Indian Journal of Spatial Science Vol - 6.0 No. 1 Summer Issue 2015 pp. 1 - 73

Indian Journal of Spatial Science

EISSN: 2249 - 4316 homepage: www.indiansss.org ISSN: 2249 - 3921

Analysis of AgeSex Composition of Population of West Bengal, 1961 - 2011

Indrita Saha[1]

Dr. Ashis Sarkar [2]

[1]Assistant Professor, Department of Geography, Darjeeling Govt. College, West Bengal, India

[2]Professor, P. G. Department of Geography, Chandernagore College, West Bengal, India

Article Info

Article History
Received on:
06 August 2014
Accepted in *Revised Form* on:
21 December 2014
Available *Online* on and from:
23 March 2015

Key Words
Age - Sex Structure
Population Pyramid
Dependency Ratio
CBR
Family Planning

Abstract

Population pyramid is an effective way to graphically depict the nature of age and sex composition of population. Fundamentally, the shape of such pyramids is instrumental in portraying the demographic character of the region. It throws an insight into the stage of socio-economic development of a nation. Another interesting thing a population pyramid can show is the nature of gender imbalances in specified age groups. The current research seeks to explore the above in details for the state of West Bengal as well as for India during the Post-Independence period. It investigates the changing pattern of the shape of the population pyramids over the census years and then attempts to associate it with the developmental scenario of the periods.

Introduction

India, with over 1.21 billion population (2011 census), contains more than one-sixth of the world's population is projected to be the world's most populous country by 2025. India's growth rate for 1990 - 2011 is 40.2% whereas for the world it is 30.0% and China numbers at a low 17.1%. Though West Bengal ranks fourth (7.55%) among the Indian states in terms of population, it is equivalent to Vietnam and has a growth rate of 31.7% for 1990 - 2011, that is a slightly more than the world average. Thus, it is necessary to analyze the demographic characteristics of the two entities to explore this discrepancy between the statistics of a nation and a state within the nation.

It may be of concern to compare a nation (India) and one of its state (West Bengal), however, the level of decentralization in governance in India enables both national and state policies exist. National policies are adopted centrally but implemented by the states with some share of funding from the national government. States can adopt additional policies which are then primarily funded by the state government.

Population and Family Planning Policies

The issue of population growth took root in India long before the inception of the Five Year Development Plans. In 1916, The Population Problem of India was published based on census data and highlighted the consequences of population growth. Then following the 1940 Bengal famine, the Bengal Famine Inquiry Committee was established to explore the famine and the potential link with rapid population growth. The First Five Year Plan (1951-1956) included the first national Family Planning (FP) program in the world, focusing on limiting family size and controlling population. Program implementation was limited mostly to urban areas. The Second Five Year Plan (1956-1961) retained the clinical approach and expanded the number of FP clinics, established FP boards, and created facilities for voluntary sterilizations. Under the Third Five Year Plan (1961-1966), 92% of allocation was spent, the Department of Family Planning was created within the Ministry of Health, and FP services were integrated with MCH services. Monetary incentives were directed at the poorer segments of society. The goal of the population

component of the Fourth Five Year Plan (1969-1974) was to increase sterilizations and IUDs while also promoting oral pills and injections. The Fifth Five Year Plan (1974-1979) included the National Population Policy (NPP) of 1976 which promoted measures to encourage FP practices as well as action beyond FP measures to solve the population problem. The legal age of marriage was established at 21 for men and 18 for women.

The Ministry of Health started an integrated health package (FP, health, nutrition) directed at women and children. Following political and economic unrest, Prime Minister Gandhi declared a state of emergency in 1975 and embarked on a serious population control agenda that included state-level targets for sterilizations and other forms of family planning. Partly as a result of backlash to the coercive family planning program, the ruling party lost the elections following the Emergency.The Sixth and Seventh Five Year Plans (1980-1985, 1985-1990) maintained the priority on FP but emphasized the voluntary nature of the program and the focus shifted to the vulnerable sub-population of poor women. The government acknowledged the failure of the narrow FP program and stated that increases in CPR would be based on improvements in IMR, female literacy, and job opportunities for women.

The NPP of 1986 promoted the two-child family with a focus on child mortality, health services, enforcement of the legal age of marriage, education on health and population, and women's educational and employment opportunities. The Eighth Five Year Plan (1992-1997) had an overall focus on modernizing the industrial sector, increasing employment, poverty reduction, reliance on domestic resources, and slowing population growth. The Ninth Five Year Plan(1997-2002) also stated population growth as a problem but lacked any level of detail to address the population problem.

While information is available on India's national population policies, relatively little is available on policies in West Bengal or to what extent population was on the state agenda or how the national policies were adapted, adopted, and implemented at the state level. At the Bucharest Conference (1974), the head of the Indian delegation stated that “Development is the best Contraceptive”, suggesting that emphasis ought to be on underlying causes of population growth such as poverty rather than family planning programs.

