

Changing Age-structures of China, India & Japan - Concerns and Contributions

¹T. Lakshamma, P.Lavanya Kumari²

¹Professor, ²UGC-Post Doctoral Fellow, Dept. of Population Studies, S.V.University Tirupati.

ABSTRACT: *Living Environment as well as life-style of Indian Society is getting changed day-by-day in a multi-folded way. Population ageing-increase in the proportion of population aged 60 years and above-is not unnatural with the improved standards of living, particularly nutritious, health and hygienic conditions. But, unprecedented happening is increase in the proportion of older persons (≥ 60 years) accompanied declines in the proportion of the young, under 15 years. The objective of this paper is to analyze four demographic indicators, viz., 'Ageing Index', 'Dependency Ratio', 'Potential Support Ratio' and 'Parent Support Ratio' of China, India and Japan and their impact on Society. Ageing Index is calculated as 60 years old or over per hundred persons under age 15 years. By the year 2000, the ageing index for China, India and Japan are 40.7, 22.1 and 157.9 respectively. The old dependency ratio, a commonly used measure of potential social support needs is 10.0, 8.1 and 25.2 for China, India and Japan respectively by 2002. The inverse of the old-age dependency ratio is Potential Support Ratio, i.e., the number of people in the working ages of 15– 64 years per every person 65 or older is 10.0, 12.4 and 4.0 for China, India and Japan respectively by 2002, visualizing the profound shift of age structure of the population. The Parent Support Ratio, a commonly used measure to assess the demands on families to provide support for their oldest-old members, because people are living longer. This ratio is 2.5, 1.9 and 8.1 for China, India and Japan respectively by 2002, and remarkably high levels are projected for developed regions, particularly for Japan, which is significantly lower in less developed regions. In all, the discussed above indicators of changing age structures, Japan is in highly disadvantaged state. The populous countries of the Globe, China and India have a long way to go. However, these two countries are expected to redefine their family welfare programmes and policies in order to 'be in a sustainable demographic state' by observing Japan's demographic scenario.*

Keywords—Ageing Index, Dependency Ratio, Potential Support Ratio, Parent Support Ratio

I. INTRODUCTION

In the history of humankind, population aging is unprecedented. Increase in the proportion of older persons (60 years or older) accompanied by declines in the proportion of teenagers (older 15 years). By 1998 this historical reversal had already been experienced by some of the more developed regions¹. Population aging is pervasive, a global phenomenon which has a direct bearing on the intergenerational and intragenerational quality and solidarity that are the foundations of society.⁴ Population aging is profound having major consequences and implications for all facts of human life-impact on economic growth, social sphere and in the form of political representation². Whatever may be the changes one passes-on through, quality of life, a value oriented living is sustainable, supportable and adaptable, particularly for a country like India which is with richest culture and heritage.

Population aging is enduring. Marked differences exist between regions in the number and proportion of older persons. The pace of population aging is much faster in developing countries, less time to adjust to the consequences of population aging with much lower levels of socio-economic development.

II. REVIEW OF LITERATURE

Countries with high percapita income, more developed regions tend to have lower participation of older persons than their counterparts in developing countries where lower percapita income exists. Moreover, majority of older persons are women, **feminization of aging**, because, female life expectancy is higher than that of male. In 2000, there were 63 million more women than men aged 60 or older at the oldest ages, there are two to five times as many women as men^{1,6}.

Due to fertility decline, a progressive reduction in the availability of kin to whom future generations of older persons may turn for support. This process may have a significant impact on the well-being of older persons, especially in the less developed regions where social support for the older persons is largely provided

by the immediate family.³ And also improved chances of surviving to the oldest ages are likely spur efforts to improve the health status of the older population and lead to reforms in the pension and health systems.

Increased age normally brings considerable change in individual needs. For example, health conditions typically decline with advancing age, and this suggests an escalation in the demand for long-term care.⁵

Fertility decline has been the primary determinant of population aging. In proportional terms, gains in life expectancy are expected to be higher at older ages. The female advantage in life expectancy at birth has widened.

