



## POPULATION GROWTH AND FERTILITY RATE IN INDIA

Dr. Anuradha Nandal

Assistant Professor, Department of Geography, GCW Lakhan Majra, Rohtak

**ABSTRACT** The fertility rate variations are determining the physical geography as well as economics of the country since it gives an estimation of workforce available. In the projected United nation data, there seems to be a significant decline in the fertility in India in near future despite there is a steady rise in the population. The changes are attributed to several factors including better socio-economy of the rural as well as urban population along with better health infrastructure. However, steady decline below 2.2 can be problematic in near future since percentage of older population will outnumber working population burdening the government to spend on social welfare schemes. The solution to this problem can be in migration from rural to urban economic centers but can only be sustainable if adequate facilities are provided.

**KEYWORDS** : Population growth, Physical geography, Fertility, Workforce.

**INTRODUCTION**

Demography is the subfield of geography to study and analyze the populations based on the various parameters such as size, structure, distribution, and trends. The way the population is counted has evolved quite a bit and countries employ various methodologies to count and analyze their populations. This includes census surveys, vital statistics records in the form of birth and death registration system, and sampling techniques. Using these methods, the enumeration provides insights into population density (population living in per square kilometer), age distribution and their literacy and work status, migration patterns, and other vital demographic indicators (Visaria, 2004). It guides the policymakers to employ healthcare, education, housing, and employment opportunities. By finding the demographic changes, the policymakers can estimate the future challenges and adapt policies accordingly. The demography is one of the most important tools for government, enabling authorities to take informed decisions which help in implementing the interventions that improve the well-being and quality of life for their populations.

United Nations use the data from government agencies as well as use the prediction for estimating the population. This data is widely used by the agencies for several purpose and UN also funds various governments and non-governmental organization to work on several issues emerging in the reports. The United Nations (UN) estimations are based on structured, statistical process and special division UN Department of Economic and Social Affairs (UN DESA), Population Division is dedicated for this purpose. UN DESA gets the census data, civil registration, household survey, administrative records for example school enrollment, voter registration etc., whenever and wherever available. Though these data are not yearly available DESA estimates the population between surveys.  $Population_{t+1} = Population_t + Births - Deaths + Net Migration$ . For countries where data is poorly maintained or not available different statistical tools are used and explain how errors and uncertainty are measured and to make sure there are fewer inconsistencies, they compare UN estimates with World Bank or national statistics.

**Discussion and Results**

Here, one case study for India is discussed UN DESA adopts Cohort-Component Method (CCM) which is a standard demographic method to find the projected population for missing and future years. It starts with census data and adjustments are made with other available data thru surveys or other administrative way. The total population is not taken as a single number but it is divided into several groups by age, sex etc. which is followed in time and make sure that there are not discrepancies. For example, India's population was 1.21 billion during 2011 census. Thus in year, 2011 the agency estimates the number of births by applying age-specific fertility rates to the number of women aged 15-49, which in India currently produces roughly 23 million births in a year. Deaths are projected by using age-specific mortality rates derived from life expectancy and survey data, finding the total number of deaths in millions, with most occurring at older ages. Finally, net migration is added which is available thru international organizations as well as provided by the India, this number is mainly small and slightly negative, meaning a few hundred thousand more people leave the country than enter.

These components are combined using the population balancing equation: the population at the end of the year equals the population at the beginning of the year plus births, minus deaths, plus net migration. Applying this to India gives a population of about 1.4345 billion in mid-2025. The UN then "ages" the population forward by one year, moving each age cohort into the next age group and applying survival rates to account for deaths within each cohort. As a result, even though births continue, the share of children may decline because fertility is falling, while the elderly population grows due to improved survival and population aging. After this calculation, the UN performs consistency and quality checks by comparing the results with household surveys such as the National Family Health Survey, examining sex ratios and age patterns, and adjusting for known problems like under counting or age misreporting.

Since child mortality rate were higher due to lack of medical facilities, the fertility rates measurements didn't gain significant attention until the 19th century. As the child mortality decreased in European countries, consequently leading to a decline in fertility rates as well. This phenomenon caught the attention of policymakers which prompt them to understand the importance of observing the fertility trends with equal diligence as mortality. While mortality rates are closely related to the effectiveness of resources such as health, transport etc. fertility rates are found to be influenced by factors such as cultural norms, religious beliefs, and economic conditions. Understanding these factors is important for government and policymakers to formulate effective population policies. When both mortality and fertility rates remain stable which means the elder deaths are replaced by new born babies, populations tend to experience equilibrium, resulting in relatively constant population sizes. But in urban twos due to various reasons, people tend to migrate so the role of migration cannot be overlooked in demographic analysis. Migration patterns become most significant to population dynamics and need to be accounted for in comprehensive demographic studies.

The population in India has been on rise however in recent years as the proposed the fertility rate, birth rate are lower than replacement age and the elder population will take over the younger one. The UN data as given in the table shows a clear trend in total number of births as well as change in fertility from 1951 to 2024. Total Fertility Rate (TFR), is a measure of the average number of live births a woman would have over her lifetime. These two factors are clear indicator of growth of the population as well as provides an estimate of younger versus older population over a large time span which can be further extrapolated.