Changing Pattern of Age-Sex Pyramid

For the analysis, Age-Sex pyramid has been used as a powerful tool to identify the trends and to predict the future. Age-sex structure is the diagrammatic representation of population of a region, systematically arranged in age groups/cohorts along the vertical axis and sex wise along the horizontal axis. The analysis is critical to any spatial unit because inherently it bears the signature of its history and is instrumental in defining and predicting the social-cultural-economic geography of the region.

a) India

Fig. 1 demonstrates the decadal change of age sex pyramid of India since 1961. The 1961 diagram is a typical pyramid with expanding broad base and a narrow top. The younger age group has more females than males. Over the years the broad base has shrunk from 15% on either side to around 10% for a gender. The neck of the pyramid has gained width. A considerable decrease in proportional child population and an increase of proportional working population is noticed 1981 onwards. The shortening of the width of the pyramid has started from 2001. The bulge of the pyramid is at the age cohort of 10 - 14.

b) West Bengal

There is a noticeable change in the shape of age sex pyramid of WB from 1961 - 2011 (Fig.2). The broad-based pyramid with very high proportion of child population and considerably small proportion of working population has eventually transformed into a balloon shaped pyramid with moderate child population and a huge proportion of working population. The notch noticed in 1961 pyramid is perhaps the result of partition in 1947. The shrinking of the base starts mainly from 1971 but the increase of percentage of the working population is noticeable from 1991. In 2001, the child population for both the sex came down to less than 10% of the total. The 2011 pyramid is an example of an almost developed nation that is approaching towards maturity that is a cylindrical shaped pyramid.

Statistical Analysis of Demography

a) Mean Age

For India the mean age increases at a moderate rate (Fig. 3 and 4). It is interesting to note that while the mean age for women remained below average before 1991, it soared above the male mean age after the year. Wb's mean age increased from 23 to around 29. There existed a wide gap between male and female mean age but with time this disparity has become negligible.

b) Median Age

The median age remained constant for India at 20 - 24 age cohort for both the gender and the total. The median age for WB has increased from 20 - 24 to 25 - 29 in 2011. The male showed the similar trend in their median age. The female median age has increased from 15 -19 to 25 - 29 that signifies the improving status of women.

c) Modal Age

For India the modal age changed from 0 - 4 (1961) to 10 - 14 (2011). Male modal age changed to 5 - 9 in 1971 and the same happened for the female in 1981 and they eventually rose to 10 - 14 in 2011. Entire WB started with 5 - 9 (i.e. higher than India), increased to 10 - 14 in 2001

and further rose to 15 -19 in 2011 except for the females, that remained constant at 10 - 14.

d) Standard Deviation

The SD of the age of Indian population did not vary markedly but it kept increasing and after 1991, SD of females trended higher than the normal and male. The fluctuation of trend of SD for WB was greater than that of India, though it ranged between 18 and 20 (Fig. 5 and 6). SD of both the sexes were almost stable till 1991 which showed an increasing trend later.

e) Skewness

The asymmetry of the curve is measured by skewness. For both India and WB the curves are positively skewed meaning that the bulge is at the younger age group (Fig. 7 and 8). A zero skewed curve would mean a peak at the age group of 45 - 50, at an advanced stage of development. WB has a lower skewness as compared to India, thus progressing toward development before India.

f) Kurtosis

Kurtosis measures the peakiness of the curve. A leptokurtic distribution would imply excess population in a particular age group. A mesokurtic distribution, on the other hand is desirable for age sex pyramid of any developing nation. The trend of kurtosis implies that both India and WB are moving from a leptokurtic scenario to a mesokurtic one, but the distribution of population in WB across the ages are more even than that of India.

Agewise Trend of Population

Attempts havebeen made here to explain the trend of population of WB and India with respect to various age groups. India is shown in red and blue shows WB. The dotted lines represent the females and males are represented by the continuous line.

a) The Juvenile (0 - 14)

This age group has experienced nearly a 10 point drop from 1961 to 2011 (Fig.9). This significant change reduces the broad base of the pyramid and depicts the success of family planning measures. Though in Indian scenario the difference was only around 5-8%, WB showed a remarkable reduction that is a response to population policies. In WB females constituted a huge proportion of the age group 1961 which decreased eventually to meet the males and state average in 2011.

b) The Youth (15 - 29)

Analysis of this group is important as this group constitute the bulk of the working population. The benefit of demographic dividend is to be reaped from this age group. The youth population shows a steady growth over the years for both India and WB. This group should be trained to become employable as this age group provides with the most dynamic and diverse workforce for all the sectors of economy. Inadequate job opportunities leave the unabsorbed part of the population futile which extends the period of waithood and a complex situation of unemployment, disguised unemployment and underemployment (Fig.10).

