

# Demography & Vital Statistics

Dr. Mandar Chandrachod  
Professor  
Community Medicine  
MIMER Medical College



Ministry of Health & Family Welfare  
Government of India



जोड़ी जिन्नोंदार्द  
जो प्लान करे परिवार

# World Population Day

11 July, 2024

“Healthy timing & spacing of pregnancies  
for wellbeing of mother and child.”



Let's talk about family planning together.

#WorldPopulationDay

# Definition - Demography

“The scientific study of human population as regards to **size, composition distribution** and **changes** of population is called as demography.”

OR

“Description and prediction of population growth and age structures.”

# Growth Rate

- Growth rate of the population is the difference between the birth rate and the death rate.

# THEORY OF DEMOGRAPHY

- Malthus theory
- Demographic transitional theory  
(Demographic cycle)

Malthus believed that population would grow indefinitely until something checked its expansion.

- Positive check

- Events that raised the mortality rate: disease, war, disaster.

- Preventive check

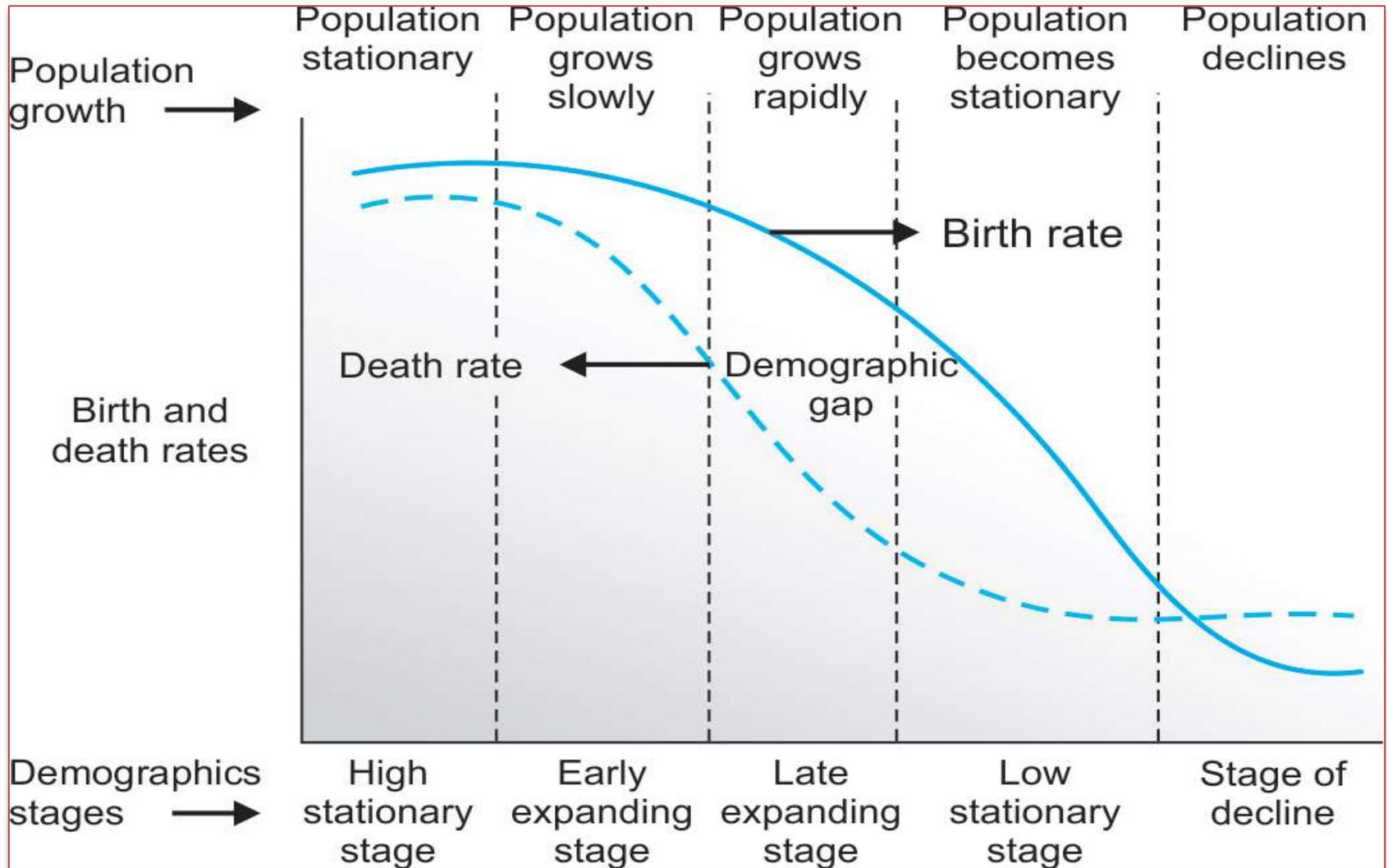
- Behavior that lowered the fertility rate: delaying marriage or not marrying at all.