During 1950s, the fertility was on higher side but since the mortality was higher as well in India this did not result in equivalent population growth. From 1951 to 1955, births increased steadily from about 153 lakhs to nearly 169 lakhs per year. Not only this fertility rate also increased from while the TFR rose from 5.73 to 5.91. Since both are high this indicates that there were larger families as well as high number of infants in the families. At later times from 1955 to mid 1965, the fertility is reported to be high and from the mid-1950s to the mid-1960s, fertility remained persistently high, with the TFR remaining almost constant at value slight less than 6. However total birth kept on

rising during the decade. TFR reaches a maximum value in 1965 at a value 5.96. Importantly, this rise in births occurred even though fertility was not increasing much, because the number of women of reproductive age was expanding. This illustrates the effect of population momentum, where past high fertility continues to generate large numbers of births.

**Table 1:** Year wise birth and total fertility rate of India

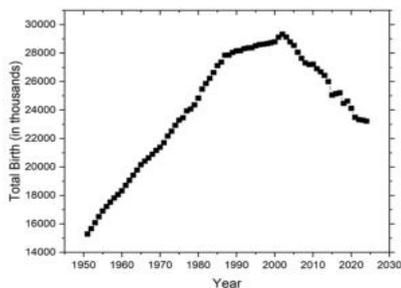
Year	Births(thousands)	Total Fertility Rate (live births per woman)
1951	15288	5.73
1956	17220	5.91
1961	18705	5.92
1966	20414	5.94
1971	21705	5.62
1976	23451	5.2
1981	25471	4.78
1986	27367	4.43
1991	28172	4.05
1996	28588	3.65
2001	29112	3.35
2006	28063	2.96
2011	26901	2.6
2016	25147	2.29
2021	23485	2.05
2022	23322	2.01
2023	23286	1.99
2024	23219	1.98

Source: <https://population.un.org/wpp/downloadsfolder=Standard%20Projections&group=Most%20used>

Interestingly after 1965, TFR starts decreasing from 5.9 steadily to lower values. It reaches to a value of 5.13 by 1977 and around 4.89 by 1979. This decline is due to several factors, for example family planning since India was emphasizing of "hum do hamare do" to control the increasing population. Also, better health facilities were being available which resulted in decreasing child mortality and eventually decline in TFR. However, despite falling fertility, the number of births continued to increase during most of this period, reaching nearly 24 million by the late 1970s. Again, this apparent paradox is explained by the growing population of women.

Along with above mentioned reasons, the cost of living was also increasing which resulted in further decrease in TFR during 1980s. The TFR dropped from 4.81 in 1980 to about 4.22 by 1989. Births, kept on increasing at steady rate and were estimated to be just over 280 lakhs by the late 1980s. This is clearly due to high TFR in 1960 where TFR was at peak and the female children born at that time were in child bearing age.

**Figure 1:** Total number of births every year from 1951 to 2024



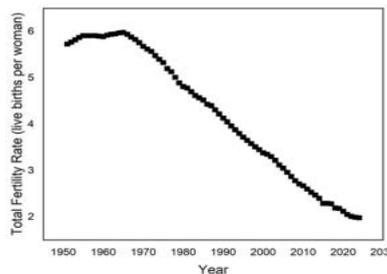
Source: Table 1.

Clearly, the rate of increase of total births increases from 1980 to 1999 in comparison to last two-three decades and were estimated to be around 280 lakhs to 290 lakhs. But it became constant from 1990 to 1999 and fertility as well fell from about 4.13 in 1990 to 3.45 by 1999, reflecting wider access to health care and government proactive stance for providing contraception etc, increase in the marriage age, and improved health care resulting in fewer child mortality. This plateau indicates that the effect of declining fertility was beginning to counterbalance population momentum.

Total births peaked around early 2000 at a value of 293 lakhs in 2002, before it started decreasing indicating a demographic transition. The TFR declined from 3.38 in 2000 to just over 3.0 by the mid-2000s and below 3 by 2006. The births started decreasing after 2003 and this is important since it represents a significant where the fertility started playing a major role in determining the population rather than population of women of reproductive age.

From the late 2000s through the 2010s, fertility continued to fall steadily, dropping from 2.96 in 2006 to about 2.29 by 2015. Births declined more clearly during this period, falling from around 28 million to about 25 million annually. This reflects widespread adoption of smaller family norms, increased female labor force participation, urban living, and improved access to reproductive health services. By this stage, many regions had reached or were approaching replacement-level fertility.

**Figure 2:** Yearly total fertility rate of India.



Source: Table 1

The period from 2016 to 2024 shows fertility falling to replacement level and then below it. The TFR declined from about 2.29 in 2016 to 1.98 by 2024, crossing below the replacement threshold of about 2.1. Correspondingly, annual births fell from around 25.1 million to about 23.2 million. This recent phase indicates entry into a low-fertility regime, where long-term population growth will increasingly slow and eventually stabilize or decline as smaller birth cohorts replace larger ones.

**CONCLUSION**

The change in fertility rate is becoming a major factor in determining the population rather than the population itself. This is possibly due to significant transformation in socio-economic conditions as well as better health infrastructure of India. Though it can be cause of concern as well since that fertility rate is reaching less than the replacement number of 2.2. If the migration does not take place then the population will remain constant for some time but the elder population will outnumber younger population causing a burden on the socio-economic affairs of country. If the fertility will decrease lower than the replacement age the city might not get the workforce. Thus, the policies should promote migration in organized way such that these cities can get required workforce.

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