c) The Matured (30 - 44)

The matured age group too exhibits an increasing trend though WB's rate of increase is greater than that of India. Initially India had a smaller proportion of female population as compared to the male population but eventually the females outnumbered the males Fig.11). The overall gender gap of India in this age cohort is small. Wb started with a wide gender disparity in 1961 but it was almost negligible by 2011. In 1981 the percentage of population in this group dropped but it gained momentum and maintained an increasing trend.

d) The Experienced (45 - 60)

The males outnumber the females in this group throughout the length of time. WB and India show a similar trend of being stable till 2001, then it has a slight increase. This increase is more pronounced in WB than in India (Fig. 12).

e) The Retired (60 - 75)

India demonstrated a minor increase till 1991 after which it increased rapidly, mainly for the female population. Females of WB constituted a greater percentage of population for the entire period. The curve steepens upward only after 2001 which clearly indicates a slow ageing of population after 2001 (Fig. 13).

f) The Old (above 75)

This group of people needs special attention because of their susceptibility to numerous health problems. The graph shows a slow and stable increase of population in this age group. WB's old population was below 1% in the post-independence period and ha a slow rate of increase till 1991. After that it increased at an increasing rate to reach 1.5% in the last census of 2011. Throughout the plot, female population female population has remained more than males because of greater life expectancy (Fig. 14).

Demographic Transition Stages

Demographic Transition Model (DTM) elaborates a ideal situation where a nation advances from high birth rate, high death rate and low but rapidly increasing population to low birth rate, low death rate and stable population. It traces the journey of a nation from primitive agricultural stage to post-modern stage via pre industrial stage, industrial stage and take off stage.

As is evident from the transitional phase of 1981 - 2011 of India, all the three variables decreased almost at a constant rate. From 1997 onwards it started

to decrease at a decreasing rate, till it reached 2003 when it moved into the 3rd phase of DTM. The changes in CBR, CDR and NC of India shows a metastable condition and that is the reason why India took a long time to come out of the second 2nd stage. It should be noted that change of NC of India is inversely proportional to the change of CDR (Fig.15).

WB's transition phase lasted for a decade when it finally surpassed to the 3rd phase in 1991. After entering the third phase the variables initially decreased at moderate rate, that slowed down around 2003. The dynamic metastable nature of the change of CBR, CDR and NC made it possible for a speedy transition. The period of 1981 - 95 is characterized by highly fluctuating values, whereas after that it seems to stabilize. Change of NC is aligned with the change of CBR. In 2011 the CBR of WB has gone below the replacement rate, which is an achievement in itself (Fig. 16, 17, 18, 19).

Dependency Rate of India and West Bengal

The ratio of dependent population (0 - 14 and > 59) and the working population (15 - 59). It is important for planning and formulating government policies. India had a DR of around 90% in 1961 which increased slightly in 1971, decreased at a stable rate for the next three decades and then had a step fall to 65% in 2011 (Fig.20). Male and female showed similar pattern ad there were no disparity between male and female DR. WB male started with a DR less than 80% which swelled to over 85% in 1971, then decreased in 1991 drastically and since then it decreased at a stable rate to reach beyond 55%. WB females had a high DR around 95% that hiked to 105% and in 1971 and slipped at an increasing rate in 1981, after that there has been a rapid decline in WB female DR and in 2011 it is less than 60%.

Conclusion

The discussion, ut supra brings out the following facts in an unambiguous way. West Bengal has entered into the 3rd Phase of DTM (about 2 Years before India). The broad base of the age - sex pyramid has been gradually shrinking. It seems that basically, West Bengal's scenario of 'dynamic metastable equilibrium' has definitely helped to reduce the CBR and CDR at a faster pace. However, young population is declining at a faster pace and ageing of population has been significantly increasing. As a result, the dependency rate is decreasing steadily.

Thus, the metastable change of India's demography may lead to stagnation with under-utilization or no utilization of demographic dividend. Waithood in employment would certainly increase with fast increasing problem of unemployment. In view of these, the prime recommendation is to formulate strategies for increasing awareness of family planning, setting up specialized training institutes, creating opportunities for the fresh graduates in the job market, easy financing for the self employment schemes for the age group: 15 - 29, increasing health care facility for the old, creating old age homes for the common, and finally the right to social security and adequate insurance cover.

References

1. Barclay, G. W. (1958). *Techniques of Population Analysis.* New York: John Wiley and Sons.
2. Bose, A., Bose, P. B., & Jain, S. P. (1970). *Studies in Demography.* London: George Allen and Unwin Ltd.
3. Garnier, J. B. (1978). *Geography of Population.* London: Longman.
4. Government of India. (1961 - 2011). *Census of India.* New Delhi: Government of India.
5. Momsen, J. H., & Townsend, J. G. (1987). *Geography of Gender in the Third World.* Hutchison: State University of New York Press.
6. Petrov, V. (1985). *India - Spotlight on Population.* Moscow: Progress Publishers.
7. Yeates, M. (1974). *An Introduction to Quantitative Analysis in Human Geography.* New York: McGraw-Hill Book Company.