# Demographic transitional theory (Demographic cycle)

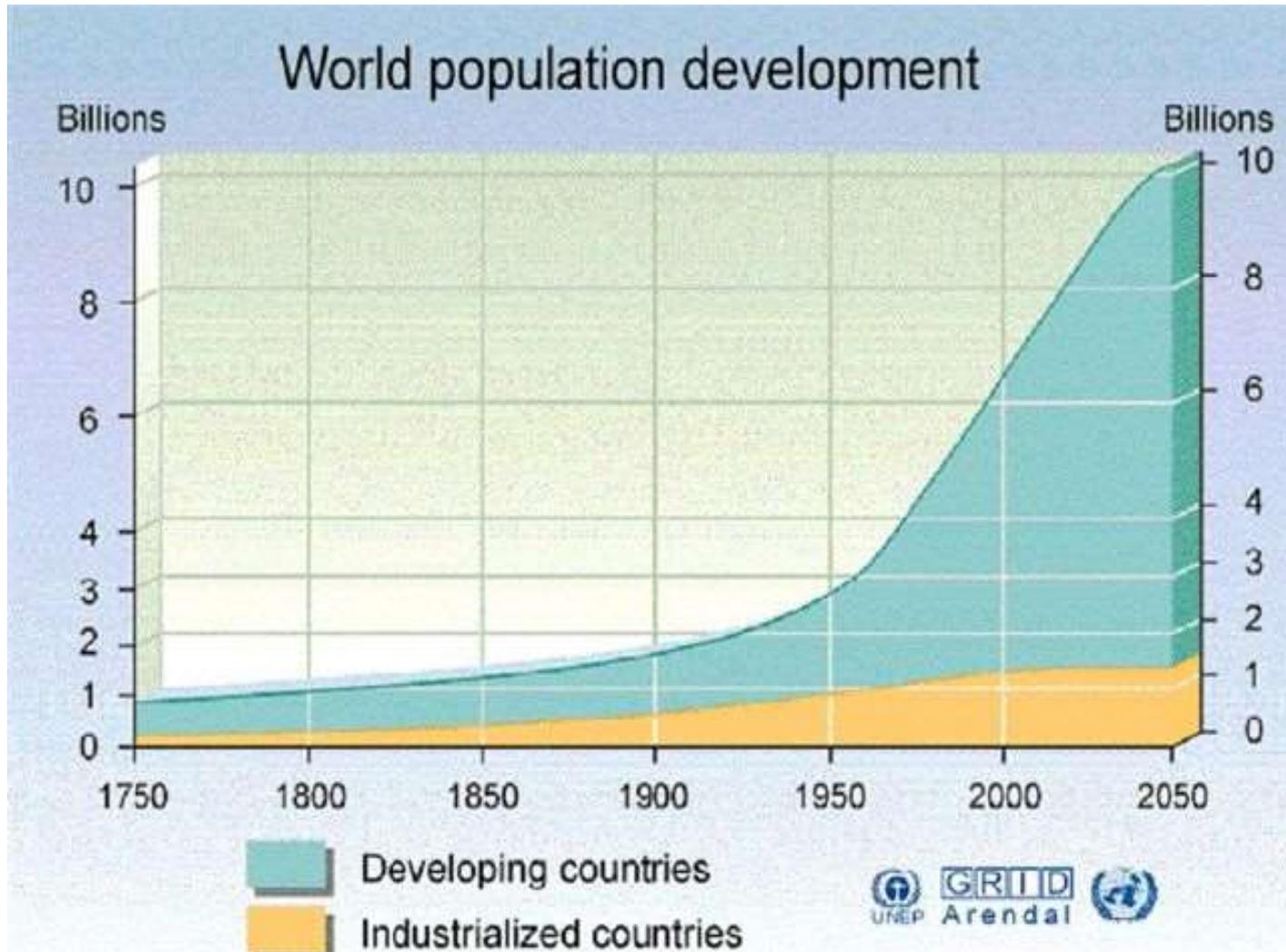
## **STAGES:**

- 1) First stage (high stationary)
- 2) Second stage (early expanding)
- 3) Third stage (late expanding)
- 4) Fourth stage (low stationary)
- 5) Fifth stage (declining)

# Stages of Demographic cycle



# DEMOGRAPHIC TRENDS OF WORLD





Years	Population (in billions)	Annual growth rate (%)	Doubling
1800	1.0	0.4	130 years — 45 years 40 years
1850	1.3	0.5	
1900	1.6	0.6	
1930	2.0	0.8	
1950	2.5	1.1	
1960	3.0	1.8	
1975	4.1	1.9	
1987	5.0	1.6	
2000	6.1	1.4	