In Japan, the near 85 years, life expectancy at birth for women is currently the highest in the world. Over the next 50 years, female life expectancy at birth is expected to surpass 92 years in Japan and 85 years in other 26 countries¹.

The older population is growing faster than the total population in practically all regions of the World and the difference in growth rates is increasing¹.

It is observed that the doubling periods of population between 1999 and 2025 estimates, the population of India will be doubled in 35 years where as the same is 267 years for Japan^{14 (pp.91)}. For the populous country China, the estimated doubling period is 61 years, indicating the decline of natural growth rate.

Table-1: Doubling Period

Country	Population 1999 - 2025	Years for population to Double
India	996.0 million	35 years
Japan	126.0 million	267 years
China	1300.0 million	61 years
World	5607.0 million	35 years
India	996.0 million	43 years

Right from the rise of human civilization, the scholars did not agree on the population growth as it is, while opined the population as the strength of the Nation. According to the Demographic Transition Theory^{27 pp130}, India is in the *third* stage, Japan is in the *last* stage and China is in the *fourth* stage of Demographic Transition.

Table-2: Demographic Transition

Stage	Birth Rate	Death Rate	Growth Rate of Population
I	High	High	High Stationary Stage
II	High	Decreasing	Early Expanding Stage
III	Decreasing	Rapidly Decreasing	Late Expanding Stage
IV	Low	Low	Low Stationary Stage
V	Low - lesser than Mortality	Low (equal)	Declining Stage

If there are not enough people to develop, all the resources of an area may not be exploited and its standard of living may remain lower than it would be. Enough population is required to its full potential realized. This is what **Optimum Population** theory says.

Population aging is a by-product of the demographic transition in which both mortality and fertility decline from higher to lower levels.

The number of older persons (60 year older) is growing faster (1.9%) than the total population (1.21%) in practically all regions of the world – and the difference in growth rates is increasing.¹

At the global level, the average annual growth rate of persons aged 80 years or over is 3.8 percent, twice the rate of growth of the population 60 years of age, 1.9 percent.¹ This percentage is projected to increase 4.1 percent by 2050. The most remarkable increase is expected to occur in Japan, where more than 1 in every 3 persons aged 60 year or over will be at least 80 year old by 2050, nearly 1 percent of Japan populations will be 100 years old or older¹. The proportion of elderly have surpassed the proportion of younger since 1997 in Japan^{16,pp15}. Currently (2000), the following six countries account for 54 per cent of the total number of aged 80 years or over.

Table-3: Population of Oldest-old

Country	Population 80 years over (millions)
China	12
U.S.A	9
India	6
Japan	5
Germany	3
Russia Federation	3

Table-4: Distribution of Aged

Country	With more than 20 million population of aged 60 year older by 2000	With More than 50 million by 2050
China	129	437
India	77	324
U.S.A	46	107
Japan	30	70
Russia Federation	27	58

Important observation is, the developed countries have experienced very slow process of aging in the past, whereas the developing countries are experiencing the same in a much shorter period of time with low socio-economic development¹.

The young age (0-14 years) group of population is economically unproductive, and the most expensive as it is to be provided with food, clothing, education, health, medical and recreation facilities.

The old age group (60 years and above) is largely an economic burden upon the adult age group as it is provided with food, clothing and adequate care under the social security system.

Table-5: Population of Young and Old

Country	Population (in percent)			
	0-14 years		≥ 60 years	
	2000	2025	2000	2025
India	33.5	23.2	7.6	12.5
Japan	14.7	12.1	23.2	35.1
China	24.8	18.4	10.1	19.5
World	30.0	24.3	10.0	15.0

The above table presents the current (2000) and the increasing trend of dependency burden of ≥60 population in Japan, India and in China, the first two populous countries of the World¹.