Table – 1: Demographic History of India, 1901 to 2011

Period (India)	CBR	CDR	Rate of NC
1901 - 21	High	High	Broadly Stable
1921 – 51	High	High and Decreasing	Slow Increase
1951 – 81	High	Moderate	Rapid Increase
1981 – 01	Moderate to Low	Moderate to Low	Moderate
2001 - 11	Moderate to Low	Low	Low

Table – 2: Demographic History of West Bengal, 1901 to 2011

Period (WB)	CBR	CDR	Rate of NC
1901 - 51	High	High	Broadly Stable
1951 – 71	Very High	High and Falls Rapidly	Very Rapid Increase
1971 – 91	High	Moderate	High
1991 – 11	Moderate to Low	Moderate to Low	Moderate to Low

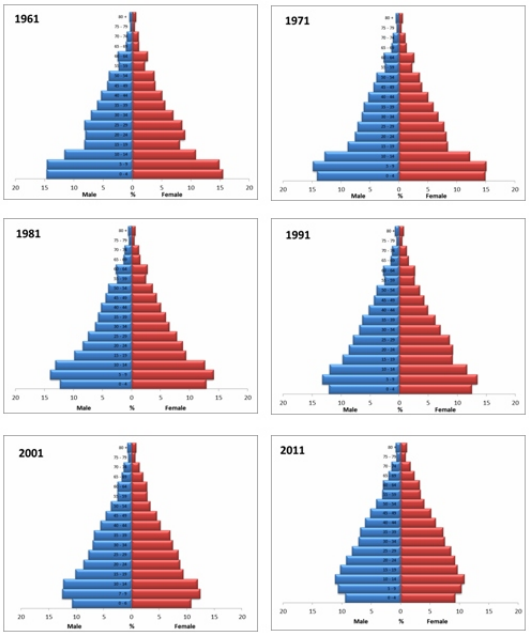

Fig. 1: Population Pyramid, India 1961 - 2011

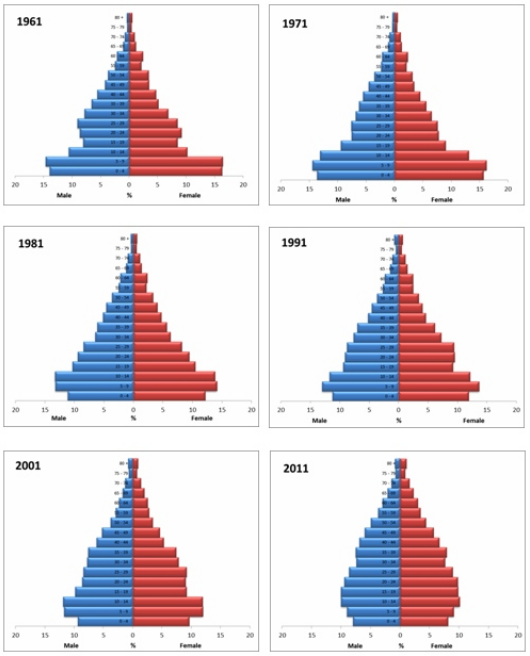

Fig. 2: Population Pyramid, West Bengal 1961 - 2011

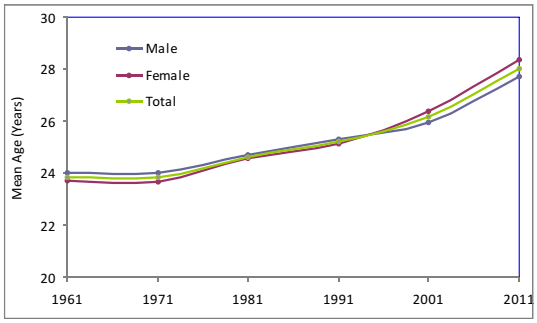

Fig. 3: Trend of Mean Age of Population, India 1961 - 2011

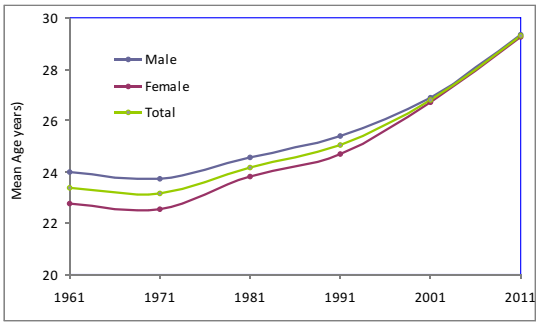

Fig. 4: Trend of Mean Age of Population, WB 1961 - 2011

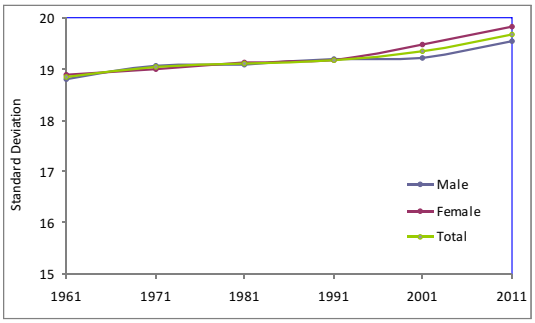

Fig. 5: Trend of SD of Age of Population, India 1961 - 2011

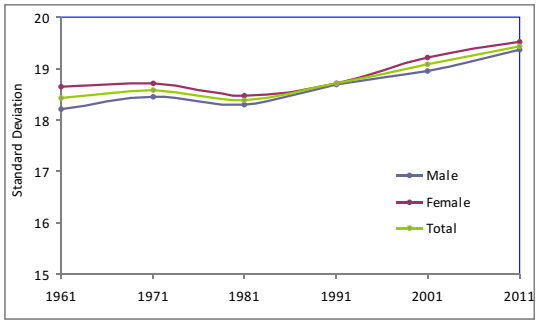

Fig. 6: Trend of SD of Age of Population, WB 1961 - 2011