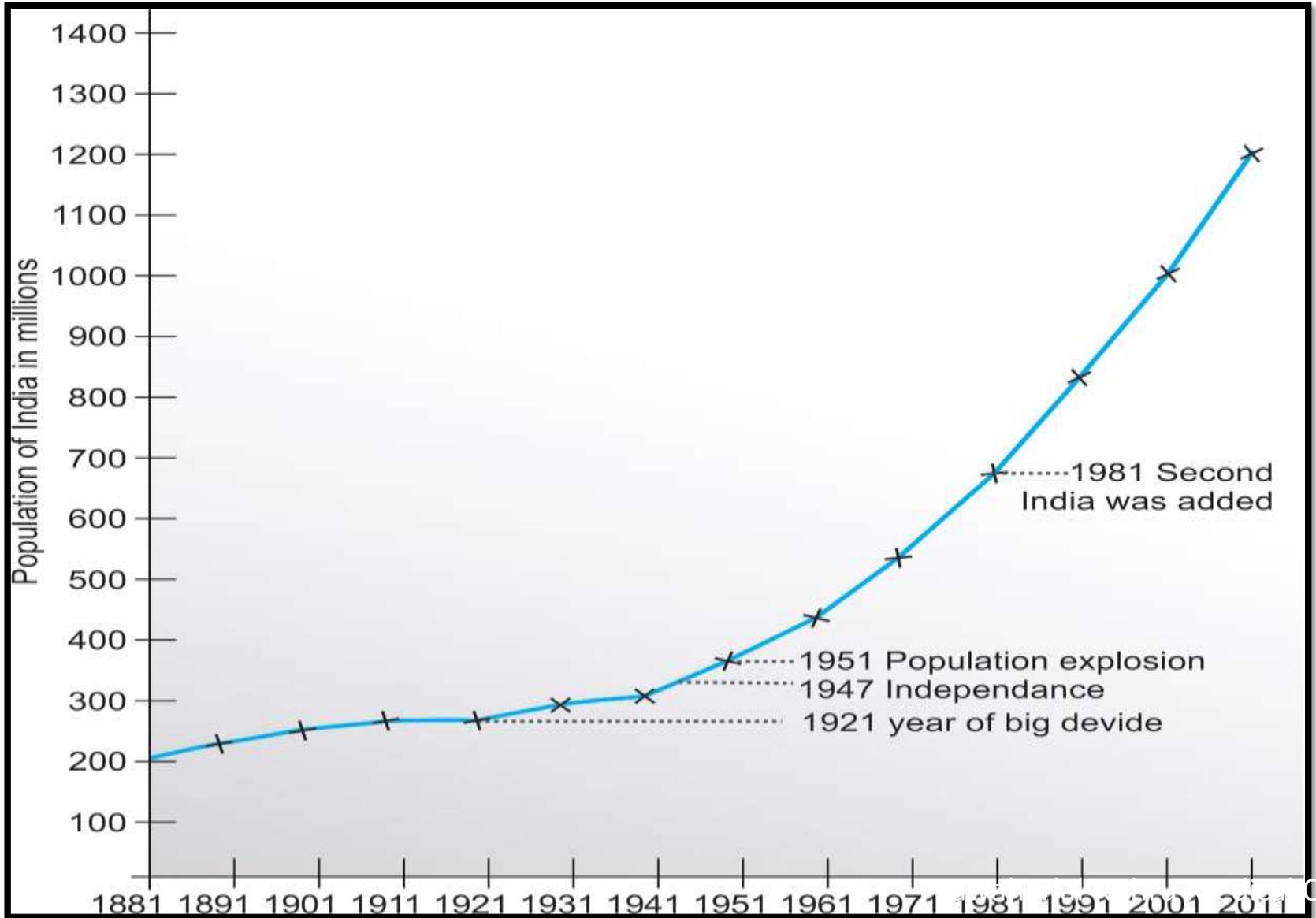
Note: 1 billion = 1000 millions.

- Thus, the population of the world is growing at the rate of about
- 200 births per minute or
- 10,000 per hour or
- 2.5 lakhs per day or
- 10 crores per year.
- This growth of the population is the **single, greatest obstacle** for the development and progress of the country.