Figure-1(a) Age Pyramid of India

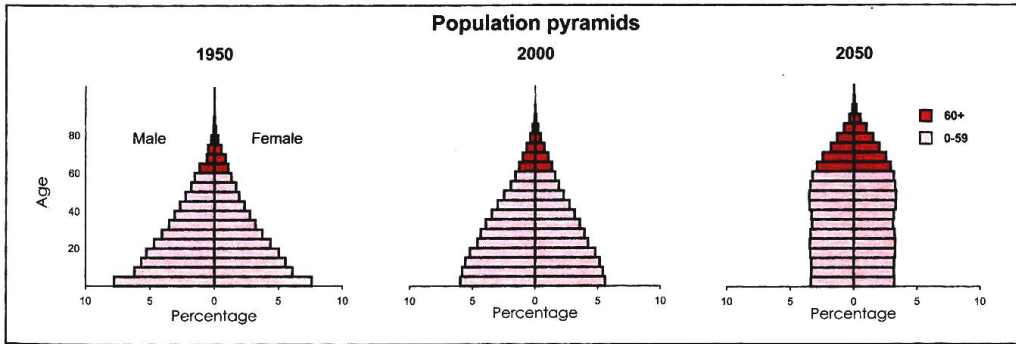


Figure-1(b): Age Pyramid of Japan

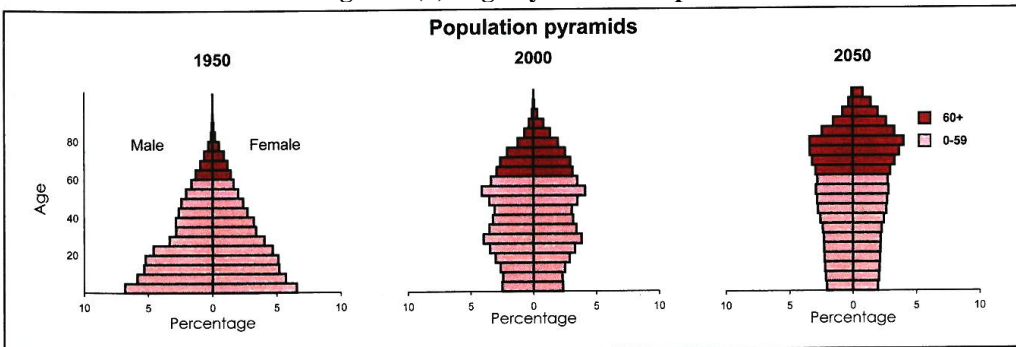


Figure-1(c): Age Pyramid of China

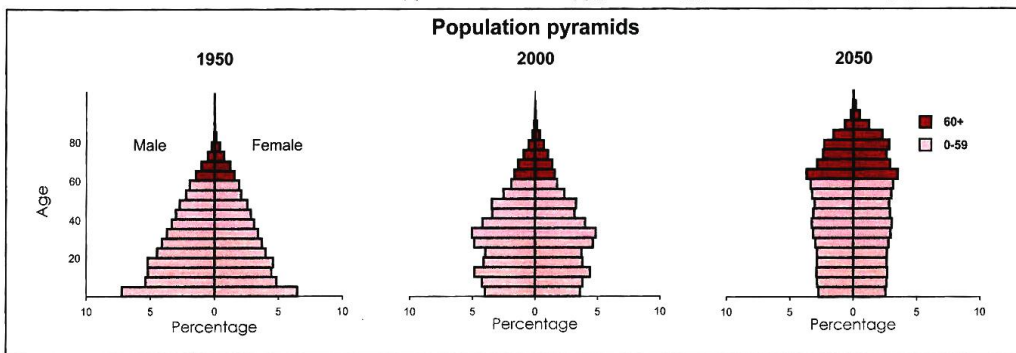
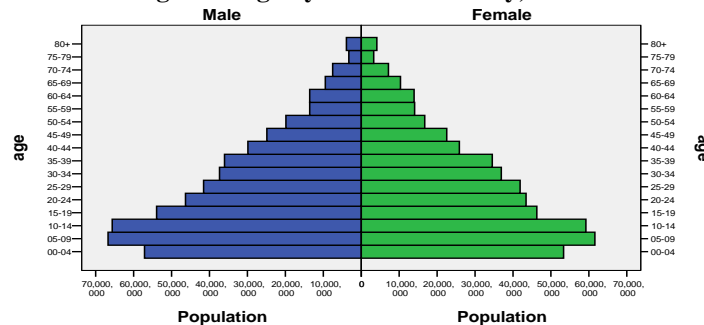


Figure-2 Age Pyramid of India by, 2010



III. OBJECTIVE

The main objective of this paper is to analyze four demographic indicators, i.e., 'Ageing Index', 'Dependency Ratio', 'Potential Support Ratio' and 'Parent Support Ratio' of China, India and Japan to look into the present and future trends and their impact on Society.

