolitan Area	22.90	24.03	25.46	27.21	28.61	29.92	31.05	22.02	32.84
South Kanto	15.69	17.28	19.12	21.14	22.79	24.28	25.53	26.58	27.46
North Kanto	7.21	6.76	6.34	6.06	5.81	5.64	5.62	5.44	5.38
(4) Hokuriku-Tosan	8.70	8.11	7.69	7.29	6.98	6.72	6.51	6.33	6.18
(5) Tokai	10.66	10.63	10.80	11.19	11.66	12.15	12.61	13.03	13.41
(6) Kinki									
Metropolitan Area	13.95	14.35	15.02	15.95	16.73	17.38	17.92	18.38	18.82
Kyoto-Osaka-Hyogo	10.82	11.40	12.21	13.20	13.96	14.53	14.95	15.27	15.55
Surrounding Area	3.13	2.95	2.81	2.76	2.77	2.85	2.97	3.11	2.43
(7) Chugoku	8.17	7.83	7.43	7.02	6.70	6.40	6.14	5.90	5.69
Sanyo	6.35	6.10	5.84	5.57	5.35	5.15	4.98	4.84	4.71
Sanin	1.82	1.73	1.59	1.45	1.35	1.25	1.16	1.07	0.98
(8) Shikoku	5.07	4.76	4.41	4.04	3.71	3.43	3.19	3.00	2.86
(9) Kyushu	14.54	14.49	13.81	12.67	11.72	10.86	10.13	9.51	8.97
(10) Tokaido Megalopolis (3)+(5)+(6)	47.51	49.01	51.28	54.34	57.00	59.45	61.57	63.43	65.07

Source: Table 1.

Table 3. FUTURE POPULATION PROJECTIONS FOR JAPAN BY AGE GROUP: As of 1st October

	Year	Population (In thousand)				Percent distribution			Vital rates	
		Total	0-14	15-64	65+	0-14	15-64	65+	Birth	Death
Census	1955	89,276	29,798	54,729	4,747	33.4	61.3	5.3	18.0	7.9
	1960	93,884	28,012	60,512	5,360	29.8	64.5	5.7	16.7	7.3
Projections	1965	98,403	24,767	67,453	6,183	25.2	68.6	6.3	16.6	6.9
	1970	103,327	23,810	72,162	7,355	23.0	69.8	7.1	16.6	6.6
	1975	108,635	24,620	75,259	8,756	22.7	69.3	8.1	15.4	7.0
	1980	113,265	25,087	77,882	10,296	22.2	68.8	9.1	13.4	7.8
	1985	116,458	24,335	80,617	11,506	20.9	69.2	9.9	12.2	8.5
	1990	118,619	22,722	82,826	13,072	19.2	69.8	11.0	12.1	9.4
	1995	120,225	21,545	83,357	15,323	17.9	69.3	12.9	12.2	10.4
	2000	121,353	21,362	82,363	17,628	17.6	67.9	14.5	12.0	11.5
	2005	121,698	21,481	80,724	19,493	17.7	66.3	16.0	11.4	12.9
	2010	120,817	21,124	78,291	21,402	17.5	64.8	17.7	10.8	13.8
	2015	119,015	20,226	74,941	23,848	17.0	63.0	20.0		

Source: Institute of Population Problems, Future Population Estimates for Japan by Sex and Age, for October 1 from 1955 to 2015, Research Series, No. 159, June 1, 1964, Tokyo.

Table 4. FUTURE PROJECTIONS OF THE NUMBER OF

Region	Census	
	1955	1960
All Japan	17,959.9	20,656.2
(1) Hokkaido	897.8	1,077.8
(2) Tohoku	1,643.8	1,815.4
(3) Tokyo Metropolitan Area	4,394.3	5,486.5
South Kanto	3,270.6	4,290.0
North Kanto	1,123.7	1,196.5
(4) Hokuriku-Tosan	1,411.5	1,504.1
(5) Tokai	1,859.3	2,129.1
(6) Kinki Metropolitan Area	2,794.5	3,279.5
Kyoto-Osaka-Hyogo	2,234.9	2,690.6
Surrounding Area	559.6	588.9
(7) Chugoku	1,481.5	1,592.3
Sanyo	1,174.2	1,272.0
Sanin	307.3	320.3
(8) Shikoku	884.9	940.8
(9) Kyushu	2,592.5	2,830.7
(10) Tokaido Megalopolis (3)+(5)+(6)	9,048.1	10,895.1

Note: Because of rounding, the comulated total of individual regional values may not exactly match all Japan value.