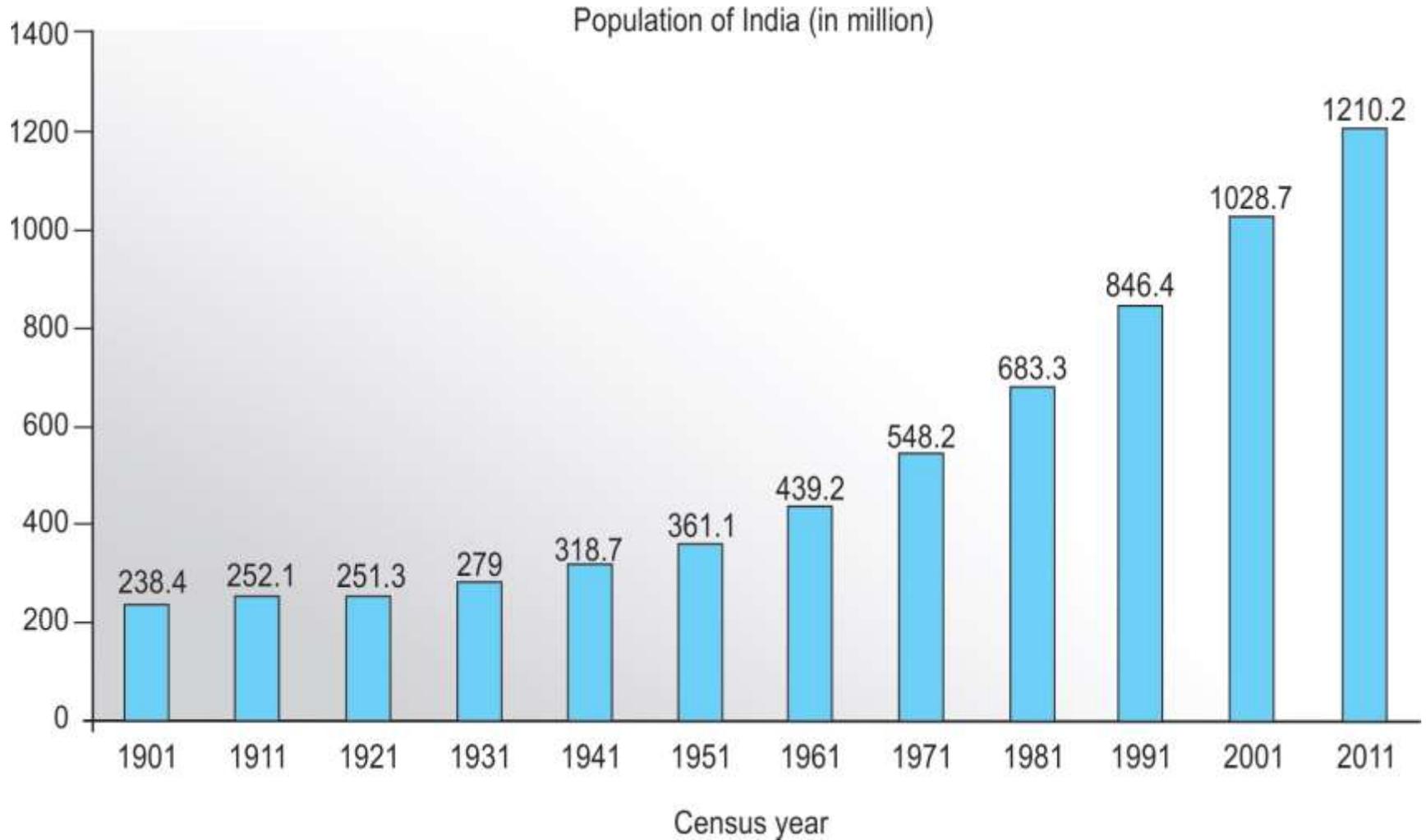


# Population Trend in India

## Population growth in India (1881–2011)

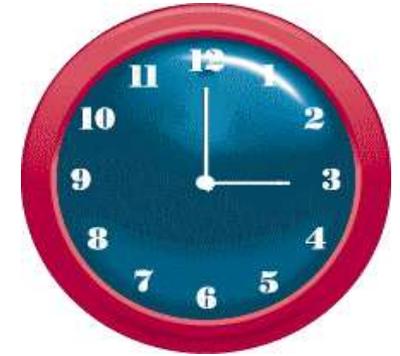


# Population Trend in India



## Population growth

Rating	Annual rate of growth %	Number of years required for the population to double in size
Stationary population	No growth	
Slow growth	Less than 0.5	More than 139
Moderate growth	0.5 to 1.0	139-70
Rapid growth	1.0 to 1.5	70-47
Very rapid growth	1.5 to 2.0	47-35
Explosive growth	2.0 to 2.5	35-28
Explosive growth	2.5 to 3.0	28-23
Explosive growth	3.0 to 3.5	23-20
Explosive growth	3.5 to 4.0	20-18