IV. SOURCE OF DATA

The discussions are based on the secondary data available in the report of United Nations entitled 'World Population Ageing, 1950-2050, published in the year 2002.

V. DISCUSSIONS

The present paper is intended to highlight the relevant indicators of population ageing and warning signs of changing age compositions of China, India and Japan. This paper confined to discuss on four important indicators of age composition and its impact on a country's economy and social security system.

5.1 Ageing Index

Ageing Index is calculated as the number of persons 60 years old or over per hundred persons under age 15 years.

$$\text{Ageing Index} = \frac{\text{popn.} \geq 60 \text{ ys}}{\text{popn.} < 15 \text{ ys}} \times 100$$

Population ageing- an increase in the proportion of population aged 60 years and over which is unprecedented, but not unnatural with the improved standards of living, particularly nutritious, health and hygienic conditions. Moreover, changes in life-style, reference group psychology and regional peculiarities are the determinants of declining fertility resulting in ageing of the society, rise in old-age dependency, erosion of creative viability and retardation of economy, etc.

Table-6: Ageing Index

	India	Japan	China
1950	14.4	21.7	22.3
1975	15.6	48.1	17.6
2000	22.1	157.9	40.7
2025	53.6	290.0	106.5

Increase in the older population is the result of the demographic transition from high to low levels of fertility and mortality. The older population is growing at a faster rate in the less developed regions^[pp.13]. Ageing index disparities are even greater at the country level.

5.2 Dependency Ratio

The total dependency ratio is a commonly used measure of **potential social support needs**. It is based on the simple notion that all persons under 15 years and those 65 or older are likely to be in some sense dependent on the population in the working ages of 15-64 years.

$$\text{Total Dependency Ratio} = \frac{\text{popn.} < 15 \text{ ys} + \text{popn.} \geq 65 \text{ ys}}{\text{popn. between 15 - 64 ys}} \times 100$$

*Those in the working ages are assumed to provide direct or indirect support to those in the dependent ages. Such support may be provided within the family, through religious or communal institutions or by the State.*⁸

However, the total dependency ratio is a rough indicator of the burden of dependency. Not all young and old persons require support and also not all working age persons actually provide support directly or indirectly.⁹

Moreover evidence exists that older persons in many societies are providers of support to their adult children¹⁰. Infact, older persons of a family/society are the security and counseling force to the family/society if considered properly.