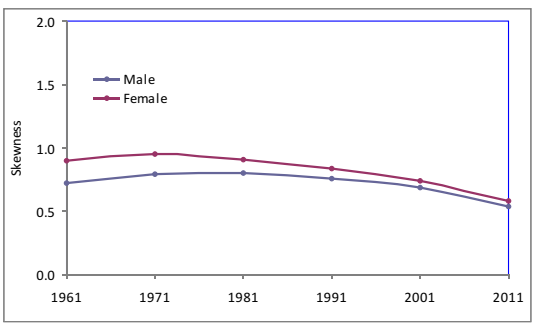

Fig. 7: Trend of Skewness of Age of Population, India 1961 - 2011

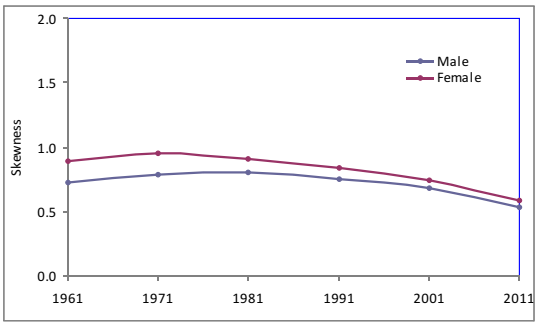

Fig. 8: Trend of Skewness of Age of Population, WB 1961 - 2011

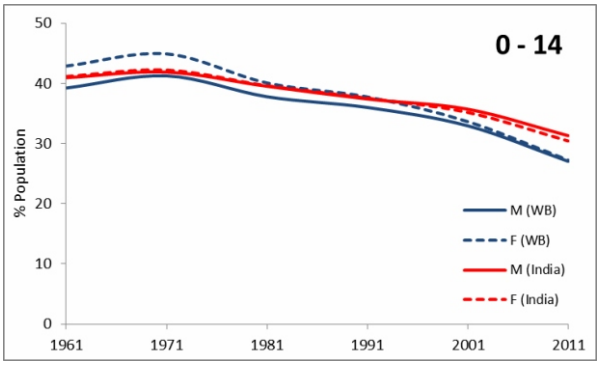

Fig. 9: Trend of Juvenile Population, 1961 - 2011

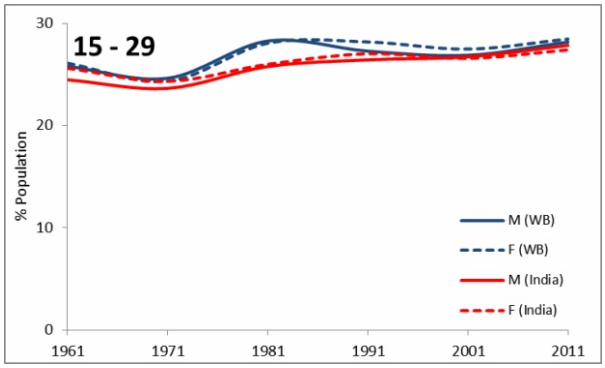

Fig. 10: Trend of Youth Population, 1961 - 2011

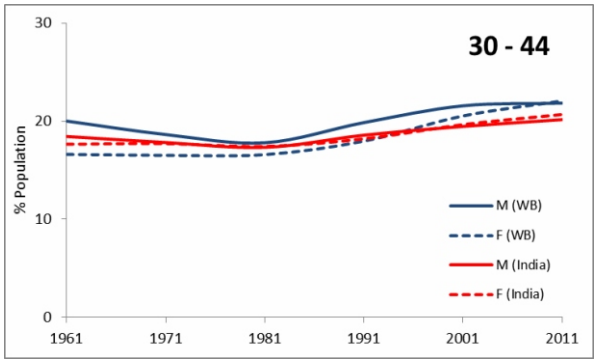

Fig. 11: Trend of Mature Population, 1961 - 2011

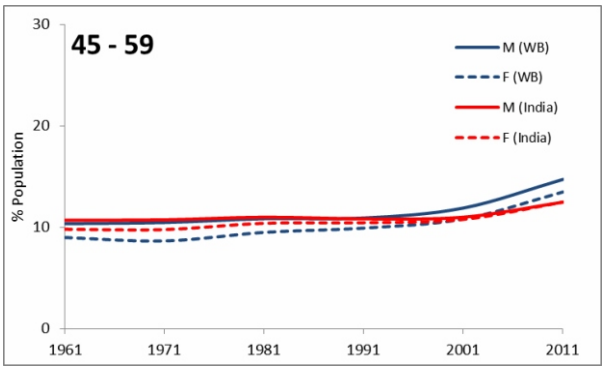