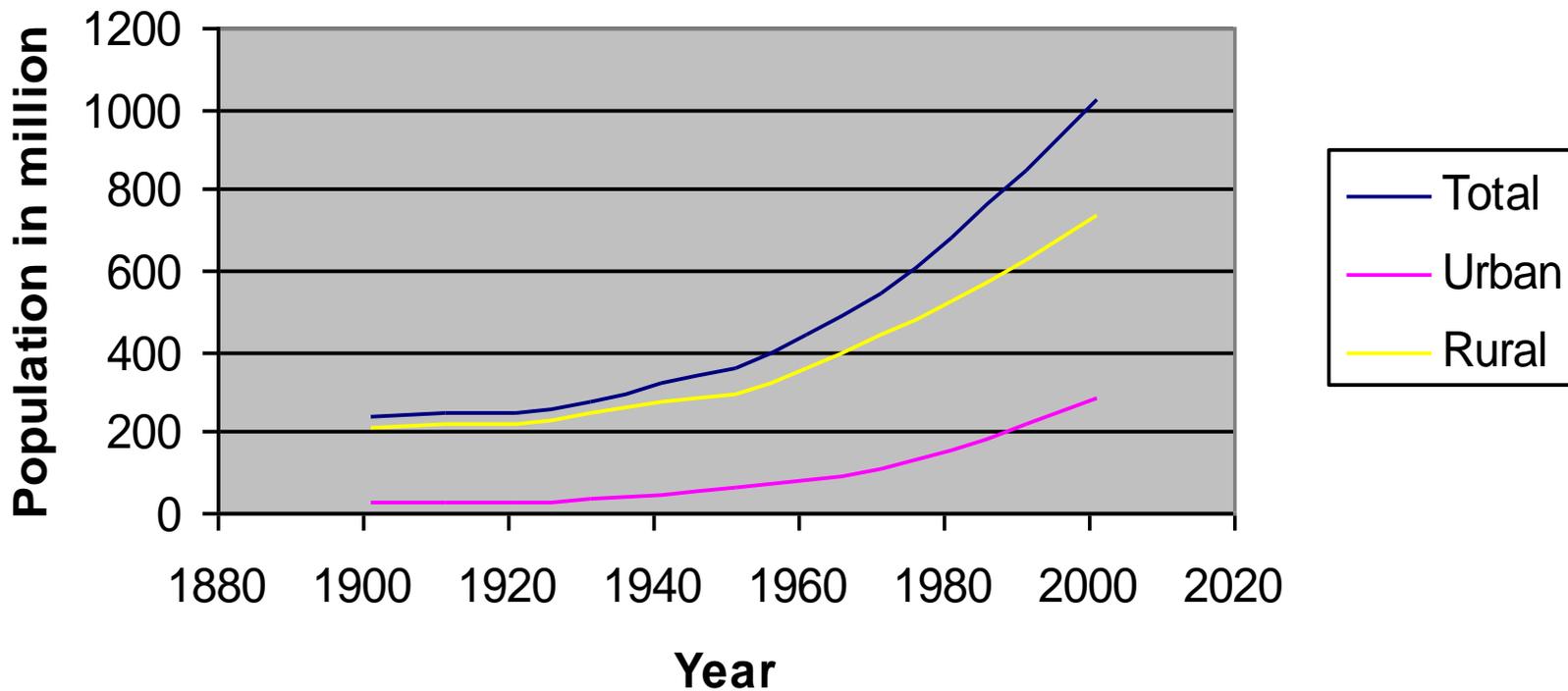


## Components of Population Change

- One birth every 1 seconds
- One death every 3 seconds
- One net migrant every 1 minutes
- Net gain of one person every 2 seconds

**India is the most populous country.** With only 2.4% of the worlds land area, India is supporting about 16.87% of worlds population.