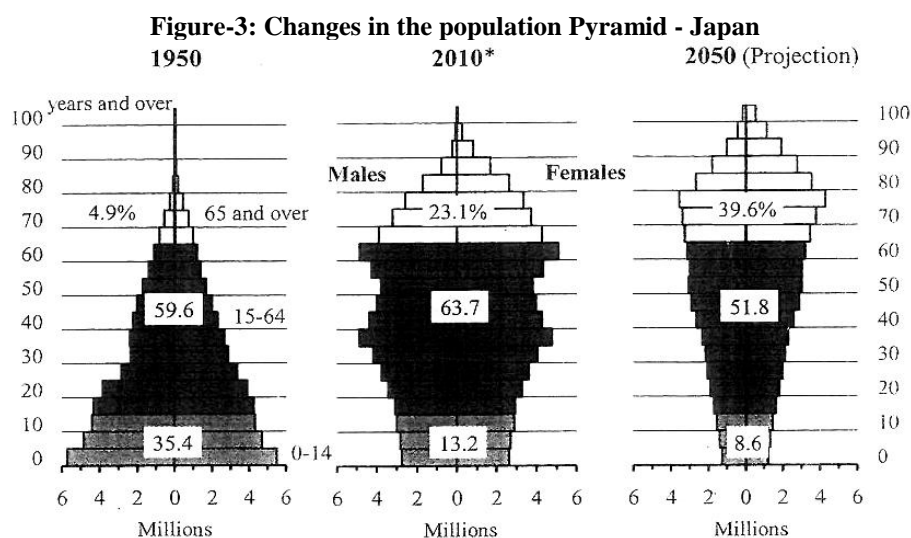
Table-7: Dependency Ratio

Year	India			Japan			China		
	Total	Youth (0-14 ys)	Old (□ 65 ys)	Total	Youth (0-14 ys)	Old (□ 65 ys)	Total	Youth (0-14 ys)	Old (□ 65 ys)
1950	73.2	67.4	5.8	67.8	59.5	8.3	61.3	54.1	7.2
1975	77.4	70.6	6.8	47.5	35.8	11.6	78.2	70.4	7.8
2000	62.5	54.4	8.1	46.8	21.6	25.2	46.4	36.4	10.0
2025	46.1	33.9	12.1	69.6	20.5	49.0	46.2	26.8	19.4

In three of these countries, the dependency ratio of youth (0-14 ys) is in decreasing trend, and the old age dependency ratio (65 ±) is in increasing trend. This is because the decline in fertility over the recent

decades. The total dependency ratio also went down. But in Japan, due to increase in the proportion of population in the age group 65 years and over (23.1%), highest in the World, the total dependency ratio is increased, very high (69.6%). The same could be observed as in old age dependency ratio in Japan (Table-7).

The population pyramid (Figure-3) of 1950 shows that Japan had a standard-shaped pyramid marked by a broad base. In 2010, the population of elderly citizens (65 years and over) was 29.29 million, constituting 23.1 per cent of the total population. The population below 15 years is 13.2 per cent, 2010. The dependent proportion of the total population is high, about 36 per cent, more than 1/3rd of the total population of Japan¹¹. As a result of the remarkable decrease in the birth rate and general death rates in Japan, the ageing of the population has accelerated. The population is now one of the serious social concerns in Japan. Fertility decline to a very low level is quite favourable for economic development in terms of a relatively large size of working age enjoyed by Japan.



Source: Statistics Bureau, MIC; Ministry of Health, Labour and Welfare.

Japan started to have fertility decline in the 1920's itself, and has been having low fertility around replacement level since 1956. Japan is appreciably different from other countries in terms of contraceptive use, family structure, cohabitation, etc. In Japan 'prescription' is required for use of Oral Pills: The Japanese experiences demonstrate that the decline in fertility down to replacement level took place without a previous background of family nucleation³⁹. In Japan, low fertility becomes 'a style of life'. It is the people's response to the highly competitive society²³.

The World's highest old-age dependency ratio will almost triple in the next 50 years. By 2050, Spain at 74, will have the World's highest ratio, followed by Japan (71), and Italy (68)¹. According to the age distribution of population in India, 2001 Census,¹⁵ the total dependency ratio is 67.3, young age (0-14 years) dependency ratio is 59.3, and the old age dependency ratio is 8.0 (calculated). For Japanese, an ageing society, government policy initiatives have been designed to encourage a more active and independent old age, eg: "Self-care" programmes, "Silver Volunteers", etc., and also for the disabled and most senior-elderly, to promote "home-care" and continued privatization of care taking responsibilities.¹⁷ One of the Japanese solutions is a "domestic care" of old parents within the private households of sons or daughters.

Over the years, the government of India has launched various schemes and policies for older persons to promote the health, well-being and independence of senior citizens around the country. The policies are:

- National Policy for Older Persons in 1999. The main objective of this policy is to make older people fully independent citizens.
- Integrated Programme for Older Persons – 2007.
- Maintenance of Parents and Senior Citizens Bill of 2007.
- These new developments for senior citizens are meant to get them on the path to a better, peaceful and finally sound life.

According to China Population Information Center, long back during 1987 itself, China has conducted a National Sampling Survey of aged population in all the provinces, autonomous regions and Municipalities to have a clear understanding about basic conditions of elder population in the Country, particularly their income, living conditions, re-employment, marital status, family, medical care and ways of being supported to provide the policy makers with grounds for research on the reform of pension system, building-up of the Social Security System with *Chinese Characteristics*.