Fig. 12: Trend of Experienced Population, 1961 - 2011

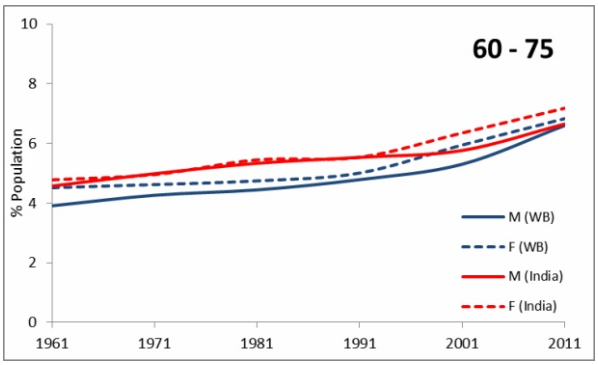

Fig. 13: Trend of Superannuated Population, 1961 - 2011

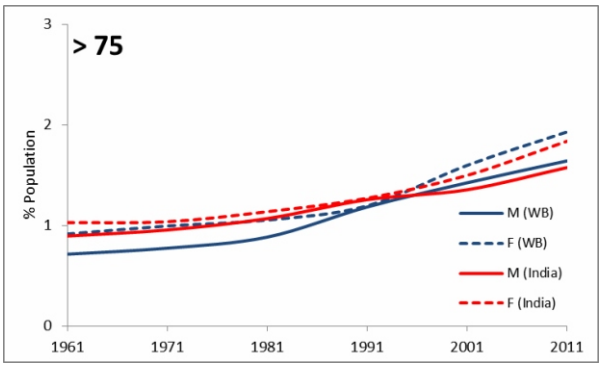

Fig. 14: Trend of Age-Old Population, 1961 - 2011

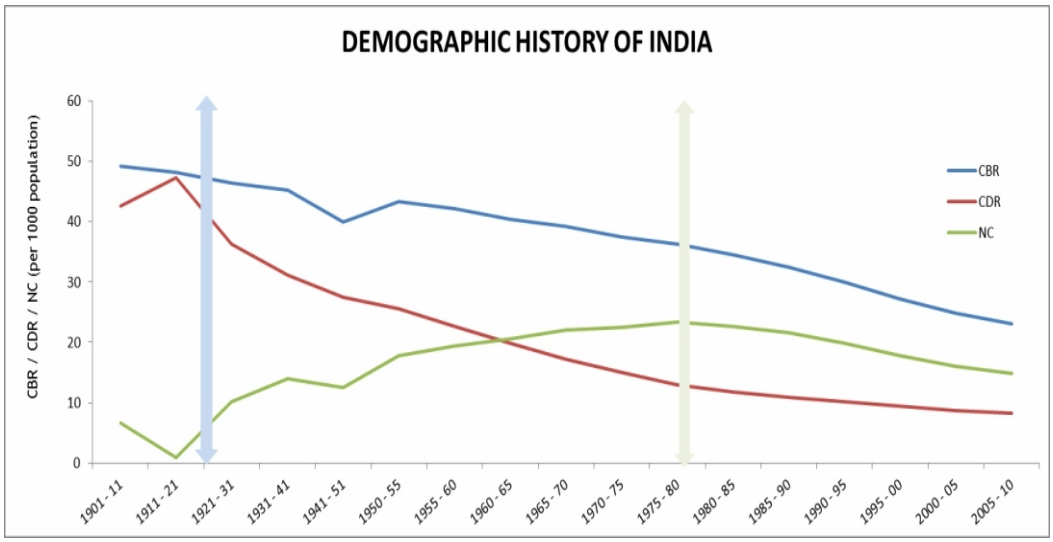

Fig. 15: History of Demographic Transition of India

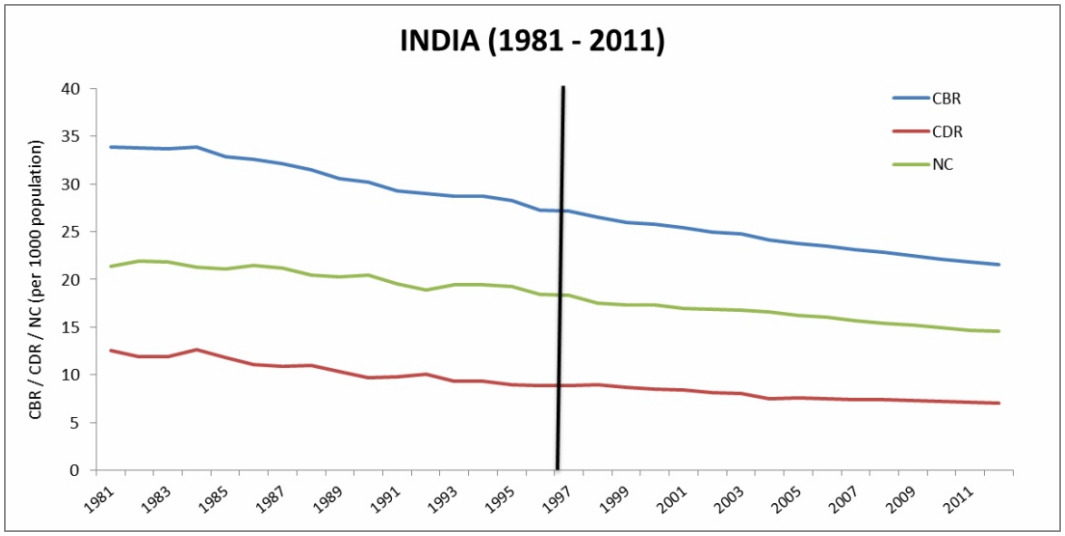

Fig. 16: Trend of Demographic Parameters of Population, India 1981 - 2011

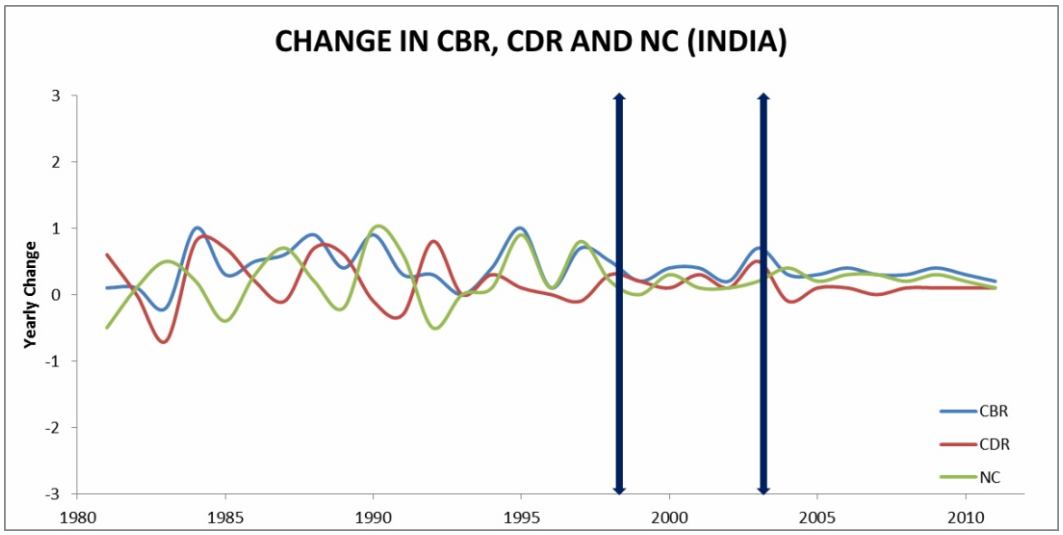

Fig. 17: Pattern of Annual Change of Demographic Parameters of Population, India 1981 - 2011