## Indian population in 20th Century



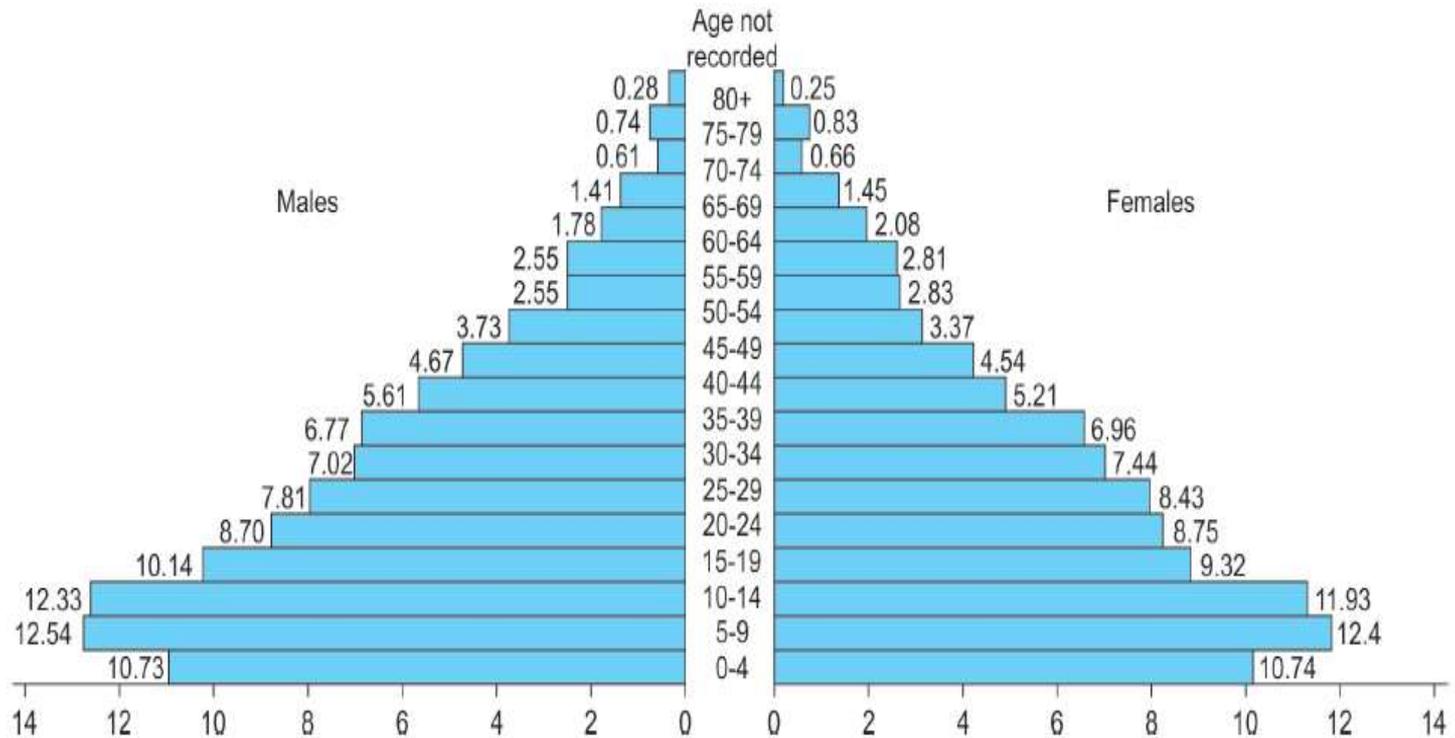


# DENSITY OF INDIAN POPULATION

YEAR	POP/ Sq km
1901	77
1911	82
1921	81
1931	90
1941	103
1951	117
1961	142
1971	177
1981	216
1991	267
2001	327

# Population pyramid (Age and Sex Composition)

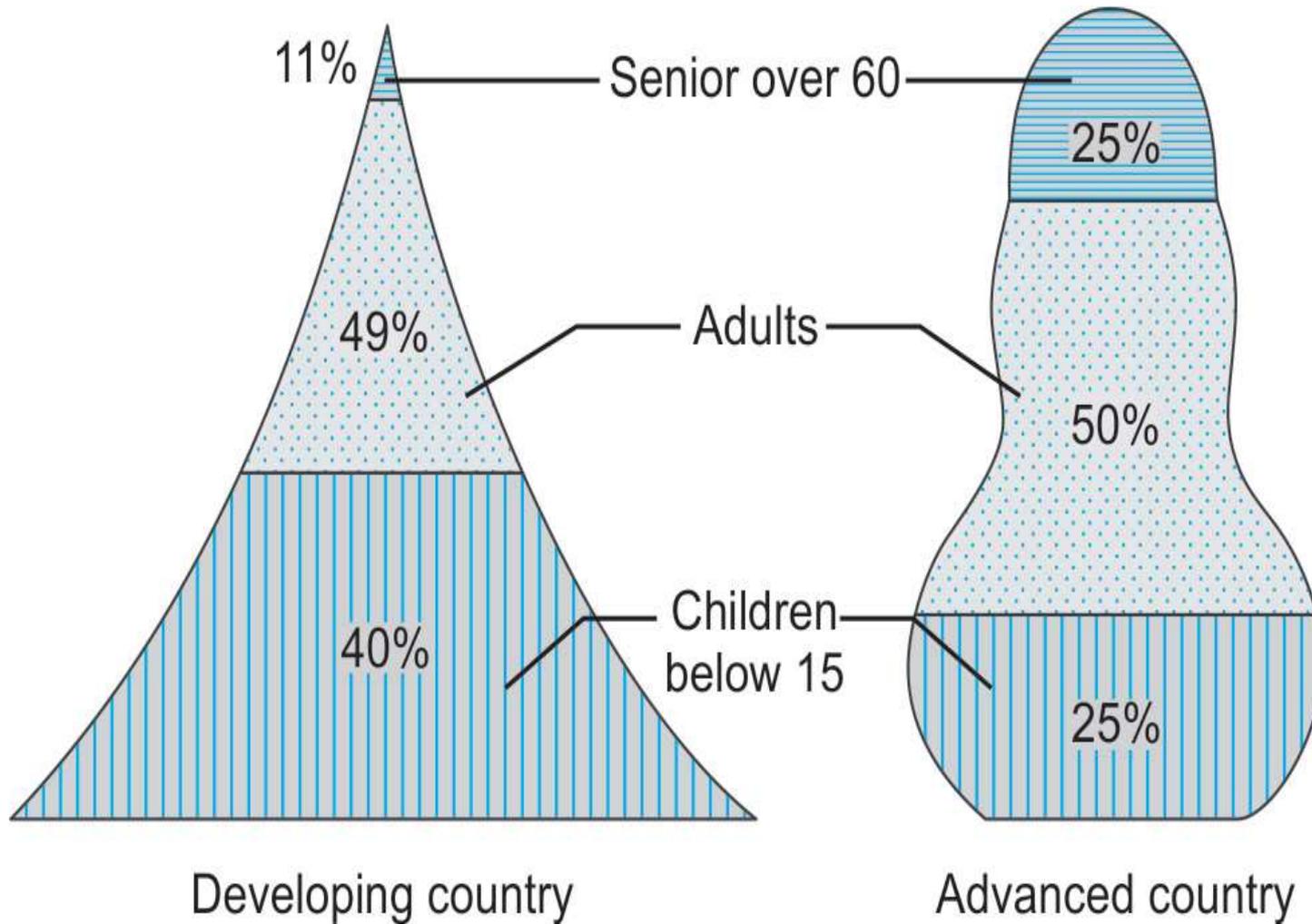
**Fig. 23.4** Projected population of India (in millions)  
 Source: GOI. MOHFW. Family Welfare Statistics in India 2011.