5.3 Potential Support Ratio (PSR)

The Potential Support Ratio (PSR) is an alternative way of expressing the numerical relationship between those more likely to be economically productive and those more likely to be dependents. It is the inverse of the old-age dependency ratio, that is, the number of people in the working ages of 15-64 per every person 65 or older, which indicates dependency burden of a population.

$$PSR = \frac{\geq 65 \text{ ys}}{15 - 64 \text{ ys}}$$

Currently, there are fewer than 5 persons in the working ages for every person 65 or older in Europe, there will be fewer than 2 by 2050¹.

Table- 8: Potential Support Ratio (PSR)

	India	Japan	China	World
1950	17.2	12.1	13.8	11.6
1975	14.7	8.6	12.8	10.1
2000	12.4	4.0	10.0	9.1
2025	8.2	2.0	5.2	6.3

In 2000, the ratio of persons aged 15-64 to those 65 or older was under 5 in 23 majority of European countries, and in Japan the ratio is still less, 4¹. PSR in India, currently is 12.4, projected to decline to 8.2 by 2025, the same for Japan is 2.0 by 2025. PSR in China is 10.0 currently (2000) and the same is 5.2 by 2025.

The widespread decrease of the Potential Support Ratio (PSR), which means a widespread growth of the old age dependency ratio, indicates a situation, where increasing number of beneficiaries of health and pension funds are supported by a relatively small number of contributors, mainly those in the economically active ages of 15-64. This tends to impose heavier demands on the working age population in the form of higher taxes and other contributions in order to maintain stable flow of benefit to the older groups.¹⁸

Even a sharp decline in youth dependency that normally accompanies the increase in old age dependency may not be enough to offset the increased costs, since the relative expense of supporting the old is, in general, higher than that of supporting the young.¹⁸

5.4 Parent Support Ratio (Pt. S.R.)

The parent Support Ratio (Pt.S.R.) is a measure that has been commonly used to assess the demands on families to provide support for their oldest old members. It relates the oldest old to their presumed offspring, who were born when the older persons were in their twenties and thirties. However, since the people in the numerator and those in the denominator are not necessarily related by kinship ties. The Pt.S.R. should be taken only as a rough indicator of changes in the family support system required for the oldest old.¹⁹ More and more people in their fifties and sixties are likely to have surviving parents or other very old relatives.

Table – 9:Parent Support Ratio (Pt.S.R)

	India	Japan	China	World
1950	1.0	1.5	0.7	1.8
1975	0.9	2.6	1.5	2.6
2000	1.9	8.1	2.5	4.3
2025	3.3	27.7	3.9	5.5

Table-9 presents Pt.S.R. of India, Japan and 1st populous country, China for different periods. Pt.S.R. is the number of persons 85 years or older per one hundred persons of 50-64 years. In all these three countries the Pt.S.R. is in increasing trend from past (1950) to current (2000), and to the future (2025). This trend is significantly high in Japan, as it is an aging society with high standards of living, high life expectancy and minus natural growth of population.¹⁶ The Pt.S.R. in India and China also in increasing trend as these countries also experiencing fertility decline, and changing age structure.

People are living longer and then are more likely to experience multiple chronic diseases, more and more adults are expected to face the need to care for very old and sometimes frail relatives.

Remarkably high levels of parent support ratio (Pt.S.R.) are projected in the more developed regions, particularly in Japan¹. By 2050, Japan is projected to have by far the world's highest ratio, of 56.¹ On the other hand, the parent support ratio is projected to remain significantly lower in the less developed regions.

In all, the discussed above indicators of changing age structures, Japan is in highly disadvantaged state. The populous countries of the Globe, China and India have a long way to go. However, these two countries are expected to redefine their family welfare programmes and policies in order to 'be in a sustainable demographic state' by observing Japan's demographic scenario.