HOUSEHOLDS FOR JAPAN AND 9 REGIONS: 1965 TO 1990

(In thousand)

Projections (As of 1st April)					
1965	1970	1975	1980	1985	1990
23,752.8	26,964.2	30,463.6	33,670.5	36,041.6	37,917.8
1,245.7	1,393.9	1,547.7	1,671.9	1,750.5	1,803.7
1,969.5	2,115.1	2,246.8	2,345.8	2,372.8	2,357.9
6,768.6	8,140.6	9,642.0	11,079.7	12,254.3	13,228.1
5,465.5	6,708.9	8,084.6	9,392.4	10,473.3	11,370.8
1,303.1	1,431.7	1,557.4	1,687.3	1,781.0	1,857.3
1,609.2	1,742.9	1,885.8	2,009.0	2,082.4	2,130.4
2,486.8	2,908.7	3,399.2	3,874.9	4.262.8	4,601.8
3,961.7	4,584.9	5,314.7	5,990.1	6,515.9	6,967.7
3,319.0	3,856.0	4,482.0	5,043.0	5,464.3	5,814.7
642.7	728.9	832.7	947.1	1,051.6	1,153.0
1,721.4	1,861.8	2,003.0	2,123,9	2,188.7	2,223.0
1,390.9	1,508.7	1,635.7	1,748.8	1,817.6	1,863.0
330.5	353.1	367.3	375.1	371.1	360.0
995.1	1,055.9	1,106.0	1,144.3	1,159.1	1,163.4
2,994.8	3,160.4	3,318.4	3,430.0	3,455.1	3,442.0
13,217.1	15,634.2	18,355.9	20,944.7	23,033.0	24,797.6

Source: Prepared by the author.

Table 5. PERCENTAGE DISTRIBUTION OF THE FUTURE NUMBER OF HOUSEHOLDS OF JAPAN BY 9 REGIONS: 1965 TO 1990

Region	Census	Projections (As of 1st April)						
	1955	1960	1965	1970	1975	1980	1985	1990
All Japan	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
(1) Hokkaido	5.00	5.22	5.24	5.17	5.08	4.97	4.86	4.76
(2) Tohoku	9.15	8.79	8.29	7.84	7.38	6.97	6.58	6.22
(3) Tokyo Metropolitan Area	24.47	26.56	28.50	30.19	31.65	32.91	34.00	34.89
South Kanto	18.21	20.77	23.01	24.88	26.54	27.90	29.06	29.99
North Kanto	6.26	5.79	5.49	5.31	5.11	5.01	4.94	4.90
(4) Hokuriku-Tosan	7.86	7.28	6.77	6.46	6.19	5.97	5.78	5.62
(5) Tokai	10.35	10.31	10.47	10.79	11.16	11.51	11.83	12.14
(6) Kinki Metropolitan Area	15.56	15.88	16.68	17.00	17.45	17.79	18.08	18.38
Kyoto-Osaka-Hyogo	12.44	13.03	13.97	14.30	14.71	14.98	15.16	15.34
Surrounding Area	3.12	2.85	2.71	2.70	2.73	2.81	2.92	3.04
(7) Chugoku	8.25	7.71	7.25	6.90	6.58	6.31	6.07	5.86
Sanyo	6.54	6.16	5.86	5.60	5.37	5.19	5.04	4.91
Sanin	1.71	1.55	1.39	1.31	1.21	1.11	1.03	0.95
(8) Shikoku	4.93	4.55	4.19	3.92	3.63	3.40	3.22	3.07
(9) Kyushu	14.43	13.70	12.61	11.72	10.86	10.19	9.59	9.08
(10) Tokaido Megalopolis (3)+(5)+(6)	50.38	52.74	55.64	57.98	60.26	62.20	63.91	65.40

Source: Table 4.

The Eleventh Pacific Science Congress
General Meeting
September 3, 1966.

RESOLUTIONS

Population Symposium

The Congress recognises and accepts a responsibility for the continuance and intensification of population research which is essential to the understanding and solution of the population problems in the Pacific.

1. RESOLVED that the Congress recommends to the National Science Councils or other representative institutions of the member countries that they take steps to integrate population science into their organisations.

2. RESOLVED that the Pacific Science Council and the National Science Councils or other representative institutions of the Pacific countries urge the United Nations and its specialized Agencies to accord high priorities to population problems commensurate with their immensity and urgency. These priorities should include:

A. A focus on population factors as key variables in formulating plans for economic and social development.

B. A population institute or institutes broadly based in the various fields relevant to the definition,

assessment, and solution of population problems:

i. To provide research and training

ii. To assess research and development needs in population fields and to stimulate research within countries.

iii. To facilitate contact and cooperation among member countries or groups of member countries, particularly through working parties in defined critical areas of immediate concern.

C. A greatly strengthened effort in the United Nations Development Program to advise and assist countries in their population problems and plans.

The Eleventh Pacific Science Congress
General Meeting
September 3, 1966.

RESOLUTIONS
ON THE FORMATION OF STANDING COMMITTEE

A. Congress Symposium on Population Problems in the Pacific

The members of the Symposium recommend that the Pacific Science Council establish a Standing Committee on population

a) to define critical areas and to initiate proposals for research

b) to urge the extension of, and to cooperate in, international research projects

c) to facilitate communication and collaboration among workers in population fields in the countries of the region

d) to serve as a focal point for committees, panels, or other groups established by the National Science Councils or other representative institutions of the countries of the region