**Fig. 23.5** Age and sex pyramid of India 2001 (Population pyramid)  
 Source: Sunderlal, Adarsh, Pankaj. Textbook of Community Medicine 1st edn, 2007.



# Population Pyramid



# Population pyramid

Developing country	Developed country
Broad base (indicating high birth rate)	Narrow base (low birth rate)
Concave border (concavity facing outwards)	Convex border (facing outwards)
Acute apex (indicating less number of elderly people)	Obtuse apex (more of elderly people)

# Vital Statistics

## Definition:

It is the quantitative information on vital events occurring in life i.e. births, migration, marriages and deaths in a given population.

## Sources of Vital Statistics:

1. Population Census
2. Records of vital statistics
3. Records of health departments
4. Records of health Institutions
5. Records of special surveys

# Uses of Vital Statistics:

1. To calculate indices that measure levels of health and morbidity in a population.
2. To compare natality, mortality or morbidity of different places, times, communities and professions.
3. To monitor the progress made in the health and family welfare programmes.
4. To fix up “priorities” in adoption of future health measurements bases on feed-back on the same nature of problem.

# CENSUS in INDIA

- Important Source of health information
- First regular census in India 1881 and then 10 yearly
- **Definition:-** ‘Total process of collection, compilation & publication of demographic, social & economic data pertaining at a specified time or times, to all persons of the country or delimited territory’
- Massive activity
- Drawback- time consuming analysis
- Census act 1948
- Supreme officer – census commissioner

## ***'De facto' and 'De Jure' system***

- If enumeration is done based on the place, where the individual is found, it is called *'De facto' system* .
- *If done* based on the place of the permanent residence, it is called *'De Jure' system of census estimation*.

# CENSUS in INDIA

## Census- 2011

- It is 15<sup>th</sup> census & 7<sup>th</sup> after independence
- **Expenditure** – 5956 crore (Census and NPR - National Population Register)
- People involved - 25,42,934
- Use of paper -11631 metric tons
- **Phase I** – April to September 2010 [House listing & housing census & collection of data on NPR]
- **Phase II** – February 9-28, 2011, [Population enumeration]

# National Family Health Survey

- The National Family Health Survey (NFHS) is a large-scale, multi-round survey conducted in a representative sample of households throughout India.
- MOHFW, GOI, designated IIPS as the nodal agency, responsible for providing coordination and technical guidance for the NFHS. NFHS was funded by the USAID with UNICEF.

# Sample Registration System

- Registration of births and deaths is an important source for demographic data for socio-economic development and population control in developing countries.
- This has been developed in India since 1964 to provide estimates of fertility and mortality at both state and national levels is described.
- The system **includes both continuous enumeration of vital events and a semiannual evaluation** survey of the data collected.

## **Expected LAQ, SAQ**

- Define the term Demography. Write in brief about demographic cycle.
- Enumerate the sources of vital statistics and describe the census in detail.

# **Demographic Indices**

# Indian Stats (census.gov.in)

1) Population:-                      2) Birth Rate:-                      3) Death Rate:-

4) Dependency Ratio:-

Total :- , Child:- , Old age :-

5) Population Density:-                      6) Urban population:- ( %)

7) Literacy rate:-

Male:- %, Female:- %, Total:- %

8) Life Expectancy:-

Male:- yrs, Female:- yrs

9) Total Fertility Rate:-

# Crude Birth Rate (CBR)

**CBR:** “number of live births in an area during 1 year per 1,000 mid-year population.”

$$\text{Birth Rate} = \frac{\text{Number of live births during the year}}{\text{Estimated mid-year population}} \times 1000$$

**CBR = 20**

Example:

- State, Yr - live births: 250,000; population: 30,000,000
- CBR =  $250,000/30,000,000 \times 1000$   
= 8.3 live births per 1000 population per year

# Crude Death Rate (CDR)

**CDR:** It gives the number of deaths in a defined community in a year per 1,000 population in the middle of year (i.e., on July 1).

$$\text{CDR} = \frac{\text{Total deaths in a defined community or defined area in a year}}{\text{Mid-year population (July 1) of that community or defined area}} \times 1,000$$

**CDR = 6.2**

Example: State, Yr - population: 5000; deaths: 25

$$\text{Crude Death Rate} = 25/5000 \times 1000$$

$$= 5 \text{ deaths per 1000 per year}$$

# Growth rate

- **Population Growth Rate:** This is also known as the natural rate of population increase. It is calculated as the difference between CBR and CDR.
- For example, if the CBR in a country is 21 per 1000 while the CDR is 9, the population growth rate would be 12 per 1000 or 1.2%.
- **GR = 1.02%**