According to latest report by Associated Press, Japan, on Japan Earth Quake and Tsunami , Japan's Prime Minister has called the disaster as the worst crisis since World War-II and he has also urged for country for unite. Further in his famous radio speech to the people of Japan, Emperor Hirohito emphasized the moral and spiritual strength of the Japanese Nation, but stated bluntly that superior modern technology had tilted the balance in the war. Japan has overcome by modernity after all. Hirohito's words warned that the use of this kind of technology risked bringing about the end of the civilization itself. His meaning is contested but the spirit of his speech suggest that the Japanese should not allow the power of material technology to destroy the spirit or to eradicate Japaneseness, if modern technology is allowed to rule over everything, what is to become of the spirit that makes us human, by Hirohito. Today, there are questions of policy, but the dialog concerns the desirability and the procedures to rise the birth rate or to maintain it, 'not to lower it' in Japan.

Support to the old is only partially provided through public transfers of resources. The *family* is an important source of support to older persons especially in the less developed regions where social security systems are generally less adequate.²⁰

Family support is particularly crucial in the case of the oldest-old, whose physical and economic needs are usually greater. The parent support ratio gives an indication of the overall demand and for family support of the oldest-old. The continuing increase of this ratio implies that more and more frequently the young old will find themselves responsible for the care of one or more oldest – old family members.

The rapid growth of the oldest old group population is of special reference / relevance in terms of public policy. Although their group still remains a small proportion of the total population, its increasing number is important, especially in less developed regions. Because, health conditions typically decline with advancing age, and this suggests exaltation in the demand for long-term care²⁰. *Further, one significant observation is feminization of oldest group of population.* The implications of this gender imbalance for social support and public planning can be great, as women are with less education, less work experience and less access to public and other private income assistance²¹. Old age support systems in the form of pension and retirement programmes are much less prevalent in the less developed regions than in the more developed regions.

Economic growth without social security would bring about serious problems of social development. The objective of social security programmes are emerged to redefine in order to improve social welfare and to ensure social justice with an approach to help the needy/vulnerable to help by themselves not to enhance *attention seeking tendencies* among individuals.

In the Asian context as for as India concerned, one of the strong inducement to small family size would be provision of a minimum level of social security and in particular the oldage benefits which would gradually transfer some of the familial functions of security.

Changes in the age structure of a Nation have profound social, economic and political consequences many of which are not at fully understood. The age structure of a nation influences social contacts which affect the process of socialization, the formation of attitudes, values and behaviours, the nature of family structure and functions. The age structure of a Nation that has a major impact on the goods and services provided on the composition of the labour-force and on the allocation of the economy.

The age structure of a nation may influence its political order in affecting the outlook and temperament of its people on a liberal to Conservative Continuum: social security burden, heavy increase in expenses of maintaining public medical and health insurance schemes. Changes in population structure are differential by Nations, in its degree of intensity and in its swiftness⁷.

Table-10: Demographic and Economic indicators of China, India & Japan

		India	Japan	China	World
Population (2010) in millions		1,225	128	1,341	908
Rank in HDI (1995)		139	8	106	-
Population of Elderly Popn. (%2010) 65 years		4.9	23.1	8.2	6.8
Expectation of Life at birth	M	69.9	79.6	69.6	63.9
	F	73.4	86.4	73.3	68.1
Natural change		1.8	-1	0.5	1.3
G.D.P. (percapita US \$)		349	40,854	572	
Popn. Doubling period		35 years	267 years	61 years	43 years

The role of international migration is far less important in population growth and changing age structure in comparison with that of fertility and mortality, i.e., natural change in a population. With improved standards of living conditions, people will live longer denoting by expectation of life at birth(e_0^0). With a rigid and vigorous population policies and programmes, the doubling period of population is longer for China compared to that of India indicating below replacement level of fertility, negative natural growth of population and an increasing ageing index in near future.

Human development index (HDI) is a device to measure a country's/region's achievements in the enhancement of human capabilities. This index helps in ascertaining the impact of planning on the quality of life of the people of a country/region. Over the past three decades, the HDI in all the countries has gone up. The HDI worked out for 174 countries with ranking¹⁴ (Table-10). Similarly, Gross Domestic Product(GDP) is a significant indicator of human resource development, showing the percapita income of a country. The percapita GDP of Japan is \$40,846 second highest in the World, and China is in between India and Japan. In the same way, the rank in the HDI is highest for Japan (8) compared to China(106) and India (139). The country like Japan is in disadvantaged state of changing age structure (demographic transition) with high HDI and GDP. This is right time to China and India to redefine and modify their population policies and programmes. Human security is interdependent and is easier to ensure through early prevention than later interventions since 'Prevention is better than cure'. Human security is a universal concern.