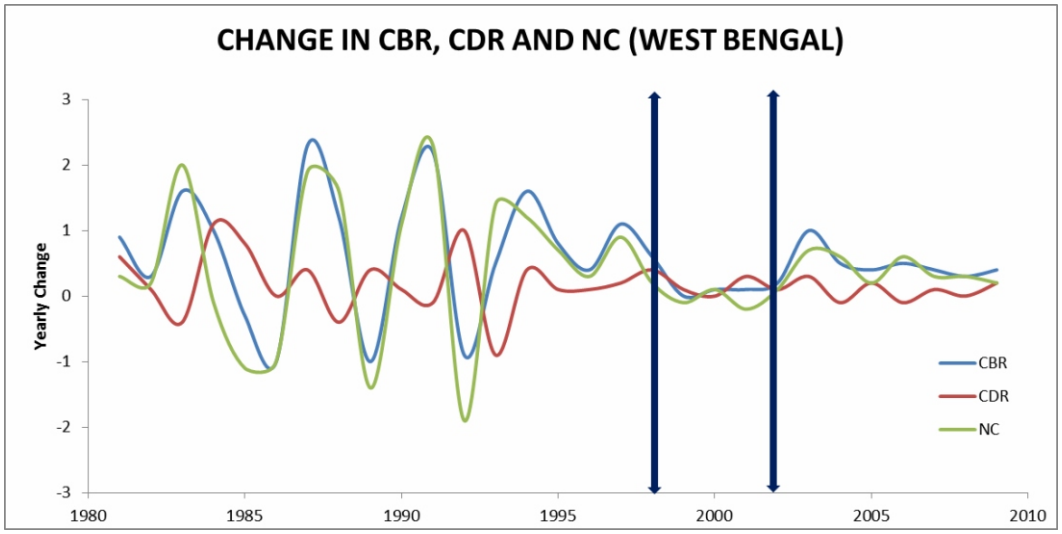

Fig. 17: Pattern of Annual Change of Demographic Parameters of Population, WB 1981 - 2011

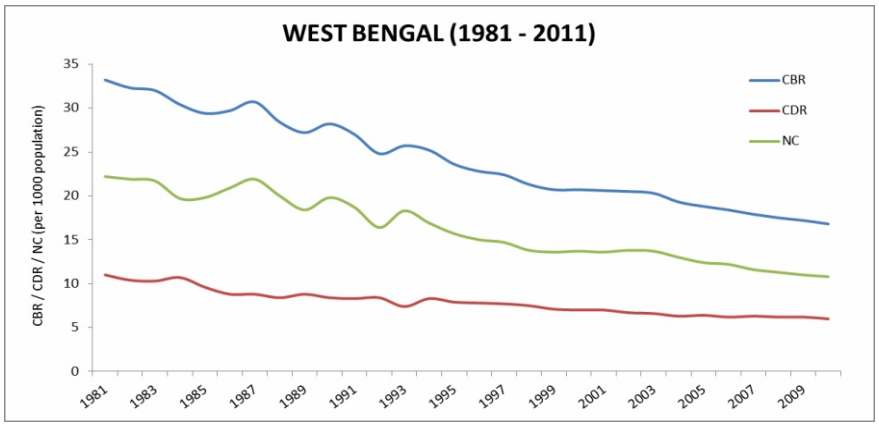

Fig. 19: Trend of Demographic Parameters of Population, West Bengal 1981 - 2011

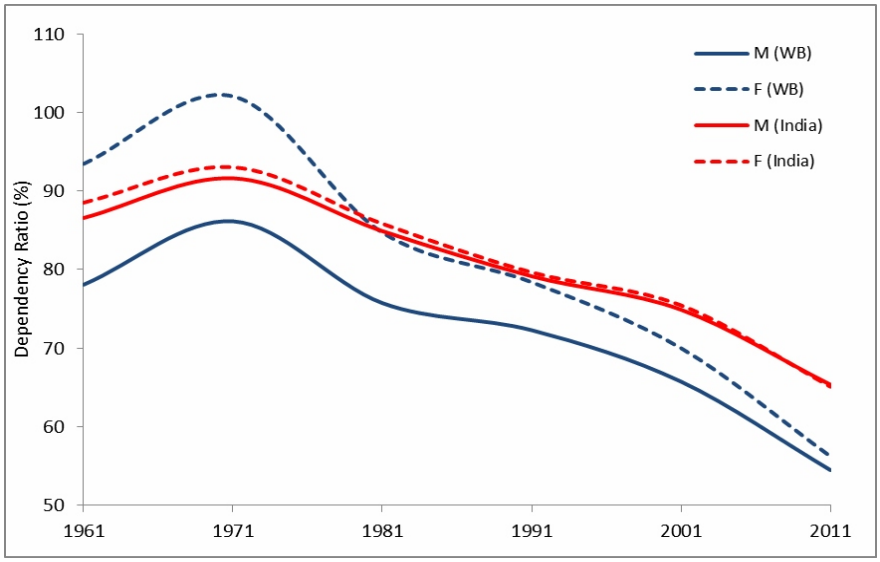

Fig. 20: Trend of Dependency Ratio of Population, 1961 - 2011

Indrita Saha
Assistant Professor, Department of Geography
Darjeeling Govt. College,
Darjeeling, West Bengal, India
Email: indrita.saha@gmail.com

Dr. Ashis Sarkar
Professor, Post Graduate Department of Geography
Chandernagore College,
Chandernagore, West Bengal, India
Email: profdrashis@gmail.com