# Sex ratio

- It is defined as number of females per 1,000 males
- In India, the sex ratio, as per 2011 Census, was found to be 940 females per 1,000 males

# Dependency ratio

- Calculated by dividing  
(population <15 years age + population aged  $\geq 65$  years)  
by  
(population in the age group of 15–64 years)  
expressed as %
- The dependency ratio for India = 52.2% in 2015.
- “Child dependency ratio” (population 0–14 years divided by population 15–64 years) is 43.6%
- “Old age dependency ratio” (population aged 65 years and above divided by population 15–64 years) is 8.6%.
- **Demographic Bonus or Burden**

# Density of population

- Calculated as number of persons living in 1 sq. km. of land area in a country
- **Population density (persons/sq. km) = 464 per sq. km**

# Population Density

- The important indicator of the population concentration is ‘Density of the population’, i.e. number of persons living per square kilometer area.
- It was 77/sq. km in 1901 and 382/sq. km during 2011.
- Most important factor which determines the density of the population is ‘Growth rate’ and to some extent migration.

# Urbanization

- The proportion of the urban population in India is increasing due to natural growth and migration.
- **Urban locality:** Towns having 5,000 or more inhabitants, a density of not less than 390/sq. km, pronounced urban characteristics and at least 3/4<sup>th</sup> of the adult population employed in pursuits other than agriculture.

# Family size

Family size means the total number of children a woman has borne at a point in time.

## **The family size depends upon:**

- duration of marriage,
- education of the couple,
- the number of live births and living children,
- preference of male children
- desired family size.

# Literacy status

- A person is deemed as literate if he/she is above seven years age and can read and write with understanding in any language.
- Crude literacy rate
- Effective literacy rate
- **Adult literacy (total/males/females) = 78%/85%/70%**

# Life expectancy

- Defined as the average number of years in a population (or a nation) that an individual is expected to live from birth onwards, if the current mortality rates continue.
- Life expectancy at birth, or at 1 year age, or at any other age is calculated through “life tables.”
- **Expectation of life at birth in years = (Total / Males / Females): 70/69/71 yrs**

# Declining Sex Ratio & Population Dynamics of India

# Sex ratio

- It is defined as number of females per 1,000 males
- In India, the sex ratio, as per 2011 Census, was found to be 940 females per 1,000 males

# Child Sex Ratio

- It is defined as “number of female children in the age group of 0–6 years, per 1000 male children of the same age group.”
- It gives a more clear picture of the recent practices in the society regarding selective elimination of female children.
- As per the Census, 2011, the child sex ratio (0–6 years) is 919.

# Sex Ratio at Birth

- It is defined as number of female children born per 1000 male children, in a calendar year
- By natural laws, it should be 1000 (1:1) A low sex ratio at birth gives a very reliable measure of the current practices of gender discrimination.
- As per NFHS-5 data, low sex ratio at birth was seen in for Chandigarh (838), Tamil Nadu (878), Rajasthan (891), Haryana (893), Odisha (894), and Jharkhand (899)

# Causes of Low Sex Ratio

- Preference for male children, Illiteracy, Poverty, Culture and traditional beliefs
- Beliefs of community:
  - Only the son who can perform the last rites
  - Lineage and inheritance runs through the male line
  - Sons will look after parents in old age
  - Men are the breadwinners
- Exorbitant dowry demand

# Causes of Low Sex Ratio

- Other socio-economic reasons for low sex ratio are:
  - Male children are “working hands”
  - Male children carry on the genetic tree whereas girls are “other family’s property”
  - Female children need more protection, being susceptible to sexual and physical violence and such acts may bring shame to the family of the girl
  - Widely available diagnostics to detect the sex of foetus and termination in case of a female foetus

# Implications of Low Sex Ratio

- Socio-Ecological “Imbalance” if females are very less, since nature requires one female for every male in the long run
- Low social status of females and Low “decision-making power” in family affairs
- Low literacy rate among women
- Violence against women, both in the homes and in the society

# Preventive Measures

- Education of the society using mass media and various social and religious platforms
- Role modeling, with depiction of the facts that girls and women can contribute much more than men, in every walk of life
- Social welfare schemes, for example, “Beti Bachao, Beti Padhao” program
- Improving the status of women in the society, by increasing their educational levels and creating more job opportunities for them

# Preventive Measures

- Increasing the status of women in the society. Free education and reservations in educational seats for females in various educational and professional courses
- Reservations for women in employment, both government and private
- Improved health care for women and children
- Legal actions, for example, the PC-PNDT Act. Strict implementation of Anti-Dowry Act and rules

# Population Dynamics

- It is the study of factors responsible for the changes (Size, Composition, Distribution) of the population.
- These factors are
  - **Marriages**
  - **Births**
  - **Deaths**
  - **Migration**
  - **Social mobilization**

**THANK YOU**