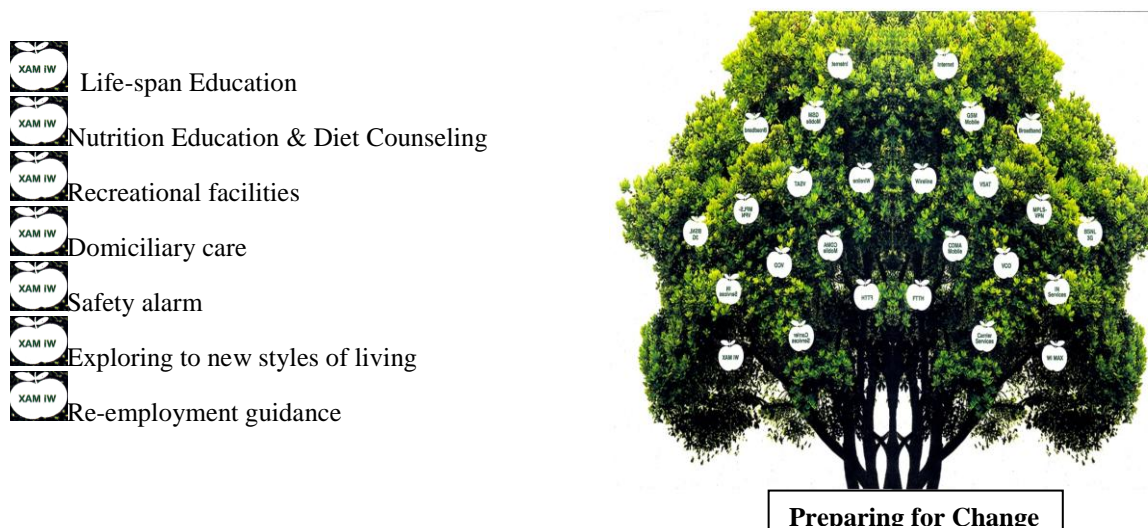
The challenges for the future is to ensure that people every where will be enabled to age with security, dignity and continue to participate in their societies as citizens with all rights. At the same time, the rights of older persons should not be incompatible with those other young groups of population. The reciprocal relationships between the generations must be nurtured and encouraged.²²

With increasing urbanization and industrialization extended families which are in-built system of social security to individuals are decreasing, giving rise to nuclear families. As a result, it is necessary for countries to introduce modern social security programmes to parents where children are considered as source of old-age security for parents.²³

Once the ageing process is in full scoring, it would be almost impossible to change a Course in a short-term. Hence, it is now really a high-time for planners in Government or Private sector to give careful and long-term thoughts to future prospects of the population and its transformation of age-structure which will definitely arrive at the end of demographic transition.

Most elderly persons are survivors of generations which had large families, perhaps been an over reliance on the extended family to care for them. With changing family system, and family size norms, government and voluntary social and welfare services will have to grow if Countries are seriously concerned to maintain a given quality of life and alleviate suffering. This will inevitably entail increased government expenditure.

Figure-4: Family Tree



A generation has to be prepared for receiving the changes & challenges between generations with a maximum possible harmony, in which I tried to say in the form of a **Family Tree** through Life-span Education,

Nutrition Education & Diet counseling, Recreational facilities , Domiciliary care , Safety alarm, Exploring to new styles of living , Re-employment guidance, etc.

VI. CONCLUSION

Instead of *one or none*, it is advisable to desire *one or two* breadwinners for socio-psychological and economic reasons. It is not out of place to recall that all the theories of population including Malthusian if properly understand, population is considered as the strength of the Nation at household and also at National level. Certain changes are desirable- in terms of increased human development Index, if it carries natural and indigenous security system of life like, family and optimum changes of any for that matter. Certain changes are not desirable which would effect on sustainability of mankind.

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